AN APPLICATION OF TRANSTHEORETICAL MODEL AND PARTICIPATORY LEARNING APPROACH TO PROMOTE DIABETIC SELF-CARE BEHAVIOR IN THA-TA KO DISTRICT NAKHONSAWAN PROVINCE

UMAPORN SANUSANTI

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UMAPORN SANUSANTI: AN APPLICATION OF TRANSTHEORETICAL MODEL AND PARTICIPATORY LEARNING APPROACH TO PROMOTE DIABETIC SELF-CARE BEHAVIOR IN THA-TA KO DISTRICT NAKHONSAWAN PROVINCE. THESIS ADVISORS: CHANUANTONG TANASUGARN, Dr.P.H., ROONGROTE POOMRIEW, Ph.D., MANDHANA PRADIPASEAN, Dr.P.H., BHUSITA INTARAPRASONG, Ph.D., 239 p. ISBN 974-04-0862-1

Diabetes Mellitus is a chronic non-communicable disease with an annual increased incidence rate. Compliance to a regimen is crucial for patients in preventing life-threatening complications.

This research was a quasi-experimental research focusing on evaluating the effectiveness of the health education program applying the Transtheoretical model and participatory learning by developing a model of a diabetes clinic for behavioral changes. The study group consisted of 70 diabetic patients and 70 family members who lived in Tha-Ta Ko community, Tha-Ta Ko District, Nakhonsawan Province. The experimental and comparison groups each consisted of 35 diabetic patients and 35 family members. The experimental group received the health education program through a group process, and had 3 sessions at 2 week intervals, while the comparison group received the regular services of the hospital. The program was conducted for 8 weeks followed by a follow-up period of 4 weeks. The data were collected twice, pretest and posttest, by using an interview questionnaire and blood examination. Percentage, mean, standard deviation, Mann-Whitney U test and Willcoxon Match-pairs test were used for statistical analysis.

Data revealed that after implementing the program, the diabetic patients in the experimental group had a significant increase in perceived susceptibility, perceived efficacy, self-care supported by family members, and self-care behaviors including dietary control, exercise, taking medication, keeping appointments and foot care. The Hemoglobin A_{1C} level of diabetic patients in the experimental group was lower than before but was not significantly different when compared with that of the comparison group. In the family member group, the experimental group had a significant increase in perceived susceptibility of having diabetes, perceived susceptibility of having complications, perceived efficacy to prevent diabetes, self-care behaviors to prevent diabetes mellitus, and supportive behavior given to the patients for promoting the patient's self-care. In addition, the level of Fasting Plasma Glucose of the experimental group was significantly lower at the end of the program and was significantly lower than that of the comparison group.

Regarding the findings, the health education program applying the Transtheoretical model with participatory learning could positively improve self-care behaviors of diabetic patients and family members, and glycemic control. Therefore, this program should be applied to diabetic patients in other hospitals as well as to other chronic diseases.

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อุมาภรณ์ สานุสันติ: การประยุกต์ทฤษฎีขั้นตอนการเปลี่ยนแปลงพฤติกรรมร่วมกับการเรียนรู้แบบมีส่วนร่วมเพื่อดูแลโรคเบาหวานด้วยตนเอง อำเภอท่าตะโก จังหวัดนครสวรรค์ (AN APPLICATION OF TRANSTHEORETICAL MODEL AND PARTICIPATORY LEARNING APPROACH TO PROMOTE DIABETIC SELF-CARE BEHAVIOR IN THA-TA KO DISTRICT NAKHONSAWAN PROVINCE) คณะกรรมการควบคุมวิทยานิพนธ์: ชะนวนทอง ธนสุกาญจณ์, Dr.P.H., รุ่งโรจน์ พุ่มริ้ว, Ph.D., มันทนา ประทีปะเสน, Dr.P.H., ภูษิตา อินทรประสงค์, Ph.D., 239 หน้า. ISBN 974-04-0862-1

โรคเบาหวานเป็นโรคเรื้อรังที่รักษาไม่หายขาดและมีแนวโน้มเพิ่มมากขึ้นทุกปี ผู้ป่วยที่เป็นโรคนี้จึงต้องให้ความร่วมมือในการดูแลตนเอง และได้รับการดูแลจากแพทย์อย่างต่อเนื่องและสม่ำเสมอ ทั้งนี้เพื่อป้องกันภาวะแทรกซ้อนที่อาจทำให้เป็นอันตรายถึงชีวิตได้

การวิจัยครั้งนี้เป็นการวิจัยกึ่งการทดลองมีวัตถุประสงค์เพื่อศึกษาประสิทธิผลของโปรแกรมสุขศึกษาด้วยการจัดรูปแบบบริการของคลินิคเบาหวานโดยประยุกต์ทฤษฎีขั้นตอนการเปลี่ยนแปลงพฤติกรรมร่วมกับการเรียนรู้แบบมีส่วนร่วม กลุ่มตัวอย่างที่ทำการศึกษาคือ ผู้ป่วยเบาหวาน ในเขตตำบลท่าตะโก อำเภอท่าตะโก จังหวัดนครสวรรค์ จำนวน 70 คน โดยแบ่งเป็นกลุ่มทดลอง 35 คน กลุ่มเปรียบเทียบ 35 คน และบุคคลที่อยู่ในบ้านเดียวกับผู้ป่วยเบาหวานจำนวน 70 คนเช่นกัน โดยกลุ่มทดลองได้รับโปรแกรมสุขศึกษา โดยการจัดกิจกรรมกลุ่ม 3 ครั้ง ห่างกันครั้งละ 2 สัปดาห์ กลุ่มเปรียบเทียบได้รับบริการตามปกติของโรงพยาบาล ใช้เวลาในการศึกษา 8 สัปดาห์ และติดตามผลอีก 4 สัปดาห์ ผู้วิจัยเก็บรวบรวมข้อมูล 2 ครั้งคือ ก่อนและหลังการทดลอง โดยใช้แบบสัมภาษณ์ และผลการตรวจเลือด แล้วนำมาวิเคราะห์ข้อมูลด้วยสถิติ ร้อยละ ค่าเฉลี่ย และส่วนเบี่ยงเบนมาตรฐาน และทดสอบทางสถิติด้วย Mann-whitney U test, Willcoxon Match-pairs test

ผลการวิจัยพบว่า ภายหลังการทดลองผู้ป่วยเบาหวานทดลองมีการรับรู้โอกาสเสี่ยงต่อการเกิดโรคแทรกซ้อน การรับรู้ความสามารถตนเองในการป้องกันโรคแทรกซ้อน พฤติกรรมการดูแลตนเองเพื่อป้องกันโรคแทรกซ้อนด้านการรับประทานอาหาร การออกกำลังกาย การรับประทานยา การมาตรวจตามแพทย์นัด การดูแลเท้า และการได้รับการสนับสนุนการดูแลตนเองจากญาติดีกว่าก่อนการทดลองและดีกว่ากลุ่มเปรียบเทียบอย่างมีนัยสำคัญทางสถิติ และยังพบว่าระดับน้ำตาลสะสมในเลือดกลุ่มทดลองลดลงกว่าก่อนการทดลองอย่างมีนัยสำคัญทางสถิติ และลดลงกว่ากลุ่มเปรียบเทียบแต่ไม่แตกต่างทางสถิติ สำหรับกลุ่มญาติ พบว่าภายหลังการทดลอง มีการรับรู้โอกาสเสี่ยงต่อการเกิดโรคเบาหวานและโรคแทรกซ้อน การรับรู้ความสามารถตนเองเพื่อป้องกันโรคเบาหวาน พฤติกรรมการดูแลตนเองเพื่อป้องกันโรคเบาหวาน และพฤติกรรมให้การสนับสนุนผู้ป่วยเบาหวานให้ดูแลตนเองดีกว่าก่อนการทดลอง และดีกว่ากลุ่มเปรียบเทียบอย่างมีนัยสำคัญทางสถิติ นอกจากนี้ยังพบว่าญาติในกลุ่มทดลองมีระดับน้ำตาลในเลือดก่อนอาหารเช้าลดลงกว่าก่อนการทดลอง และลดลงกว่ากลุ่มเปรียบเทียบอย่างมีนัยสำคัญทางสถิติ

จากการวิจัยครั้งนี้แสดงให้เห็นว่า โปรแกรมสุขศึกษาโดยการประยุกต์ทฤษฎีขั้นตอนการเปลี่ยนแปลงพฤติกรรม ร่วมกับการเรียนรู้แบบมีส่วนร่วมมีประสิทธิผลทำให้เกิดการปรับเปลี่ยนพฤติกรรมการดูแลตนเองของผู้ป่วยเบาหวานและญาติ รวมทั้งสามารถควบคุมระดับน้ำตาลในเลือดได้ดี ซึ่งสามารถนำไปประยุกต์ใช้ในผู้ป่วยเบาหวานโรงพยาบาลอื่นๆ และผู้ป่วยโรคเรื้อรังอื่นๆต่อไป

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CHAPTER I

INTRODUCTION

1.1 Rationale and Background

The advanced development of sciences and technology affects life-style and health behaviors of people. Particularly in developing countries like China, Indonesia, Thailand, and other Asian countries, economic growth has resulted in changing eating behaviors. Eating habits have changed from traditional food to be more western dishes which contain mostly meat and fat. Consequently, higher fat intake causes increasing numbers of patients with cardiovascular diseases and diabetes mellitus.

Diabetes mellitus (DM) is a chronic disease that becomes a major socioeconomic as well as public health problem in many countries. Since DM is not a curable disease, the prevalence of this disease tends to increase every year. In term of genetics, abnormal genes can be transmitted from parents to their children. However, diabetes in offspring is also triggered by environmental factors. Environmental factors or risk factors of diabetes include obesity, aging, damaged pancreas, viral infection, adverse affects of drugs, and pregnancy (Himatongkum, T. 1999: 28-29).

In addition, other causes of diabetes are endocrine disorders, destruction of liver cells, stress, and lack of exercise. Uncontrollable blood sugar can severely cause acute and chronic complications among DM patients. Comparing with general populations, diabetic patients are 2 times more likely to have arteriosclerosis, 17 times more likely to

have renal impairment (Department of Health, Ministry of Public Health, 1995:2), 20 times more likely to have retinopathy, and 40 times more likely to have their feet amputated than general populations (Himatongkum, T. 1999: 37-40). Foot infection is the most common infection found in diabetic patients. Other infection includes Tuberculosis and urinary tract infection. Diabetic patients are 2-3 times more likely to have tuberculosis and urinary tract infection compared to general populations (Saereerat, S.1996:15)

Although DM is a chronic disease, its complications are preventable and controllable. As mentioned by Tep Himatongkum and colleagues (1999:18), the results of the Diabetic Complications Control Trial reported in 1994 found that controlling blood sugar to be at normal range can prevent complications of diabetes. Therefore, the goal for diabetes treatment is to control patient's blood sugar through diet, exercise, and medications. Besides medication, the effectiveness of the diabetic treatment relies largely on patients. Physicians and nurses can only give advice, while diabetic patients are the ones who have to take the advice and adapt to their own lifestyles.

In Thailand, the most common type of diabetes found is the non-insulin dependent diabetes. It is reported that 4 diabetic patients can be found in every 100 Thais. Similar to Thailand, 99% of diabetic patients in Asian countries are non-insulin dependence, the most common type found in adults (Himatongkum, T. 1999:15).

Department of Medicine, Ministry of Public Health, is the center of the National Diabetic Prevention and Control Program Initiative. Since there are many risk factors of diabetes including uncontrollable causes such as genetic, the goal of the program is to reduce complications and morbidity caused by disease. Strategies for program

implementation are systemic collaboration between scholars and administrative officers, network development, and campaigns for increasing knowledge related to the disease among population.

According to public health statistics (WEB SITE http://moph.go.th/ June 29th, 2000), morbidity rates by causes during 1995-1997 revealed that the numbers of diabetic patients were 53,760, 69,114, and 81,601, representing the morbidity rates of 100.11, 127.49, and 148,70 per 100,000 population, respectively. When divided by region, the numbers of diabetic patients tend to increase in every region, especially the central region excluding Bangkok. The morbidity rates of diabetic patients in the central region during 1995-1997 were 87.31, 158.32, and 195.1 per 100,000 population.

In Nakornsawan Province, the morbidity rate base on the number of admission and causes of death in 1998 and 1999 revealed that diabetes is ranked the ninth as the cause of hospitalization and ranked the eight as the cause of death. In 1998 and 1999, the morbidity rates of diabetic patients by causes of hospitalization were 186 and 221.65 and by causes of death were 13.95 and 12.65 per 100,000 population, respectively.

Ta Tha-Ko community hospital is a 60-bed sized hospital under supervision of Provincial Public Health Office in Nakornsawan Province. Its diabetic clinic services on Monday, Wednesday, and Friday. According to out-patient statistics, the numbers of diabetic patients in 1998 and 1999 were 600 and 655, respectively (Summary Report of Diabetes Surveillance, Ta Tha-Ko Hospital, 1998-1999). In addition, since the beginning of the year 2000 until now (January-July, 2001), there are 600 patients attended the diabetic clinic, with there are about 50-70 patients visit the clinic each day. As reported in the statistics, the number of diabetic patients tend to increase which makes diabetes an

important public health problem that needs to be solved. Health education is occasionally provided irregularly in the diabetic clinic for a group of 4-5 new patients who attended the clinic. Individual education is given when the patient has the blood sugar higher than 200 mg%. However, the number of patient with uncontrollable blood sugar still exists.

According to the review of diabetic patients' record at Ta-Tha-Ko Hospital, Ta-Tha-Ko district, Nakornsawan Province in the year 2000, there were 46% of diabetic patients had uncontrollable blood sugar. Among these patients, 31% had their blood sugar higher than 150 mg% and 15% had their blood sugar higher than 200 mg%. Complications commonly found among these diabetic patients were poor visibility (40%) and itchiness and less sensitivity in hands and feet (25%).

The interview of 20 Type 2 diabetic patients and 10 family members in the community revealed that:

1. Diabetic patients and general population did not feel that diabetes is a harmful disease. They were not worried about the disease and did not perceive about potential complications. Most of diabetic patients could not control their blood sugar and were not responsible for their practices to control their blood sugar. Moreover, most diabetic patients were not afraid of the severity of the disease.

2. In terms of practices, most diabetic patients had inappropriate eating behaviors such as having desserts, seasonal fruits like banana, mango with sticky rice, rambutan, and sweet tamarind. Most of the patients did not regularly control their diet, while some of them never controlled their diet at all. Regarding exercise, patients mostly thought that doing housework such as cleaning, washing their clothes was sufficient for exercise. For medications, most patients did not have their meals on time resulting in postponing

their medications. Patients mostly came to the clinic when they were out of their medications. Although patients mostly believed that medication was an important treatment, some patients did not continue their medications.

Situational analysis of diabetes revealed that occurrence of diabetes in community is increasing because the numbers of new patients was observed in the area. Decisions to visit the diabetic clinics were from communication between general population and ones who suspected themselves as having diabetes. Therefore, it may be concluded that diabetes in the area is caused by lack of perceptions regarding severity of the disease, lack of self-care skill in disease prevention, as well as lack of self-care skill in preventing complications after the disease occurred.

Therefore, a health educational program that can increase perceived disease severity and self-care skill of diabetic patients attended the diabetic clinic along with increasing self-care skill in disease prevention of people in community should be developed. In order to provide information to promote learning and practices, the information needs to be matched with needs and thinking process of each individual (Prochaska 1982 cited in Charuchaovarit, P. 1995: 41). The Transtheoretical model has to be used to classify people into different stages of behavior change and activities can then be arranged to meet the needs of the target group.

Researcher aimed to classify diabetic patients by applying the Transtheoretical Model. Diabetic patients under supervision of Ta-Tha-Ko community hospital will be classified based on their perception and practices, the information is then used as a basis for development of the program aimed to prevent diabetes and promote self-care ability of diabetic patients and family. Researcher expects diabetic patients to increase their self-

care activities in controlling blood sugar as well as expects families and people in the community to increase their perceived susceptibility about the disease and increase their support for patients' self-care activities.

1.2 Research Question

Whether the health education program using a model of diabetes clinic by applying Transtheoretical Model with Participatory Learning will increase perceived susceptibility of having diabetes mellitus and its complications, perceived efficacy to prevent complication, self-care behaviors among diabetes patients and the family member group, and supportive behavior giver to the patient for promoting the patient's self-care of the family member group.

1.3 Research Objectives

General Objective

To evaluate the effectiveness of the health education program based on Transtheoretical Model and Participatory Learning.

Specific Objectives

The objectives of this study are:

1. To assess the stages which the diabetic patients were in before the experiment if using the stages of change model classification.

2. To compare differences among diabetes patients and the family members between group and within group, before and after the experiment in the following aspects:

2.1 In diabetic patient group, comparison has been made in terms of:

1) Perceived susceptibility of having complications
2) Perceived efficacy to prevent complications
3) Self-care behaviors to prevent complications including dietary control, exercise, medication taking, keeping appointment, and foot care
4) Self care supported by family members

2.2 In the family member group, comparison has been made in terms of:

1) Perceived susceptibility of having diabetes
2) Perceived susceptibility of having complications
3) Perceived efficacy to prevent diabetes
4) Self-care behaviors to prevent diabetes mellitus including dietary control and exercise
5) Supportive behavior given to the patients for promoting the patient's self-care

3. To assess changes in hemoglobin A1c level of diabetic patients before and after participating in the program.

4. To assess changes in blood sugar level of the family members group before and after participating in the program.

1.4 Research Hypotheses

1. Health education program will enhance diabetic patients and the family members in changing their behavior better than before the experiment and better than that

of the comparison group in the following aspects for the diabetic patients and the family members:

1.1 Diabetic patient group;

1) Perceived susceptibility of having complications
2) Perceived efficacy to prevent complications
3) Self-care behaviors to prevent complications: dietary control, exercise, medication taking, keeping appointment, and foot care
4) Self care supported by family members

1.2 The family member group;

1) Perceived susceptibility of having diabetes
2) Perceived susceptibility of having complications
3) Perceived efficacy to prevent diabetes
4) Self-care behaviors to prevent diabetes mellitus including dietary control and exercise
5) Supportive behavior given to the patients for promoting the patient's self-care

2. After the experiment, level of hemoglobin A_{1c} of diabetic patients who are in the experimental group will be lower than before the experiment and than that of the comparison group.

3. After the experiment, level of fasting plasma glucose of the family members who are in the experimental group will be lower than before the experiment and than that of the comparison group.

1.5 Scope of the Study

1. This study aims to evaluate the effectiveness of the health education program based on Transtheoretical Model and Participatory Learning.

2. The samples of this study included type 2 diabetic patients attended diabetic clinic at Ta-Tha-Ko hospital and the family members living in Ta-Tha-Ko district, Nakornsawan Province. The study was conducted during October 2000-January 2001.

1.6 Research Assumptions

Health education activities, even though have been arranged in different date and time, are considered to be the same because of its similarity in social context, place in delivering the service, process, and steps of implementation.

1.7 Research Variables

1. Independent variable is the Participatory Learning designed to fit different stages of change which the patients and family members after in applying stages of change questionnaires.

1. Dependent variables are:

2.1 Diabetic patient group;

1) Perceived susceptibility of having complications

2) Perceived efficacy to prevent complications

3) Self-care behaviors to prevent complications including dietary control, exercise, medication taking, keeping appointment, and foot care

4) Self care supported by family members

1.2 The family member group;

1) Perceived susceptibility of having diabetes

2) Perceived susceptibility of having complications

3) Perceived efficacy to prevent diabetes

4) Self-care behaviors to prevent diabetes mellitus including dietary control and exercise

5) Supportive behavior given to the patients for promoting patient's self-care

1.8 Definitions of Variables

1. **Transtheoretical Model** refers to the individual's stages of change their behavior. Appropriate activities based on their stages of readiness are require to promote behavior change. Five stages of behavior change include:

1. Precontemplation is the stage where there is no intention to take action within the next six months.
2. Contemplation is the stage where there is intention to take action within the next six months.
3. Preparation is the stage where there is strong intention to take action within the next 30 day and has taken some behavioral steps in that direction.
4. Action is the stage where individuals have started changing their behavior for less than six months.
5. Maintenance is the stage where individuals have changed their behavior for more than six months.

2. **Participatory learning** refers to concept of patients-centered learning that emphasizing on knowledge development from previous experienced and group process. Group process promotes exchanging experience and reflecting thoughts among participants through discussion., critical thinking and ideas. Result from the group process will increase knowledge, confidence and lead to practice among diabetic patients and the family members.

3. **Perceived susceptibility of having complications** refers to the extent of perception and understanding among patients and the family members concerning the risk of having complications from diabetes.

4. **Perceived efficacy to prevent complications** refers to level of patients' perception of their own ability to prevent disease complications or to practice recommended behavior. Appropriate preventive practices include dietary control, exercise, taking medicine, keeping appointment, and foot care.

5. **Self-care behaviors to prevent complications** refers to patients' lifestyle on practices including dietary control, exercise, taking medicine, keeping appointment, and foot care. Appropriate self-care behaviors will help keeping blood sugar within the normal range. Normal blood sugar (having HbA1c less than 7%) indicates the diabetes control during the past 6-8 weeks

6. **Self care supported by family members** refers to receiving support, encouragement from the family members to regularly practice their self-care activities including dietary control, exercise, taking medicine, keeping appointment, and foot care.

7. **Perceived susceptibility of having diabetes** refers to level of perception, understanding, and feeling of the family members regarding his/her own risk of having

diabetes in relation to age, genetic, obesity, infection, exercise, taking certain medications, and pregnancy.

8. **Perceived efficacy to prevent diabetes** refers to perception of the family members in their own ability to prevent occurrence of diabetes using dietary control and exercise.

9. **Preventive behaviors for diabetes** refers to life-style practices and self-care activities of the family members group to prevent diabetes including dietary control and exercise.

10. **Supportive behavior given to the patients for promoting the patient's self-care** refers to levels of supportive behaviors given for diabetic patients as well as the family members to encourage regular self-care activities including dietary control, exercise, taking medicine, keeping appointment, and foot care.

11. **Perception** refers to the interpretation from what are seen, what are heard, and what are felt by sensory organs, which tend to lead to an action based on belief and understanding.

12. **Effectiveness of changes in self-care behaviors related to diabetes** refers to the effects of a health education program applying Transtheoretical Model in the classified target groups. Arranged activities for the target groups included patient-centered participatory learning, individual counseling, demonstration, reinforcement or patients by the family members, and researcher.

13. **Fasting plasma glucose** (FPG) refers to blood test for glucose level taken after eight hours of fasting. Normal FPG level is the value that lies below 110 mg/dl (or 6.1 mmol/L). Levels between 110 and 125 (6.1 to 6.9 mmol/L) are classified as impaired

fasting glucose, which is considered to be a risk factor for developing diabetes type 2 and its complications.

14. Hemoglobin A1c (HbA1c) refers to blood test which indicated the levels of hemoglobin A1c (HbA1c) which also called glycosylated hemoglobin. Hemoglobin, a protein molecule found in red blood cells, becomes modified by having glucose bound to it. Much evidence exists that this process, called glycosylation, affects a number of proteins and is strongly associated with complications of diabetes. Measuring glycosylated hemoglobin is useful for predicting complications in patients with existing diabetes. Then, HbA1c indicated that diabetes control between 1-2 months in the past.

In conclusion: This background information supported that diabetes mellitus is a major public health. Most diabetic patients and these family members do not perceive that they are susceptible to diabetes mellitus and lack of self-care skill in preventing diabetes mellitus and complication. The researcher aimed to increase perceived susceptibility and severity in having complication and enhance self-care skill of diabetic patients and family members to prevent DM of population in community. Therefore, the researcher has developed a health education program by applying the Transtheoretical model with participatory learning. After the literature review presented here in chapter 2 whereas, the independent and dependent variables are also mentioned.

CHAPTER II

LITERATURE REVIEW

This research plan approach the Transtheoretical model and Participatory Learning to develop the health education program and conceptual framework of the study to promote self-care behaviors among type 2 diabetes mellitus and the family members in Tha-Ta Ko District Nakonnsawan Province. The concepts, theories and research involved in the research as follows:

Part 1 : The Knowledge of Diabetes Mellitus

1.1. Definition of Diabetes Mellitus

1.2. Type 2 Diabetes

1.3. Causes of Type 2 Diabetes

1.4. Who Gets Type 2 Diabetes

1.5. Symtoms of Type 2 Diabetes

1.6. Diagnotics Tests for Type 2 Diabetes

1.7. Complications of Type 2 Diabetes

1.8. Life-Style Measures for Treating and Preventing Type 2 Diabetes

Part 2 : The approach to concepts and theories in research

2.1. The Transtheoretical Model (Stages of Change)

2.2. Participatory Learning

Part 3 : Related Researches

3.1. Related researches in Thailand

3.2. Related researches in Other Countries

Part 1 : The Knowledge of Diabetes Mellitus

1.1 Definition of Diabetes Mellitus (Harvey, [Online] : 1998)

Diabetes is a disease in which the body does not produce or properly use insulin, a hormone that is needed to convert sugar, starches and other food into energy needed for daily life. The cause of diabetes is a mystery, although both genetics and environmental factors such as obesity and lack of exercise appear to play roles. There are four major types of diabetes:

Type 1 An auto-immune disease in which the body does not produce any insulin, most often occurring in children and young adults. People with type 1 diabetes must take daily insulin injections to stay alive. Type 1 diabetes accounts for 5-10 percent of diabetes. Type 1 (previously juvenile-onset diabetes).

Type 2 A metabolic disorder resulting from the body's inability to make enough, or properly use, insulin. It is the most common form of the disease. Type 2 diabetes accounts for 90-95 percent of diabetes. Type 2 diabetes is nearing epidemic proportions, due to an increased number of older Americans, and a greater prevalence of obesity and sedentary lifestyles. Type 2 (previously called noninsulin-dependent diabetes mellitus (NIDDM) or maturity-onset diabetes).

Gestational diabetes develops in 2 –5 percent of all pregnancies but disappears when a pregnancy is over. Women who have had gestational diabetes are at increased risk for developing type 2 diabetes later in life.

"**Other specific types**" of diabetes result from specific genetic syndromes, surgery,drugs, malnutrition, infections, and other illnesses.

1.2 Type 2 Diabetes (Harvey, [online]: 1998)

The two major forms of diabetes are type 1 (previously juvenile-onset diabetes) and type 2 (previously called noninsulin-dependent diabetes mellitus (NIDDM) or maturity-onset diabetes). They share a central feature: elevated blood sugar levels due to absolute or relative insufficiencies of insulin, a hormone produced by the pancreas. Insulin is a key regulator of the body's metabolism. After meals, food is digested in the stomach and intestines; carbohydrates are broken down into sugar molecules, of which glucose is one, and proteins are broken down into amino acids. Glucose and amino acids are absorbed directly into the bloodstream, and blood glucose levels rise. Normally, the rise in blood glucose levels signals important cells in the pancreas, called beta-cells, to secrete insulin, which pours into the bloodstream. Insulin, in turn, enables glucose and amino acids to enter cells in the body, importantly, those in the muscles, where, along with other hormones, it directs whether these nutrients will be burned for energy or stored for future use. As blood sugar falls to pre-meal levels, the pancreas reduces the production of insulin, and the body uses its stored energy until the next meal provides additional nutrients.

Type 2 diabetes is by far the more common form of diabetes, accounting for 90% of cases. About 16 million Americans have type 2 diabetes and half are unaware they have it. Most type 2 diabetics produce variable, even normal, amounts of insulin, but they have abnormalities in liver and muscle cells that resist its actions. Insulin attaches to the receptors of cells, but glucose does not get inside, a condition known as insulin resistance. Because many type 2 diabetics seem to be incapable of secreting enough insulin to overcome insulin resistance, it is likely that in such cases an

additional defect exists in the beta-cells that impairs insulin secretion. Other factors may also play a role in type 2 diabetes.

Maturity-Onset Diabetes in Youth Maturity-onset diabetes in youth (MODY) is a rare genetic form of type 2 diabetes that usually develops in thin teenagers; it accounts for 2% to 5% of type 2 cases. A variant has also been reported in Florida among African Americans. In about half of these families an abnormality in a liver enzyme is most likely responsible for this condition.

Gestational Diabetes About 0.5% of pregnant women develop a form of type 2 diabetes in their third trimester called gestational diabetes. After delivery, blood glucose levels generally return to normal, although one-third to one-half of these women develop type 2 diabetes within 10 years.

1.3 Cause of Type 2 Diabetes (Harvey, [Online] : 1998)

Type 2 diabetes is caused by a complicated interplay of genes, environment, insulin abnormalities (reduced insulin secretion in the beta-cells and insulin resistance in muscle cells), increased glucose production in the liver, increased fat breakdown, and possibly defective hormonal secretions in the intestine.

1. Causes of Insulin Resistance :Elevated levels of three factors are believed to be involved in development of obesity and insulin resistance leading to type 2 diabetes. They are: free fatty acids (acids in the blood produced by breakdown of fat), leptin (a protein produced by fat cells), and tumor-necrosis factor, or TNF (a component of the immune system). How each of these actorscontributes to type 2 diabetes is under investigation.

2. Genetic Factors :Genetic factors play an important role in type 2 diabetes, but the pattern is complicated, since both impairment of beta-cell functions and an abnormal response to insulin are involved. Researchers have identified a number of genetic suspects. In certain Caucasian populations, a single gene may alter the metabolism of fatty acids that leads to insulin resistance. Researchers have also identified the P2 gene, which appears to be critical for the link between obesity and insulin resistance. Australian researchers have identified a defective lipoprotein lipase (LpL) gene, which poses a risk for coronary artery disease and type 2 diabetes in people who have it. Researchers also have identified a defective gene that regulates glucose metabolism, which may provide the link between low birth weight and a later risk for type 2 diabetes and insulin resistance. A defective gene has been detected that reduces activity of a protective substance called B 3-adrenergic receptor, which is found in visceral fat cells (those occurring around the abdominal region). The result is a slow-down in metabolism and an increase in obesity. The defective gene has been found in Pima Indians and other populations with a very high incidence of type 2 diabetes and obesity.

1.4 Who Gets Type 2 Diabetes (Harvey, [Online] : 1998)

Diabetes, particularly type 2, is reaching epidemic proportions throughout the world as more and more cultures adopt Western dietary habits. The increased incidence in obesity appears to be the primary reason for this increase.

1. Age: The onset of type 2 diabetes typically occurs after the age of 40. Aging itself may increase the risk for glucose intolerance and diabetes. In one study, diabetes occurred in only 5.9% of men and 3.8% of women younger than 60 years but

in nearly 20% of men and women older than 85 years. Although still uncommon, of major concern is a significant increase in type 2 diabetes in children and adolescents, most likely due to rising rates of childhood obesity.

2. Low Birth Weight : Research now indicates that low birth weight is a risk factor for type 2 diabetes. Some research indicates that malnutrition in the pregnant woman may be responsible for causing metabolic abnormalities in the developing fetus that eventually lead to diabetes.

3. Obesity: The rate of obesity is very high in type 2 diabetics, and some studies have found that, regardless of family history, even modest weight gain is associated with an increased risk for diabetes. Excess body fat appears to play a strong role in insulin resistance, but the way it's distributed is also important. Weight concentrated around the abdomen and in the upper part of the body (apple-shaped) is associated with insulin resistance and diabetes, heart disease, high blood pressure, stroke, and unhealthy cholesterol levels. Fat that settles in a "pear-shape" around the hips and flank appears to have a lower association with these conditions. One study suggested that waist circumferences greater than 35 inches in women and 40 inches in men signify increased risk for heart disease and diabetes.

4. Family History: Between 25% to 33% of all patients have a family history of the disease, and people with first degree relatives have a 40% lifetime risk for diabetes.

5. Ethnicity: The risk for diabetes type 2 is higher in African and Hispanic Americans than in non-Hispanic Caucasian-Americans. One study found that African-American women in general have a higher rate of insulin resistance from high-fat diets than do non-African-Americans, suggesting the presence of a genetic factor. One 1999

study also found that African Americans with diabetes are also at higher risk for amputations than diabetic Caucasians, which is most likely due to a higher incidence of high blood pressure and smoking as well as poorer health care. The Pima tribe in Arizona has an incidence of type 2 diabetes that is 19 times higher than that of the white population. The association between diet and diabetes remains critical, however in assessing these ethnic differences. In one study, Mexican Pimas had lower fat (but higher overall calorie) intake and more intense physical activity than Arizona Pimas. They also had only a 6% incidence of obesity and diabetes, which was equivalent to their non-Pima neighbors. The incidence of diabetes in their Arizona Pima relatives, however, was 40%. Other Native American tribes in North America are also at high risk for type 2 diabetes.

6. Risk Factors for Gestational Diabetes : Even modest weight gain (11 to 22 pounds) during early adulthood increases the risk for gestational diabetes (temporary diabetes during pregnancy). Other risk factors include a family history of diabetes, smoking, belonging to African American, Hispanic, or Asian ethnic groups, gaining weight before getting pregnant, and being an older other. In women who develop gestational diabetes during pregnancy, taking contraceptives that only have progestins while breast feeding puts them at high risk for developing type 2 diabetes.

1.5 Symtoms of Type 2 Diabetes (Harvey, [Online]: 1998)

Type 2 diabetes usually begins gradually and progresses slowly. Symptoms may not appear for years, even decades. Type 2 diabetes may cause the following symptoms:

increased urination

excessive thirst and the drinking of a lot of fluids

increased appetite

weight gain or loss

blurred vision

skin infections

vaginal infections

tiredness

slowly healing sores

abnormal feelings of prickling, burning, or itching of the skin, usually on the hands or feet infections of the foreskin in uncircumcised men.

Some people have no symptoms.

1.6 Diagnotics Tests for Type 2 Diabetes (Harvey, [Online]: 1998)

Diagnosing Diabetes : Experts now recommend that everyone over age 45 be tested regularly for diabetes. Younger adults should be tested under the following conditions: if they weigh 20% more than ideal body weight, have high blood pressure, low HDL cholesterol levels (under 35 mg/dl), high triglyceride levels (over 250 mg/dl), have a close relative with diabetes, are from a high-risk ethnic group, have delivered a baby weighing over nine pounds, or have a history of gestational diabetes. All pregnant women should be tested for gestational diabetes between their 24th and 28th week. Pregnant women at high risk for diabetes should be tested earlier.

Testing for Diabetes (Harvey, [Online]: 1998)

Fasting Plasma Glucose: In order to simplify the diagnosis of diabetes, the American Diabetes Association has recommended the sole use of the fasting plasma glucose (FPG) test. It is a simple blood test taken after eight hours of fasting. FPG levels are considered normal up to 110 mg/dl (or 6.1 mmol/L). Levels between 110 and 125 (6.1 to 6.9 mmol/L) are referred to as impaired fasting glucose, which is considered to be a risk factor for developing diabetes type 2 and its complications and is treated with diet and exercise. Diabetes is diagnosed when FPG levels are 126 mg/dl (7.0 mmol/L) or higher on two different days. At this time, even if a person has normal FPG levels but still has symptoms of diabetes and a family history or other risk factors, then diabetes should not be ruled out and a glucose tolerance test should also be performed.

Glucose Tolerance Test: A glucose tolerance test first employs an FPG test; a blood test is then taken two hours later after drinking a special glucose solution. Normally, blood sugar increases modestly after drinking the glucose beverage and decreases after two hours; in the diabetic, the initial increase is excessive and the level remains high, 200 mg/dL (11.1 mmol/L) or more. Many experts believe this test is still important as an initial diagnostic tool for identifying people whose FPG tests are normal but who still may have impaired glucose tolerance, putting them at higher risk for heart disease and death.

Test for Glycosylated Hemoglobin: Another test examines blood levels of hemoglobin A 1c (HbA 1c) also called glycosylated hemoglobin. Hemoglobin, a protein molecule found in red blood cells, becomes modified by having glucose bound to it. Much evidence exists that this process, called glycosylation, affects a number of

proteins and is strongly associated with complications of diabetes. Measuring glycosylated hemoglobin is useful for predicting complications in patients with existing diabetes. The test is not affected by food intake so it can be taken at any time. A glycosylated hemoglobin level of 1% above normal range identifies diabetes in 98% of patients. Normal HbA1c levels do not necessarily rule out diabetes, but if diabetes is present and levels are normal, the risk for complications is low. The test is not currently used for an initial diagnosis, but some experts think it should be used to help predict complications in people who have FPG levels that are above normal but do not indicate full-blown diabetes (110-139 mg/dL).

1.7 Complications of Type 2 Diabetes (Harvey, [Online]: 1998)

1. Emergency Conditions

Hypoglycemia: Intensive insulin control increases the risk of hypoglycemia (also called insulin shock), which occurs if blood glucose levels fall below normal. Hypoglycemia may also be caused by insufficient intake of food, exercise, or alcohol. Usually the condition is manageable, but occasionally, it can be severe or even life threatening, particularly if the patient fails to recognize the symptoms. Mild symptoms usually occur at moderately low and easily correctable levels of blood glucose; they include sweating, trembling, hunger, and rapid heartbeat. Severely low blood glucose levels can precipitate neurologic symptoms: *confusion, weakness, disorientation, combativeness, and in rare and worst cases, coma, seizure, and death.*

Patients who experience repeated episodes of hypoglycemia may become insensitive to symptoms; even a single recent episode of hypoglycemia may make it more difficult to detect the next episode. By rigorously avoiding low blood glucose,

such patients can regain the ability to sense the symptoms. Patients are at highest risk for hypoglycemia at night. Bedtime snacks may be helpful. Most experts recommend that patients monitor blood levels as often as possible, four times or more per day. This is particularly important for patients who have a history of experiencing no symptoms of hypoglycemia before mental changes occur. Diabetic patients on therapies that put them at risk for hypoglycemia should always carry hard candy, juice, or sugar packets. Family and friends should be aware of the symptoms. If the patient is helpless, they should administer three to five pieces of hard candy, two to three packets of sugar, or half a cup (four ounces) of fruit juice. If there is inadequate response within 15 minutes, additional oral sugar should be provided or the patient should receive emergency medical treatment including the intravenous administration of glucose. Family members and friends can learn to inject glucagon, a hormone, which, unlike insulin, raises blood glucose.

Ketoacidosis : Diabetic ketoacidosis is a life-threatening complication caused by insulin depletion that results in an excessive amount of glucose present in the bloodstream. Fat breakdown accelerates and increases the production of fatty acids; these are converted into chemicals called ketone bodies, which are toxic at high levels. Ketoacidosis is almost always associated with type 1 diabetes and has been thought to be rare in type 2 because some insulin exists in these patients. A 1999 study reported, however, that ketoacidosis may occur with some frequency in type 2 diabetes, especially among Hispanic and African Americans. Research is needed to find which patients are at particular risk. In type 1, ketoacidosis is almost always caused by noncompliance with insulin treatments and is usually preceded by a stressful event such as an illness. It is not clear, however, what causes total insulin depletion in some

type 2 diabetics or what triggers the event. Symptoms of ketoacidosis include nausea and vomiting. Breathing may be abnormally deep and rapid with frequent sighing. The heartbeat may be rapid. If the condition persists, coma and, eventually death, may occur, although over the past 20 years, death from ketoacidosis has decreased to about 2% of all cases. Other serious complications from ketoacidosis include aspiration pneumonia and adult respiratory distress syndrome. Life-saving treatment employs rapid rehydration using a saline solution followed by low-dose insulin and potassium replacement.

2. Long-Term Complications of Diabetes (Harvey, [Online]: 1998)

The major complications in diabetes are due to vascular (blood vessel) abnormalities and nerve damage (neuropathy). Injuries in large blood vessels endanger the heart, particularly in people with existing heart disease or high blood pressure and can cause leg problems. Small blood vessel (microvascular) changes can harm the eyes and kidneys.

Cardiovascular Complications: Heart attacks account for 60% and strokes for 25% of deaths in all diabetics. A 1998 study reported that people with type 2 diabetes and no history of heart disease have the same seven-year risk for a heart attack as nondiabetics with heart disease. Long-term insulin resistance, even without type 2 diabetes, appears to have significant damaging effects on the heart, including contributing to very unhealthy cholesterol and lipid balances (high triglyceride levels and lower high density lipoprotein), blood clotting problems, and high blood pressure. Insulin resistance injures the heart whether or not the patient is obese or has unhealthy fat distribution. Hypertension is a major factor in the higher risk for stroke in people with diabetes but insulin resistance strokes also play a strong role. Research is

indicating that abnormalities in secretion of stress hormones (particularly cortisol) may be the link between insulin resistance and hypertension.

Neuropathy, Vascular Injury, and Amputations: Neuropathy is a common complication that affects about 45% of both type 1 and type 2 diabetics after 25 years. Neuropathy is decreased or distorted nerve function; it particularly affects sensation. Symptoms include numbness, tingling, weakness, and burning sensations, usually starting in the fingers and toes and moving up to the arms and legs (called a glove and stocking distribution). If the nerves are damaged as well, the person may be unaware that even a blister or minor wound has become infected. The problem is compounded in diabetes because of circulatory problems resulting from blood vessel injury, which may be severe enough to cause tissue damage in the legs and feet. Even minor infections can develop into deep tissue injury. Extensive surgery may be required, and, in extreme cases, amputation of the foot or leg may be necessary. Charcot foot is a condition associated with neuropathy that causes bone deformity. It can occur as an isolated complication or after foot or ankle surgery. Charcot foot may cause little pain, but should be suspected in cases of swelling and redness in a single leg or foot. It results in abnormal pressure on the foot and increases the risk for foot ulcers and amputation. Diabetes is responsible for more than half of all the lower limb amputations performed in the US each year, many of which can be prevented by early and aggressive treatment of feet and ankle problems. If diabetes affects the nerves in the autonomic nervous system, then abnormalities of blood pressure control, bowel and bladder function, and male sexual function can also occur. In some cases, neuropathy may block angina, the warning chest pain for heart disease and heart

attack. Diabetic patients should be aware of other warning signs of a heart attack, including sudden fatigue, sweating, shortness of breath, nausea, and vomiting.

Eye Complications: Diabetes accounts for 12,000 to 24,000 of new cases of blindness annually and is the leading cause of new cases of blindness in adults ages 20 to 74. Given long duration of the disease, most type 2 patients will develop retinopathy, abnormalities of the blood vessels in the retina, at some point in their lives. However only a minority will develop retinopathy so severely that partial or total blindness results. About 20% of type 2 patients have some eye damage when diagnosed, and blurred vision is common. In nonproliferative or background retinopathy, the early and more common type of this disorder, abnormally weakened blood vessels in the retina rupture and leak, and waxy areas may form. If these processes affect the central portion of the retina, swelling may occur causing reduced or blurred vision. If the weak blood vessels become blocked and blood flow is cut off, soft, "woolly" areas may develop in the retina's nerve layer. These areas may signal the development of proliferative retinopathy; in this more severe condition, new, abnormal blood vessels form and grow on the surface of the retina. They may spread into the cavity of the eye or bleed into the back of the eye; major hemorrhage or retinal detachment can result, possibly causing severe visual loss or blindness. Although the sensation of seeing flashing lights may indicate retinal detachment, often there are no symptoms of progressing retinopathy. People with diabetes are also at higher risk for developing cataracts and certain types of glaucoma.

Kidney Damage (Nephropathy): Kidney disease is a very serious complication of diabetes. The risk for this complication is compounded by the

presence of hypertension, coronary artery disease, and problems in the urinary tract. Symptoms include swelling in the feet and ankles, fatigue, and pale skin color.

Mental Function and Dementia: Studies indicate that patients with type 2 diabetes face a higher than average risk of developing dementia caused either by Alzheimer's disease or problems in blood vessels in the brain. Problems in attention and memory can occur even in people under 55 who have had diabetes for a number of years.

Other Complications: People with diabetes are at higher risk for influenza and its complications, including pneumonia, possibly because the disorder neutralizes the effects of protective proteins on the surface of the lungs. Women with type 2 diabetes face a higher risk for uterine cancer, although only if they are obese. Both women and men with diabetes appear to have a higher risk for colon and rectal cancers.

Complications in Pregnancy: Both preexisting diabetes in pregnant women and temporary diabetes that occur during pregnancy (gestational diabetes) can increase the risk for birth defects. Because glucose crosses the placenta, a woman with diabetes can pass high levels of blood glucose to the fetus. In response, the fetus secretes large amounts of insulin. This combination of high fetal blood levels of insulin and glucose leads to excessive fetal growth. It may also contribute to delayed maturation of the lungs or to the death of the fetus. In addition to endangering the fetus, diabetes also presents risks to the pregnant woman, particularly preeclampsia, a potentially dangerous condition involving very high blood pressure. Studies indicate that hyperglycemia may effect the developing fetus as soon as it is conceived. Diabetic women who want to become pregnant should be diligent about controlling blood glucose levels before and during pregnancy. It is not clear whether women with mild

gestational diabetes should control blood glucose levels as intensely since some studies have indicated that lower birth weights may result.

General Guidelines Treatments for Type 2 Diabetes

Although many type 2 diabetics can control their condition with diet and exercise alone for years, most eventually need medications. Unlike type1 diabetes, in type 2 diabetes some insulin is still produced, although not in the amounts necessary to overcome insulin resistance. Patients, then, who need medications usually start out with drugs that enhance residual insulin production or sensitivity rather than replacing insulin directly, the standard treatment for type 1 diabetics. Such drugs usually have a lower risk for hypoglycemia and weight gain than insulin has. The drugs currently recommended for initial treatment are the sulfonylureas, which produce insulin secretion, or metformin, which makes tissue more sensitive to residual insulin. Others are also proving to be very effective. A recent approach, for example, involves the use of new, rapid-acting insulin-secreting drugs, such as repaglinide, at meal times in order to avoid high blood glucose levels after eating (postprandial hyperglycemia). Patients may be able to control their glucose levels with single drugs, although one study reported that after three years, half of the patients needed more than one, and at nine years, only 25% could remain on a single agent. Eventually, natural insulin may completely fail and insulin replacement is needed.

Different goals may be required for specific individuals, including pregnant women, very old and very young people and those with accompanying serious medical conditions. Studies are now indicating that, as in type 1 patients, rigorous control of blood glucose levels can help reduce the risk for complications of diabetes, particularly retinopathy, but also kidney and nerve damage. People with diabetes, then,

should aim for glycolated hemoglobin levels of less than 7% and fasting plasma glucose concentrations below 110 mg/dL. Taking such actions can reduce the complication rates by between 25% and 33%. Controlling risk factors for heart disease and stroke, particularly high blood pressure (which is also a risk factor for kidney disease) as well as unhealthy cholesterol levels, is also essential. Patients should aim for blood pressure below 130/80 mmHg and LDL cholesterol below 100 mg/dL. Intensive insulin-secreting drugs or insulin itself, however, put patients at increased risk for weight gain and atherosclerosis. Because of the weight gain often produced by rigorous control of blood sugar some, experts argue that it may do more harm than good in type 2 diabetics, who tend to be overweight in the first place. Furthermore, only a relatively small number of people may actually derive additional benefits from intensive treatments, since only a small percentage of type 2 diabetics actually develop the serious kidney and eye complications that are common in type 1 diabetes. Heart disease is a far greater problem. Newer insulin-sensitizing medications may pose less of a risk for weight gain, however, and new weight loss drugs are also proving to be helpful for some patients. Patients should discuss all options with their physicians.

1.8 Life-Style Measures for Treating and Preventing Type 2 Diabetes

(Harvey, [Online]: 1998)

1. Diet and Weight Loss: For most people with diabetes, diet control is the key to managing this complicated disease. It is also extremely difficult. The current state of the diabetic diet is in flux, and at this time, there is no single diet that meets all the needs of everyone with diabetes. Patients should meet with a professional dietitian to plan an individualized diet that takes into consideration all health needs. There are

some constants, however. The general rules for healthy eating apply to everyone: limit fats (particularly saturated fats and trans-fatty acids), protein, and cholesterol, and consume plenty of fiber and fresh vegetables. All people with diabetes should aim for healthy lipid (cholesterol and triglyceride) levels and control of blood pressure. For overweight type 2 diabetics, both weight loss and blood glucose control are important. Health benefits are highest with the first pounds lost, and losing only 10% of body weight can control progression of diabetes.

Unfortunately, many of the oral medications used in type 2 diabetes cause weight gain. For obese patients who cannot control weight using dietary measures alone, weight-loss drugs, such as orlistat (Xenical) or sibutramine (Meridia), may be beneficial. In one study, orlistat not only to helped reduce weight but also improved glucose, cholesterol, and lipid levels. Surgical procedures are proving to be extremely beneficial in selected cases

2. Exercise: Exercise helps lower blood glucose and increases insulin sensitivity; it also helps lower blood pressure, improve cholesterol levels, decrease body fat, and reduce the risk of cardiovascular disease. Aerobic exercise is best. Regular exercise, even of moderate intensity, improves insulin sensitivity and can even prevent type 2 diabetes. In fact, studies of older people who engage in regular moderate aerobic exercise (eg, brisk walking, biking) lower their risk for diabetes even if they don't lose weight. For best and fastest results, experts advise frequent high-intensity (not high-impact) exercises for people who are cleared by their physicians. For people who have been sedentary or have other medical problems, lower-intensity exercises are recommended using regimens designed with physicians. Patients who are taking medications that lower blood glucose, particularly insulin, should take special

precautions before embarking on a workout program. Because diabetics may have silent heart disease, they should always check with their physicians before undertaking vigorous exercise. Exercise, particularly resistance or high impact exercises, can strain weakened blood vessels in the eyes of patients with retinopathy. High-impact exercise may also injure blood vessels in the feet.

3. Monitoring Blood Glucose: In patients being treated with insulin or insulin-producing or sensitizing drugs, it is important to monitor blood glucose levels carefully to avoid hypoglycemia. Patients should aim for pre-meal glucose levels of between 80 and 120 and bedtime levels of between 100 and 140. Blood glucose levels are generally more stable in type 2 diabetes than in type 1, so experts usually recommend measuring blood levels only once or twice a day. Usually, a drop of blood obtained by pricking the finger is applied to a chemically treated strip. The glucose level is read on a standard meter or a small, portable digital display device.

4. Daily Foot Care: Preventive foot care could reduce the risk of amputation by 44% to 85%. Patients inspect their feet daily and watch for changes in color or texture, odor, and firm or hardened areas, which may indicate infection and potential ulcers. When washing the feet, the water should be warm (not hot) and the feet and areas between the toes should be thoroughly dried afterward. Moisturizers should be applied, but not between the toes. Corns and calluses should be gently pumiced and toenails trimmed short and the edges filed to avoid cutting adjacent toes. Patient should not use medicated pads or try to shave the corns or calluses themselves. They should avoid high heels, sandals, thongs, and going barefoot. Shoes should be changed often during the day. Tight stockings or any clothing that constricts the legs and feet should be avoided. A specialist in foot care should be consulted for any problems.

Foot Care Tips: (Harvey, [Online]: 1998)

It was started on line that there are many thing which diabetic patients can do to prevent problems with their feet.

1.Check the bare feet every day. Look for cuts, sores, bumps, red spots. Use a mirror or ask a family member for help if having trouble seeing the bottoms of the feet.

2. Wash the feet in warm -- not hot -- water every day. Use a mild soap. Do not soak your feet. Dry the feet with a soft towel. Dry between toes.

3. Cover the feet with a lotion or petroleum jelly after washing them, before putting on shoes and socks. Do not put the lotion or jelly between toes.

4. Cut toenails straight across. Do not leave sharp edges that could cut the next toe.

5. Use a dry towel to rub away dead skin.

6. Do not try to cut calluses or corns yourself with a razor blade or knife. Do not use wart removers on the feet. In case of having warts or painful corns or calluses, see a doctor who treats foot problems. This kind of doctor is called a podiatrist.

7. Wear thick, soft socks. Do not wear mended stockings or stockings with holes or seams that might rub into feet.

8. Check the shoes before putting them on to be sure they have no sharp edges or objects in them.

9. Wear shoes that fit well and let the toes move. Break in new shoes slowly. Do not wear flip-flops, shoes with pointed toes, or plastic shoes. Never go barefoot.

10. Wear socks if the feet are cold at night. Do not use heating pads or hot water bottles on the feet.

11. Have the doctor check the bare feet at every visit. Take off the shoes and socks when you go in the exam room. This will remind the doctor to check the feet.

12. See a podiatrist for help if can't take care of the feet.

5. Other Recommendations

Vaccinations: Annual flu shots are strongly recommended. People with diabetes should also discuss a single vaccination against pneumococci. the most common cause of pneumonia.

Other-Counter-Medications: A daily low dose aspirin is advised for people with diabetes with risk factors for heart disease. One study found that 100 mg/day helped reduce blood-glucose related complications. Cimetidine (Tagamet), an acid blocker commonly used to treat gastrointestinal conditions may be helpful for obese type 2 diabetics. After 12 weeks of taking a liquid form of the drug, patients in one study experienced an average weight loss of 11 pounds; improvements in glucose control and decreased blood pressure were also noted.

Part 2: The Approach to Concept and Theory in Research

2.1. The Transtheoretical Model (Stages of change) (Prochaska, J.O., *et.al.*,1997)

The Transtheoretical Model use the stages of change to integrate processes and principles of change from across major theories of intervention, hence the name transtheoretical. This model emerged from a comparative analysis of leading theories of psychotherapy and behavioral change. The search was for a systematic integration in afield that had fragmented into more than three hundred theories of psychotherapy (Prochaska, [1979] 1984). The comparative analysis identified only ten processes of

change among this theories, such as consciousness raising from the Freudian tradition, contingency management from the Skinnerian tradition, and helping relationships from the Rogerian tradition.

In an empirical analysis of self-changers to smokers taking professional treatments, we assessed how frequently each group used each of the ten processes (DiClemente and Prochaska, 1982). Research participants said that they used different processes at different times in their struggles with smoking. These naïve subjects were describing a phenomenon that was not included in current therapy theories. They were revealing that behavioral change unfolds through a series of stages (Prochaska and DiClemente, 1983).

From the initial studies of smoking, the stage of change rapidly expanded in scope to include investigations and applications of a broad range of health and mental health behaviors. These behaviors focus on alcohol and substance abuse, anxiety and panic disorders, delinquency, eating disorders and obesity, high-fat diets (Glanz and other, 1994), HIV/AIDS prevention, mammograms, cervical cancer screening, compliance with medication regimes, unplanned pregnancy prevention, pregnancy and smoking, radon testing, sedentary lifestyles, sun exposure (Rossi, Blais, Redding, and Weinstock, 1995), and physicians who practice preventive medicine. Overtime, these studies have expanded, validated, applied, and challenged the core constructs of The Transtheoretical Model.

Core Constructs

This section defines core constructs including the stage of change, the processes of change, and some critical assumptions underlying the model.

Stages of Change

The stage construct is important, in part, because it represents a temporal dimension. The Transtheoretical Model conceives behavioral change as a process involving progress through a series of five stages are as following (see Table 1)

Precontemplation is the stage in which people have no intention to take action in the foreseeable future, usually measured as the next six months. People may be in this stage because they are uninformed or underinformed about the consequences of their behavior, or they may have tried to change a number of times and have become demoralized about their abilities to change. Both uninformed and underinformed groups tend to avoid reading, talking, or thinking about their high risk behaviors. They are often characterized in other theories as a resistant or unmotivated clients or as not ready for therapy or health promotion programs. The fact is traditional health promotion programs were not ready for such individuals and were not motivated to match their needs.

Contemplation is the stage in which people intend to change within the next six months. They are now aware of the pros of changing but are also acutely aware of the cons. This balance between the costs and benefits of changing can produce profound ambivalence that can keep people stuck in this stage for long periods of times. We often characterize this phenomenon as a chronic contemplation or behavioral procrastination. These people are also not ready for traditional action oriented programs.

Preparation is the stage in which people intend to take action in the immediate future, usually measured as the next month. They typical have already taken some significant action in the past year. These individuals have a plan of action

such as joining a health education class, consulting a counselor, talking to their physician, buying a self-help book, or relying on a self-change approach. These are the people should be recruited for such action-oriented programs as smoking cessation, weight loss, or exercise.

Action is the stage in which people have made specific overt modifications in their lifestyles within the past six months. Because action is observable, behavioral change often have been equated with action. But in The Transtheoretical Model, action is only one of six stages. Not all modifications of behavior count as action in this model. People must attain the criterion that scientists and professionals agree is sufficient to reduce risk of disease. In smoking, for example, only total abstinence counts. In watching one's diet, there is a consensus that no more than 30 percent, and preferably close to 20 percent, of calories should be consumed from fat.

Maintenance is the stage in which people work to prevent relapse, but they do not apply change processes as frequently as do people in action. They are less tempted to relapse and increasingly more confident that they can continue their changes. Based on temptation and self-efficacy data from a variety of sources (for example, U.S. Department of health and human services, 1990), we estimate that maintenance last from six month to about five years.

Table 1 Transtheoretical Model Constructs.

Constructs	Description
Stage of change	
Precontemplation	Has no intention to take action within the next six months
Contemplation	Intend to take action within the next six month
Preparation	Intend to take action within the next 30 day and has taken some behavioral steps in this direction
Action	Has changed overt behavior for less than six months
Maintenance	Has changed overt behavior for more than six month

Table 1 (Cont.) Transtheoretical Model Constructs

Constructs	Description
Decisional balance	
Pros	The benefits of changing
Cons	The costs of changing
Self-efficacy	
Confidence	Confidence that one can engage in the healthy behavior across different challenging situations
Temptation	Temptation to engage in the unhealthy behavior across different challenging situations
Processes of change	
Consciousness raising	Finding and learning new facts, ideas, and tips that support the healthy behavioral change
Dramatic relief	Experiencing the negative emotion (fear, anxiety, worry) that go along with unhealthy behavioral risks
Self-reevaluation	Realizing that the behavioral change is an important part of one's identity as a person
Environmental Reevaluation	Realizing the negative impact of the unhealthy behavior or the positive impact of the healthy behavior on one's proximal social and physical environment
Self-liberation	Making a firm commitment to change
Helping relationships	Seeking and using social support for the healthy behavioral change
Counterconditioning	Substituting healthier alternative behaviors and cognitions for the unhealthy behaviors
Contingency Management	Increasing the rewards for the positive behavioral change and decreasing the rewards of the unhealthy behavior
Stimulus control	Removing reminders or cues to engage in the unhealthy behavior and adding cues or reminders to engage in the healthy behavior
Social liberation	Realizing that the social norms are changing in the direction of supporting the healthy behavioral change

Termination is a six stage that applies to some behaviors, especially the addiction. This is a stage in which individuals have no termination and 100 percentage self-efficacy. No matter whether they are depressed, anxiety, bored, lonely, angry, or stressed, they will not return to their old unhealthy habit as a way of coping. It is as if they never acquired the habit in the first place. In a study of former smokers and alcoholics, we found that less than 20 percentage of each group has reached the criteria of no temptation and total self-efficacy (Snow, Prochaska, and Rossi, 1992).

Termination may not be appropriate for some behaviors, such as cancer screening or dietary fat reduction.

Processes of Change

Processes of change are the covert and overt activities that people use to progress through the six stages. Processes of change provide important guides for intervention programs, because the processes are like independent variables that people need to apply to move from stage to stage. Ten processes have received the most empirical support in our research to date.

Consciousness raising involves increased awareness about the cases that relate to a particular problem behavior and about its consequences and cures. Interventions that can increase awareness include feedback, confrontations, interpretations, bibliotherapy, and media campaigns.

Dramatic relief initially produces increased emotional experiences followed by reduced affect if appropriate action is taken. Psychodrama, role-playing, grieving, personal testimonies, and media campaigns are examples of techniques that can move people emotionally.

Self-reevaluation combines cognitive and affective assessments of one's self-image with and without a particular unhealthy habit, such as one's image as a couch potato and one's different image as an active person. Clarifying values, having healthy role models, and using mental imagery are techniques that can move people evaluatively.

Environmental reevaluation combines both affective and cognitive assessments of how the presence or absence of a personal habit effects one's social

environment, such as assessment of the effect of smoking on others. It can also include the awareness that one can serve as a positive or negative role model for others. Empathy training, documentaries, and family interventions can lead to such assessments.

Self-liberation is both the belief that one can change and the commitment and recommitment to act on that belief. New Year's resolutions, public testimonies, and multiple rather than single choices can enhance what the public calls willpower.

Helping relationships combine caring, trust, openness, and acceptance as well support for the healthy behavior change. Rapport building, therapeutic alliances, counselor calls, and buddy systems can be sources of social support.

Counterconditioning requires the learning of healthy behaviors that can substitute for problem behaviors. Relaxation, desensitization, nicotine replacement, and positive self-statements are strategies for finding safer substitutes.

Contingency management provides consequences for taking steps in a particular direction. Although contingency management can include the use of punishments, we found that self-changers rely on rewards much more than punishments. Therefore reinforcements are emphasized, because a philosophy of the stage model is to work in harmony with people's natural ways of changing. Contingency contracts, overt and covert reinforcements, and group recognition are procedures for increasing reinforcement and the probability that healthier responses will be repeated.

Stimulus control removes cues for unhealthy habits and adds prompts for healthier alternatives. Avoidance, environmental reengineering, and self-help groups can provide stimuli that support change and reduce risks for relapse.

Social liberation requires an increase in social opportunities or alternative, especially for people who are relatively deprived or oppressed. Advocacy, empowerment procedures, and appropriate policies can produce increased opportunities for health promotion among minority, gay, and impoverished populations. These same procedures, such as smoke-free zones, salad bars in school lunchrooms, and easy access to condoms and other contraceptives, can also be used to help all people change.

Decisional Balance

Decisional balance reflects an individual's of the pros and cons of changing. Originally, we relied on Janis and Mann's model (1977) of decision making, which included four categories of pros (instrumental gains for self and for others and approval for self and for others) and four categories of cons (instrumental costs to self and to others and disapproval from self and from others). In a long series of studies attempting to produce this structure of eight factors, we always found a much simpler structure- just the pros and cons of changing.

Self-Efficacy

Self-efficacy has two parts

Confidence, the primary construct in self-efficacy, is the situation-specific confidence people have that they can cope with high-risk situations without relapsing to their unhealthy or high-risk habits. This construct was adapted from Bandura's self-efficacy theory (1977, 1982).

Temptation describes the intensity of urges to engage in a specific habits when in the midst of difficult situations. The three most common types of temping

situations are negative affect or emotional distress, positive social occasions, and cravings.

Critical Assumptions

The Transtheoretical Model concentrates on five stages of change, ten processes of change, the pros and cons of changing, and self-efficacy and temptation. The model is also based on critical assumptions about the nature of behavioral change and about the interventions that can best facilitate such change.

The following set of assumptions drives both TTM research and TTM practice.

1. No single theory can account for all the complexities of behavioral change. Therefore, a more comprehensive model will most likely emerge from an integration across major theories.

2. Behavioral change is a process that unfolds over time through a sequence of stages.

3. Stages are both stable and open to change just as chronic behavioral risk factors are both stable and open to change.

4. Without planned interventions, populations will remain stuck in the early stages. There is no inherent motivation to progress through the stage of intentional change as there seems to be for stages of physical and psychological development.

5. The majority of at-risk populations are not prepared for action and will not be served by traditional action-oriented prevention programs. Health promotion can have much greater impact if it shifts from and action paradigm to a stage paradigm.

6. Specific processes and principles of change need to be applied at specific stage if progress through the stages is to occur. In the stage paradigm, intervention programs must be matched to each individual's stage of change.

7. Chronic behavioral patterns are under some combination of biological, social, and self-control. Stage-matched intervention have been designed primarily to enhance self-control.

In conclusion: This concept use to assess behavior of patients in order to provide proper activities for their group, there are 5 stages that each stage has difference method for help the patients have proper behavior then should be assess the patients by apply the stages of change model.

2.2. Participatory Learning (Department of Mental Health, 1999:12-17)

Participatory Learning used the 'student-centered' method which consists of Learning through experience and learning efficiently.

Learning through experience emphasized that the learner searches for knowledge by himself from his past experiences, comprises of 5 principles:

1. Learning through the students'

2. Challenges for learning new things continuously, called "Active Learning "

3. Interaction among students, and between teachers and students

4. Interaction that expands the network of knowledge

5. Communication through speaking or writing is the instrument for knowledge exchange, information analysis, and knowledge development.

Components of Learning through Experience

There are 4 Components of Learning through Experience:

1. Experience: The teacher helps his students in using their past experiences to develop new knowledge.

5. Communication through speaking or writing is the instrument for knowledge exchange, information analysis, and knowledge development.

Components of Learning through Experience

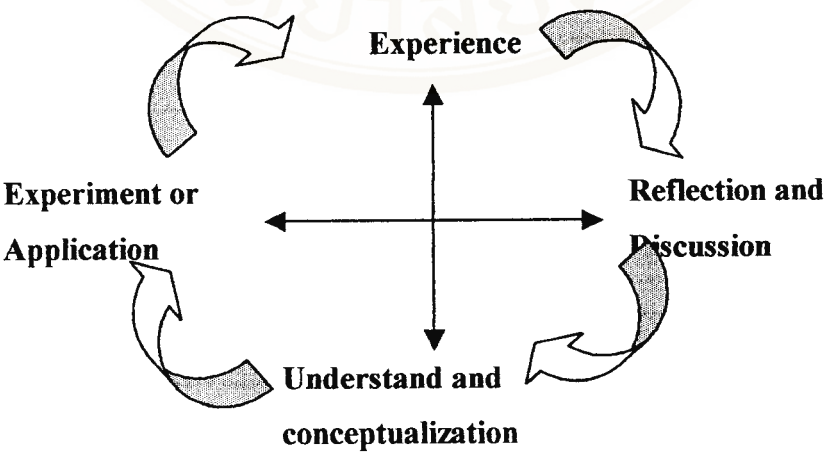
There are 4 Components of Learning through Experience:

1. Experience: The teacher helps his students in using their past experiences to develop new knowledge.

2. Reflection and Discussion: The teacher helps his students in expressing their ideas in order that students exchange opinions and learn from each other.

3. Understand and conceptualization: The students understand and will lead them to the conceptualization. This may happen in two ways-the student initiates the idea which would then be fulfilled by the teacher, or the teacher initiates and fulfil to conceptualization by the students.

4. Experiment or Application: The students applies new knowledge in different life situations.



Figer 1 : Four components of Learning through Experience in participatory learning

participation in every component. This includes sharing experiences, reflecting ideas and discussion, Understanding conceptualization, and having experiment or application of the knowledge. There should be the maximum learning in component or we can say that:

Maximum Learning (L_{max}) equals to Maximum Participation (Par_{max}) plus Maximum Performance (Per_{max}) in the four components of the participatory learning

$$L_{max} = (Par_{max} + Per_{max}) \times 4$$

Maximum Participation resulted from appropriate grouping in each learning component. Each group has different advantages and disadvantages, for example, a specific group may contribute a lot to the public but might lack variety of ideas. This kind of group then is suitable for the situation in which the teacher needs the expression and exchange of ideas from experiences without any conclusion. The details of different types of group and the limitations are in the below table:

Table 2 : Different type of grouping

Type of group	Description	Instruction	Constraints
Pair Group	Students group in pair to complete the assigned activities	Every students should be involved in all expression of ideas and action	Lack of variety of notion and experience
Traid Group	Students group in 3 Role represents clearly and can be exchanged within group	Each student has an opportunity to play every role and learn new role	Lack of variety of and confused role play

Table 2 : (cont.) Different type of grouping

Type of group	Description	Instruction	Constraints
Buzz Group	Temporary group of 3-4 students to express ideas	Every students has a chance to participate in a short period of time without any conclusion or gain only rough conclusion	Lack details and clear explanation
Small Group	5-6 student a group to accomplish activity assigned	Exchange of opinions and deep discussion to conclusion	Time consumption
Large Group	15-30 students or the whole class	Need more discussion and full idea expression or gather opinion from Buzz Group to get conclusion	Some students may not be participating or very little involvement. Also time consumption
Cross-over Group	2-step grouping. Small group for same activity to achieve expertise and all small groups gather to only one group for further development	Need each student to use full capacity in construction knowledge. Each student has involvement and gain intense knowledge.	Most time consumption. and some information/knowledge might be overlooked
Subgroup	2-step grouping. From 8-12 student group will be split into subgroup of 3-4 persons to work on different assignment	(the same with cross-over group)	(the same with cross-over group)
Pyramid Group	Collection of idea, starting from 2-4 persons a group, increasing in numbers of group members until the whole class has been included	Build awareness and empathy for each group	Lack of summarization and complete details

Appropriate grouping by the teacher in each teaching period facilitates the maximum participation and the dynamic interactive learning which will continuously inspire the students' interests.

Maximum Performance

Although designating various grouping will strengthen the participatory learning, the learning may not always be efficient. The essential core of maximum performance is the assignment to the group. There are 3 essential components of activity assignment:

1. Clearly indicate the activity, objective, type of grouping, time constrain, and preparing for presentation to other students within the specified time period.

2. Clearly assign group or individual role. In Buzz group, the role and assignment should be different. When the small groups gather the knowledge will then be various and interesting. Role assignment also include each member' s role in a group, for example, role play, observer's role or leader's role in presentation, etc.

3. Clear structure should be giving the indicated for the activity details and roles. This can be done by giving the students the work description and schedule or giving work instruction slip to the group. The later is suitable for buzz group that works for the large group. The details as below:

Work Instruction Slip is the instruction / description of assignment. The teacher may type or write in a piece of paper and distribute to the students or the groups. Often use in reflection of ideas and discussion and application activities. Clarification Slip is explanation of less-detailed work in the large group. Before starting the activities, the teacher may writes on the board or transparency and let the

students read out loud in the class or in the large group. Often use in Experience learning activity or application.

In conclusion: Participatory Learning used the 'patient-centered' method which consists of Learning through experience and learning efficiently that the patients searches for knowledge by themselves from his/her past experiences and the patients will have activity all time. There are exchange experiences between patients and health educator that help the patients develop new knowledge. In this study use Participatory Learning develop health education activities which there are 2 principles:

1. Learning through experience, comprises of using past experience to develop new knowledge, Reflection and Discussion, Understand and conceptualization, Experiment or Application.

2. Efficient learning which providing appropriate grouping in each learning component. Each group has difference advantages and disadvantages, for example, a specific group may contribute a lot to public but might lack variety of ideas. This includes sharing experiences, reflecting ideas and discussion, Understanding conceptualization, and having experiment or application of the knowledge that the patients should have maximum learning and can apply to their dairy life.

Part 3 : Related Researches

3.1. Related researches in Thailand

Table 3 : Related Researches in Thailand

Title	Research/year	Objectives	Samples	Intervention	Outcome
The effectiveness of a health education program on dietary control and exercise behavior modification among diabetic patients at Hankha Hospital Chainat province.	Narit cennoy (1999:113-117)	To study on the effectiveness of a health education program by applied Protection Motivation Theory with significant others to modify dietary control and exercise behavior of diabetic patients at Hankha Hospital Chainat province.	-Diabetic patients 88 person each group was 44 persons. -The age 40-60 years old **Concepts and theories in research** -Protection Motivation Theory -Social support -Group process	-Video -lecture -group discussion -model	After the experiment, the experimental group perform significantly better than before the experiment regarding their perception of the severity of the disease, probability, self-efficacy, outcome expectations and practices about eating and exercise behavior and than the comparison group. The plasma blood glucose of the experimental group was significantly lower than prior to the experiment and the comparison group.
The application of self-efficacy theory and health belief model to modify non-	Surasak Thumpenjit (1998: 112-113)	To assess the effectiveness of health education program for	Type 2 diabetic patients, the experimental group	-video -slide -behavior record	The experimental group gained a statistically higher

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Table 3 : (cont.) Related Researches in Thailand

Title	Research/year	Objectives	Samples	Intervention	Outcome
insulin dependent mellitus patients' behaviors at Sakolnakhon hospital in Sakolnakhon province.		blood sugar level control by applying self-efficacy theory and health belief model with group activity.	comprised 48 patients and the comparison group was 50 patients. **Concepts and theory** - self-efficacy theory - health belief model	-model -lecture	level of knowledge and practice about diabetes, the self-efficacy, the practice response efficacy and the practiceness than before experimentation and more than those of the comparison group. In addition, in the experimental group, the fasting blood sugar was decrease of the end of the program and rates significantly lower than those in the comparison group.
An application of self-efficacy theory with significant other for improving behaviors among diabetes mellitus patients, Sawanpracharuk hospital, Nakhonsawan province.	Sirima Naovarat (1998: 88-89)	To assess the health education program by applied self-efficacy theory with significant others to modify dietary control and exercise behavior of diabetic patients at Hankha Hospital Chainat province.	Diabetic patients, 40 patients in the experimental group and 39 patients in the comparison group **Concept and theory** -self-efficacy - significant others	A quasi-experimental research -video -posters -lecture	After the experiment, the experimental group had significantly better knowledge, perceived self-efficacy and practice than prior to the experiment and than the comparison group. Outcome expectation did not

Table 3 : (cont.) Related Researches in Thailand

Title	Research/year	Objectives	Samples	Intervention	Outcome
The effectiveness of health education program on level of blood sugar control among diabetes mellitus patients at Charoenkrung Pracharuk hospital in Bangkok.	Sudaporn Dumrongwanich (1994: 92-99)	To assess the effectiveness of health education program by applying group process with modification of self-efficacy theory of Albert Bandura's Model and Health Belief Model for diet control and exercise.	Non-insulin dependent diabetes mellitus, 50 patients in the experimental group and 48 patients in the comparison group. **Concept and theory** - self-efficacy theory - Health Belief Model	The health education program by group process for 1 hour and 30 minutes, 3 times at 1 month interval while the comparison group received a regular health education program.	differ. Furthermore, at the end of experiment, blood sugar (HbA_{1c}) of the experimental group was significantly lower than prior to the experiment and than the comparison group. The results showed that the experimental group grained a statistically higher level of the perceived susceptibility and severity to complication, the self-efficacy, the practice response efficacy, and the practiceness than before the experimentation and more than those of the comparison group, in addition it was found to be statistical positively associated with their behavior. Their educational level was significantly

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Table 3 : (cont.) Related Researches in Thailand

Title	Research/year	Objectives	Samples	Intervention	Outcome
					related to their regularity in their exercise; but their sex, age and duration of diabetes mellitus illness were not. In the experimental group, the fasting blood sugar was decease at the end of the program and rated significantly lower than those in the comparison group.
	Supavadee Limpaphanont. (1994: 98-103)	To assess the effectiveness of the health education program on behavior change of diabetes patients which include knowledge and practice, self-efficacy relationship problem solving were applied.	Type 2 diabetic patients, 40 patients in each group. **Concept and theory** - self-efficacy	The experimental group received individual health promotion program intervention 3 times and each 1 hour for 2 weeks period. The total time spent 8 weeks. The comparison group received routine teaching.	The results revealed that: before the experiment the grained mean score, the knowledge and the practice in self-care related to dietary control, exercise, foot care, reduced smoking mean score of the experimental group was statistically higher than the comparison group before the experiment.
The effect of goal setting for changing	Kanchana Jaithum (1998: abstract)	To assess the effectiveness of a	NIDDM patients 79 patients,	The experimental group received one	The results showed that the experimental

Table 3 : (cont.) Related Researches in Thailand

Title	Research/year	Objectives	Samples	Intervention	Outcome
behavior related to blood sugar control among NIDDM at Yala hospital.		health education program by applying goal setting with modification of self-efficacy theory for dietary control and exercise.	**Concept and theory** - goal setting - self-efficacy	hour health education program for 3 months while the comparison group received a regular health education program. -video -behavior record -group discussion	group gained a statistically higher than level of the mean score on the knowledge, the perceived self-efficacy, perceived outcome expectations and practice about diet control and exercise than before experimentation and than those of the comparison group. The HbA1c of the experimental group was also decreased significantly.
The application of self-efficacy theory for developing preventive behaviors against complications of hypertension patients in Chaoprayayommarai hospital Suphanburi province.	Praneet Singthong (1998: 89-96)	To develop preventive behaviors against complications of hypertension patients with the application self-efficacy theory to develop health education program.	Hypertension patients, 50 patients in the experimental group and 50 patients in the control group. Concept and theory -self efficacy theory -group process	The experimental group -demonstrate and training -model -group process - to remind by letter	-After the experiment, the experimental group had more significantly changes in knowledge, perceived self-efficacy outcome expectations and preventive behavior against complications of hypertension than before the experiment

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Table 3 : (cont.) Related Researches in Thailand

Title	Research/year	Objectives	Samples	Intervention	Outcome
					and than the complication group.
The effectiveness of a new approach to a health education program on Self-care behavior of NIDDM patients at Rajvithi Hospital.	Suree Chanthamolee (1992: 151)	To examine the effectiveness of a new approach to a health education as an integrated component of quality care.	NIDDM 80 patients in the experimental group, 88 patients in the comparison group. **Concept and theory** -self-efficacy -self-care theory -significant others -force-field analysis -focus group	-video -focus group -to remind by letter	The results show that health education program significantly contributed higher achievement in among those patients than prior to the study and comparison group in terms of changes in knowledge, self-efficacy and practice.
The stages of change model applied to a smoking cessation program among male junior high school students in Bangkok.	Kullawan Nakkarung (1997: 110-118)	To evaluate the effectiveness of a health education program on smoking cessation among male junior high school students in Bangkok.	Ninety male students from Mathayomsuksa 3 volunteered to participate in the study. Fourty-six of the students were assigned to partake in the health education program(the experimental group). The remainind 44 students comprised the comparison group.	-Lecture -Group discussion -Video -Role play **Concept and theory** -Stages of change model -Social support -Group process	-Participate in the health education program on smoking cessation resulted in a significant increase in attitude of smoking, the perceived susceptibility to decrease caused by smoking, self-efficacy to quit smoking, and quitting smoking behavior, and self-efficacy was significantly correlated to quitting smoking practices.

Table 3 : (cont.) Related Researches in Thailand

Title	Research/year	Objectives	Samples	Intervention	Outcome
Stage of change model applied to promote AIDS preventive behavior among pregnant women attending Buddachinaraj Hospital antenatal care clinic.	Pissamai Jaruchavalit (1995: 83-84)	To evaluate the effectiveness of health education program on AIDS preventive behavior among pregnant women.	The samples were the pregnant women, 62 pregnant women in each group. **Concept and theory** -stages of change model -group process	-video -demonstrate and training skill -focus group -individual counseling	After the experiment, the experiment group significantly changed in terms of attitude and practice in preventing HIV infection. The statistical relationship was shown between the attitude and practice.
The effectiveness of Self-Care Program, emphasized on community participation, on hypertension preventive behavior among elderly in Phree Province.	Suwicha Jansuriyagool (1993: 111-116)	To examine the effectiveness of Self-Care Program for hypertension prevention among elderly in Phree Province by applying relevant theries: Orem's theory, WHO's self-care concepts community participation, health belief model, group process including health education methods and materials.	The samples population was consisted of the elders with over 60 years of age with above, normal and borderline blood pressure. The experimental group consisted of 64 persons, the comparison consisted of 63 persons.	Situation study Village health volunteer training Training program for villages leader, villages committee, informal leaders, and elderly's close relatives Group discussion **Concept and theory** -Health belief model -Group discussion -Self-care theory	After the experiment, the statistically significant of perceived severity, perceived susceptibility and perceived benefits and obstacles of hypertension preventive behaviors were found in the experimental group when compared with the pre-test and with the comparison group.

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In conclusion: After reviewing related research, conclusion can be drawn that most of the research were studies in patients whose age were between 40-60 years old and interventions were aimed to promote the patients' knowledge about DM, perceived susceptibility and severity of having complications' perceived self-efficacy, perceived efficacy expectation, perceived outcome expectation and changed behavior to control blood sugar. The interventions activities included lecture, VDO presentation, group discussion and none of them had ever assessed the patients' behavior before implemented the activities. Therefore, this research aims to measure changes of the patients' behavior by assessing them before conducting the activities patients and applying the participatory learning to help tailoring the activities to fit with his/her past experiences.

3.2 Related researches in Other Countries:

Plotnikoff, R.C., et al., (2000: 450-9) The purpose of this study was to investigate the factors associated with exercise behavior among adults with diabetes. Exercise behavior (stage of exercise readiness and energy expenditure) and potential determinants were measured on a subsample (n = 46) of adults with type 1 or type 2 diabetes from a randomized population-based telephone survey. Participants were assessed at baseline and at a 6-month follow-up. Results indicated that sociodemographic and biomedical characteristics did not have any significant differences between the stages of exercise behavior. Scores on the psychosocial constructs of self-efficacy, behavioral processes, self-concept, and social support were significantly higher for those in the action stage than those in the pre-action stage of exercise readiness. Self-efficacy and behavioral process of change were significantly associated with energy expenditure; self-efficacy was the strongest predictor in the

longitudinal analysis. Conclusions was made to reiterate that the findings may generate direction for theory development and guide health and medical practitioners when intervening on the specific constructs. Population- and community-based surveys have utility for assessing diabetes health-related behavior (e.g., Exercise behavior).

Via, P.S., & Salyer, J. (1999:727-37) had conducted the descriptive correlational study to describe the perceived psychosocial self-efficacy, attitude toward having diabetes, baseline glucose level, and personal characteristics of male veterans with type 2 diabetes. The Diabetes Empowerment Scale (DES) was mailed to participants and collected on the day of the program. Percent ideal body weight and glycosylated hemoglobin were measured. Comparisons were made by educational level, racial origin, and type of medication regimen on the DES and its subscales. Results revealed that participants on oral medication versus insulin had higher scores in the categories of Motivation to Change and Ability to Cope with Feelings. Participants with less education had greater scores in Ability to Cope with Feelings and Obtain Support. No racial differences were seen on the measured scores; a significant difference was seen between Caucasians and non-Caucasians in baseline glycemic control. Conclusions was made in term of targeting intervention strategies early in the course of disease progression may positively affect outcome, longitudinal studies are needed to demonstrate the impact of self-management training on psychosocial self-efficacy and clinical outcomes.

Meland, E. , et al.,(1999: 11-7) had conducted the study on the total patient sample (n = 110) of a randomized controlled trial comparing two intervention methods advising cardiovascular high-risk men of lifestyle changes in general practice. Behaviour and risk factor changes during the one-year intervention study were analysed using

multiple regression and logistic regression analyses with the above-mentioned independent variables. Twenty-two general practice centres in the county of Hordaland, western Norway. Results revealed that the self-efficacy of increased physical exercise was the only variable significantly related to the exercise change. Age and self-efficacy were statistical significant predictors of smoking cessation success. None of the independent variables was statistically significantly related to blood pressure or cholesterol change. Educational level related negatively, although statistically insignificant, with total risk change. The study conducted that self-efficacy in both human behaviour and motivation for behaviour change are important. Objectives: The objectives of the study were to explore the impact of possible predictors for cardiovascular risk behaviour change, predictors such as education, age, self-efficacy, doctors' interpersonal skills, and number of appointments.

Gafvels, C.,(1999: 2211-4) Having diabetes affects life in many ways. The achievement of well-functioning self-care is highly dependent on the patient's ability to come to terms with the disease as an integral part of life, an integration which in turn is crucially dependent on the patient's emotional experience of the disease and trustful relationships with the health care professionals involved. Thus, the caregiver's professional expertise must include knowledge of the medical, psychological and social aspects of the disease. The article consists in a review of the results and conclusions of a population study designed to examine type 1(insulin-dependent) diabetics' experience of living with their disease, their use of, and attitudes to, diabetes care, and the social and psychosocial impact of the disease on their lifestyle. The principal determinants of the patients' relationship both to the disease itself and to diabetic care appeared to be gender and the presence or absence of chronic

complications. Another finding was the need of increased psychosocial support expressed by many patients, which suggests medical social workers to be important members of the diabetes care team.

Fisher, L., et al.,(1998: 599-607) Four broad groups of factors have been linked with self-management behavior in type 2 diabetes over time: (1) characteristics of patients, (2) amount and management of stress, (3) characteristics of providers and provider-patient relationships, and (4) characteristics of the social network/context in which disease management takes place. Of these four, social network/context has received the least amount of study and has been described in terms not easily applicable to intervention. The study had identified the social network/context of diabetes management as residing within the family. We defined the family for clinical purposes, reviewed the literature concerning what is known about the link between properties of the family context of care and outcomes in type 2 diabetes and other chronic diseases, and identified areas of family life that are relevant to diabetes management. This information was then used to demonstrate how a family context of care can serve as a clinical framework for integrating all four groups of factors that affect disease management. Implications of this approach for practice and research are described.

Wang, J.S., et al.,(1998: 807-15) The purpose of this study was to explore the glycemic control and influencing factors in outpatients newly diagnosed with type 2 (non-insulin dependent diabetes mellitus, NIDDM) diabetes. By purposive sampling, data were collected from 130 outpatients with type 2 diabetes mellitus at one medical center in Kaohsiung. The results indicated that (1) the mean value for HbA_{1C} was

7.12%; and 63.1% of the patients belonged to moderate to well controlled group; (2) male patient's HbA_{1C} value was significantly lower than female patient's; patients with no religious belief also had a lower HbA_{1C} value than patients with a religious background; (3) there were strongly negative correlations between self-care behaviors, social support, and self-efficacy and HbA_{1C}; (4) using a multiple stepwise regression analysis, religious belief and self-care behaviors were found to explain 10.9% variance of HbA_{1C} level. The results of this study could be used as a reference for diabetes health education program.

Penninx, B.W., et al.,(1998: 551-8) Effects of psychosocial coping resources on depressive symptoms were examined and compared in older persons with no chronic disease or with recently symptomatic diabetes mellitus, lung disease, cardiac disease, arthritis, or cancer. The 719 persons without diseases reported less depressive symptoms than the chronically ill. Direct favorable effects on depressive symptoms were found for having a partner, having many close relationships, greater feelings of mastery, greater self-efficacy expectations, and high self-esteem. Buffer effects were observed for feelings of mastery, having many diffuse relationships, and receiving emotional support. Buffer effects were differential across diseases for emotional support (in cardiac disease and arthritis only) and for diffuse relationships (in lung disease). Receiving instrumental support was associated with more depressive symptoms especially in diabetes patients.

Conclusion: After reviewing the related research in other countries it can be conducted that most studies were conducted on identifying the factors associated with behavior among diabetic patient and the results showed that the social support was crucial in promoting self care as expressed by many patients.

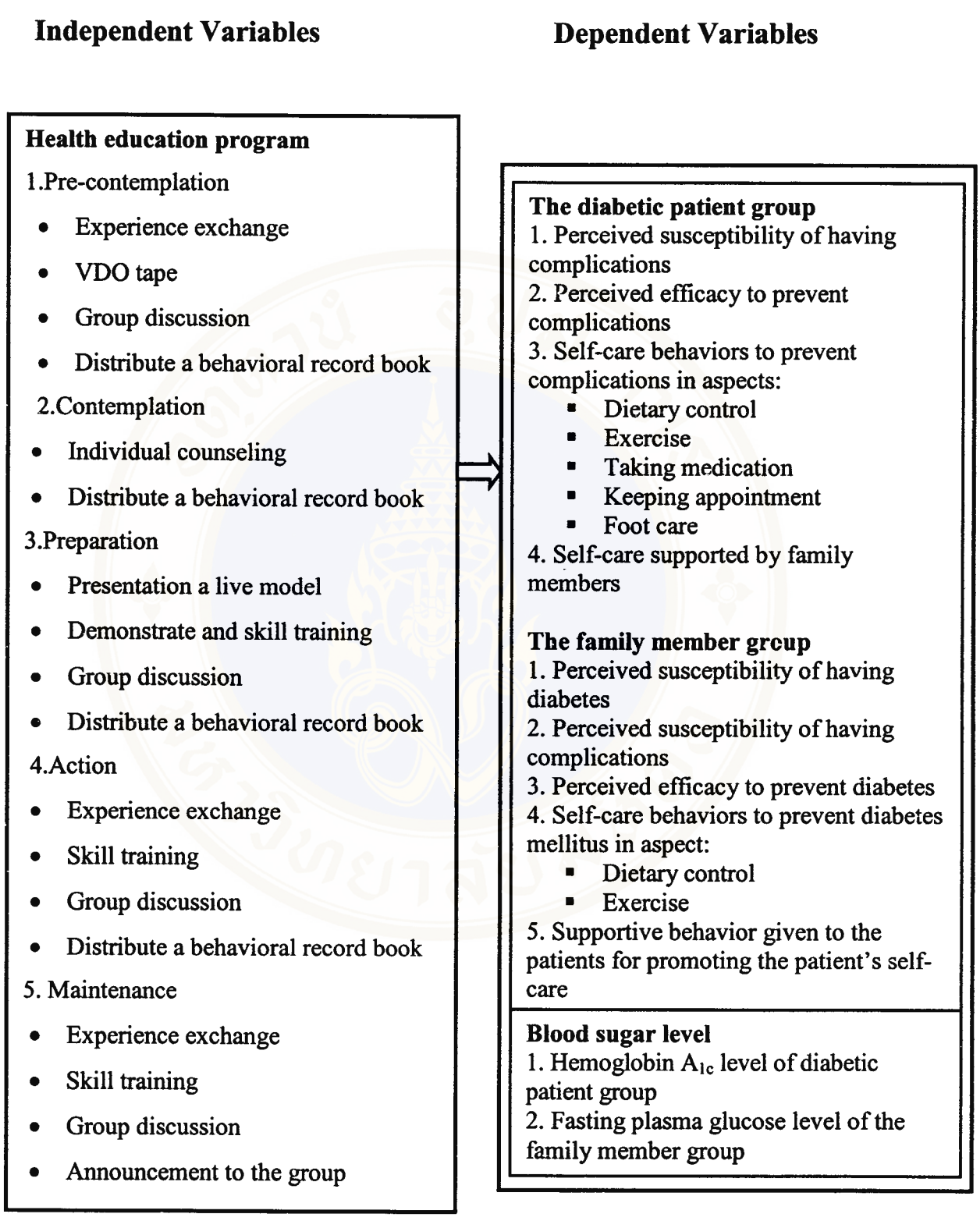


Figure 2: Conceptual Framework of Research " **An application of Transtheoretical model and Participatory Learning approach to promote diabetic self-care behavior in Tha -Ta Ko District Nakhonsawan Province"**

CHAPTER III

MATERIALS AND METHODS

This research was a quasi-experimental research by applying the Transtheoretical model and Participatory Learning principles in designing a health education program for changing health behaviors of the type 2 diabetic patients and the family members at Tha-Ta Ko District, Nakhonsawan Province. The research procedure includes:

1. Population and Sampling
2. Research design
3. Research instruments
4. Data collection
5. Statistical Analysis

1. Population and Sampling

1.1 Population in this research refers to diabetic patients and family members who were in the age group between 40-60 year old and lived in Tha-Ta Ko District, Nakhonsawan Province.

1.2 Sampling method: This study has applied the purposive sampling method by having the following

Sampling criteria:

1. Select the subdistrict where most of diabetic patients of Tha-Ta Ko District clinic came from the most and the second most;

1) The subdistrict should have most or second most diabetic patients in the Tha-Ta Ko clinic;

2) The selected villages which will be assigned as the experimental area and comparison areas should have similar geographical and socio- ecocultural context.

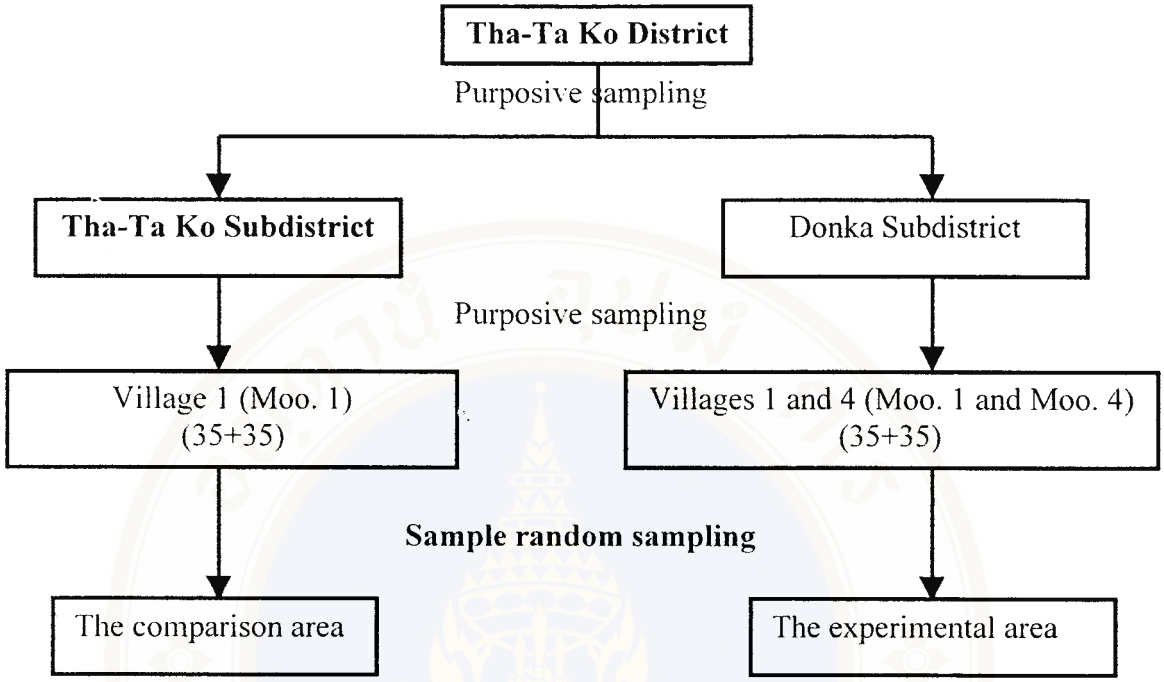
For the village level, As a result the Moo.1 and Moo.2 of Donka Subdistrict and Moo.1 of the Tha-Ta Ko Subdistrict were included in the study as a result of simple random sampling.

As a result, Donka Subdistrict was selected as the experimental group area, and Tha-Ta Ko Subdistrict became the comparison area as a result of simple random sampling.

Population sampling criteria in the patient group includes their willingness to join the program, and age group between 40-60 years old, receiving treatment from the Tha-Ta Ko clinic, has no problem in having visiting and speaking, and had no serious diabetic complication.

For the family member group sampling criteria besides willingness to participate in the program, the criteria also include living with the patients, age group between 40-60 years old.

Sampling steps diagram:



2. Research Design

This research was a pretest-posttest two groups quasi-experimental research (Waraphongsathon, T. 1997: 378) as shown in the diagram:

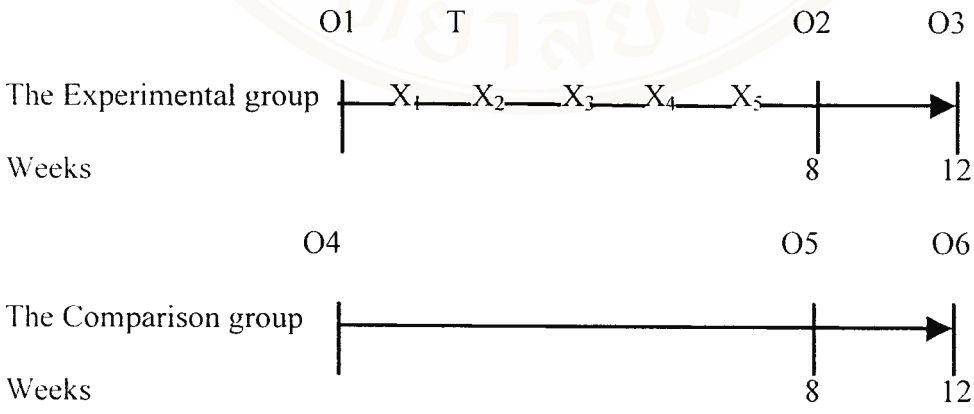


Figure 3 Research Design

Health Education Program

$X_1 - X_5$ = Health education program

O1,O4 = Collecting data before the experiment (Pretest)

O2,O5 = Collecting data after the experiment

O3,O6 = Collecting data for evaluation after finished health education program 4 weeks

X1 refers to the provision of the health education program in precontemplation stage.

X2 refers to the provision of the health education program in contemplation stage.

X3 refers to the provision of the health education program in preparation stage.

X4 refers to the provision of the health education program in action stage.

X5 refers to the provision of the health education program in the maintenance stage

T refers to a training program for the family members about disease and complications of diabetes mellitus.

Table 4. The Health Education Program

Stages of behaviors	Health education activity	Patients	Family members	Expected outcome
1.pre-contemplation stage	1.Experience exchange about cause and severity from complications 2.Watching video about diabetes mellitus and complications 3.Group discussion and presented about diet control and exercise. 4.Distribute a behavioral record and leaflet.	✓	✓	-The samples had perceived susceptibility of having complications and like to have proper behaviors in dietary control, exercise, taking medicine and keeping appointment

Table 4. (cont.)The Health Education Program

Stages of behaviors	Health education activity	Patients	Family membes	Expected outcome
The family members (Training)	1.To exchange their experiences about problem/cause and complications of diabetes mellitus 2.Watching video about diabetes mellitus /cause and complications. 3.Groupdiscussion and presented to prevention. 4.Conclusion by the researcher. 5.Distribute a behavioral record		✓	- The samples had perceived susceptibility of having complications and like to have proper behaviors in preventing complication.
2.(patients) contempla-tion stage	1.Individual counseling. 2.Distribute a behavioral record.	✓		-The samples were determined to have behaviors in diabetes control.
3.prepration stage (patients)	1.Presentation of a live model who had proper behaviors and controlling blood sugar. 2.demonstrate healthy diet and healthy diet menu management. 3.Exercise. 4.Distribute a behavioral record.	✓	✓	-The samples had skill in proper behaviors to blood sugar control (patients) and to prevent DM (The household group).
The family Members	-Conference to seeking problem and conception encouragement and mental support.		✓	-To confidence in encouragement and mental support.
4.Action stage	1.Discussion to problem, obstacles and conception, encouragement and mental support. 2.Training as same as preparation stage 3.The researcher had reinforcement.	✓	✓	-The samples had proper behaviors and had confidence in practice.
The Family Members	-Conference to problem and conception, encouragement and mental support.		✓	-To confidence in encouragement and mental support.

Table 3. (cont.) Health Education Program

Stages of behaviors	Health education activity	Patients	Family members	Expected outcome
5. Maintenance stage	1.Discussion to problem, obstacles and conception, encouragement and mental support. 2.Training as same as preparation stage 3.Announce to group and membership had mental support. 4.The researcher had reinforcement.	✓		-The samples had proper behaviors and had confidence in practice.
The family Members	-Conference to problem and conception, encouragement and mental support.		✓	-To confidence in encouragement and mental support.

3. Research Instruments

Research instruments used in this study consist of data collection instruments and the experimental instruments

1. **Data collection instruments compose of two sets questionnaire, one for the patients, and the other one for the family members:**

1.1 For diabetic patients, the questionnaire consisted of 7 parts as follows:

Part 1: Socio-Demographic characteristics of diabetic patients. This part included sex, age, education, marital status, occupation, duration of diabetes mellitus, family history of diabetes mellitus, diabetes mellitus's examination family income, body weight, blood pressure and hemoglobin A1c. There were 12 questions in this part.

Part 2: The questions aimed to classify the diabetic patients into different stage and it was applied before the experiment only. There were 20 questions which measured by a rating scale. Results were classified in 5 levels as suggested by the Transtheoretical model.

Items 1, 7, 8, 18 indicated that the samples are in the precontemplation stage.

Items 3, 10, 15, 17 indicated that the samples are in the contemplation stage.

Items 4, 5, 6, 16 indicated that the samples are in the preparation stage.

Items 2, 9, 12, 14 indicated that the samples are in the action stage.

Items 11, 13, 19, 20 indicated that the samples are in the maintenance stage.

Part 3: The questions aimed to assess stages of change of the samples focusing on 5 behaviors: eating, exercise, taking medicine, keeping appointment and foot care and the estimation level were classified 2 levels. The choices were yes and no in order to classify the samples after attending the health education program. There were the total of 8 questions.

Part 4:Perceived susceptibility of having complications. There were 12 questions and measured in a rating scale which were classified into 3 levels and weighted by 3 points for agree, 2 points for not sure, 1 point for disagree and the samples must choose one. The questions were stated in the positive measure. The scores range from 12-36 points. Base on Kiess, H. O. (1989: 48) classification criteria equation:

$$\text{Size of class interval} = \frac{X_{\text{highest}} - X_{\text{lowest}}}{\text{Number of intervals}}$$

Part 5: Perceived efficacy to prevent complications. There were 14 questions which measured in a rating scale which were classified and weighted into 3 levels: 3 points for can, 2 points for not sure and 1 point for cannot and the samples must choose one. The questions were stated in the positive measure. The scores range from 14-42 points and classified as same as part 4.

Part 6: Self-care behaviors to prevent complications, there were 20 questions and consisted of dietary control, exercise, taking medicine, keeping

appointment and foot care, and the samples must choose one. The scores range from 20-80 points. Base on Bloom, (1971:41) the classification of criteria equation are as following:

Scores	Level of Behavior
Below 60%	Low
Between 60%-80%	Moderate
Higher than 80%	High

Part 7: Taking self care supported by family members and there were 5 questions and measured in rating scale which were weighted into 3 levels: 3 points for frequently, 2 points for sometimes, 1 points for never and the samples must choose one. The questions were stated in the positive measure. The scores range from 5-15 points and classified as same as part 6.

1.2 For the family members, questionnaire consisted of 6 parts as follows:

Part 1: Socio-Demographic characteristics of the family members. This part included sex, age, education, marital status, occupation, family history of diabetes mellitus, body weight, blood pressure and fasting blood sugar. There were 10 questions in this part.

Part 2: Perceived susceptibility of having diabetes and there were 8 questions, measured in a rating scale which were classified into 3 levels and weighted by 3 points for yes, 2 points for not sure, 1 point for no and the samples must choose one. The questions were stated in the positive measure. The scores range from 8-24 points and classified as same as part 4 of the questionnaire for diabetic patients.

Part 3: Perceived susceptibility of having complications and there were 12 questions which measured in a rating scale which were classified and weighted into 3 levels 3 points for yes, 2 points for not sure, 1 points for no and the samples must choose one. The questions were stated in the positive measure. This score range from 12-36 points and classified as same as part 4 of the questionnaire for diabetic patients.

Part 4: Perceived efficacy to prevent complications and there were 6 questions, measured in a rating scale which were classified and weighted into 3 levels 3 points for can, 2 points for not sure, 1 point for cannot and the samples must choose one. The questions were stated in the positive questions and this score range from 6-12 points and classified as same as part 4 of the questionnaire for diabetic patients.

Part 5: Self-care behaviors to prevent diabetes. There were 11 questions and consisted of dietary control, exercise, taking medicine, keeping appointment and foot care, and the samples must choose one. The score range from 11-44 points and classified as same as part 6 of the questionnaire for diabetic patients.

Part 6: Supportive behavior given to the patients for promoting the patient's self-care. There were 5 questions and measured in a rating scale and estimated were weighted and weighted into 3 levels 3 points for frequently, 2 points for sometimes, 1 points for never and the samples must choose one. The questions were stated in the positive measure and the score range from 5-15 points and classified as same as part 6 of the questionnaire for diabetic patients.

Instrument Developing Steps:

The questionnaire construction was developed by following these steps:

Step 1: Review contents, concepts, theory and information from related documents or research paper.

Step 2: Outline research content and structure of the questionnaire in order to covers the objective and hypothesis.

Step 3: Draft a question and scoring level.

Step 4: Present the research implementation to the advisor to validate the accuracy, content validity, and language usage and expression in order to modify before collecting the data.

Step5: Try out the questionnaire with the type 2 diabetic patients who had the similar characteristics as the sample group to test the questionnaire's validity and reliability. Analyze the questionnaire's reliability by using the Cronbach's alpha Coefficient test from SPSS version 10.0 program and the results were as follow: (See details in appendix)

The Diabetic patient group

The Cronbach's α coefficient of all parts of this questionnaire equals to 0.73 when analyzing each part the perceived susceptibility of having complication equals to 0.72, the highest r = 0.50 and the lowest r = 0.16, perceived self-efficacy to prevent complication equals to 0.78, the highest r = 0.57 and the lowest r = 0.13, self-care behavior influenced by family members equals to 0.74, the highest r = 0.58 and the lowest r = 0.36.

The family member group

1. The Cronbach's α coefficient of all parts of this questionnaire equals to 0.82 when analyzing each part the perceived susceptibility of having diabetes equals to 0.82, the highest r = 0.66 and the lowest r = 0.46, perceived susceptibility of having complication

equals to 0.88, the highest r = 0.75 and the lowest r = 0.27, perceived self-efficacy to prevent diabetes equals to 0.75, the highest r = 0.68 and the lowest r = 0.32, supportive behaviors given to the patients for promoting the patient's self-care equals to 0.81,the highest r = 0.74 and the lowest r = 0.52.

The Experimental Instruments

1. Health education program comprised of V.D.O. tape presentation, group discussion, skill training of exercise and dietary menu management in order to change behaviors of the samples.
2. Learning materials include leaflet, video tape and games.

4. Data collection

1. Preparation
2. Procedure
3. Data collection and Data Analysis

1. Preparation

1.1 Present a letter from the Faculty of Graduate Studies, Mahidol University, to Tha- Ta Ko Hospital's director and Tha-Ta Ko district Public Health office for the permission in research.

1.2 Contact the chief nurse of the diabetes clinic for the approval of selecting the samples. (Diabetic patients)

1.3 Contact the nurse chief of the health promotion section for the approval of selecting the household member in the comparison group.

1.4 Contact the chief of the Donka community health center for the approval of selecting the household member in the experimental group.

1.5 Providing the equipment and place for using in health education activity such as room, table, desk, video tape and leaflets.

2. Procedure

The researcher conducted the experiment with the experimental group for 12 weeks by carrying out 4 sessions of health education activity, 2 sessions on Tuesday and another 2 sessions on Thursday.

Week 1 (24^{th} –28^{th} October 2000) collecting data before the experiment by administering the questionnaire in diabetic patients and the family members and then draw the blood test for hemoglobin A1c in diabetic patients, check fasting plasma glucose in the family members and classified the samples into the experimental group by the Transtheoretical model.

Weeks 2 (30^{th} October 2000– 3^{rd} November 2000) conducted the health education program on the first times in precontemplation stage and contemplation stage and then training the family members.

Weeks 3 (6^{th} –10^{th} November 2000) conducted the first health education session for the preparation stage, action and maintenance stage.

Weeks 4 (13^{th} -17^{th} November 2000) conducted the second health education for the precontemplation stage and contemplation stage.

Weeks 5 (20^{th} –24^{th} November 2000) conducted the second health education session for the preparation stage, action and maintenance stage.

Weeks 6 (27^{th} November – 1^{st} December 2000) conducted the third health education session for the preparation stage, action and maintenance stage.

Weeks 7 (4^{th} – 8^{th} December 2000) conducted the third health education session for the preparation stage, action and maintenance stage and conducted the training of health volunteer to enhance their skill of screening diabetic patients.

Weeks 12 (8^{th}-12^{th} January 2001) conducted the posttest after the experiment by using the same questionnaires in both groups and repeated blood check for hemoglobin A1c in diabetic patients, and fasting plasma glucose in the family members.

5. Statistical Analysis

After the data collection, the researcher edited, coded and analyzed the data by using the computer with statistical software package for social science. Level of significance to accept the hypothesis was set at 0.05 significance level.

1. Descriptive statistics contained percentage distribution arithmetic mean and standard deviation were performed to describe the socio-demographic characteristics of the samples.

2. Compare the differences among average scores of the diabetic patients in their perceived susceptibility of having complication, perceived self-efficacy to prevent complications, self-care behaviors to prevent complication, self-care behavior influenced by family members and of the family members in their perceived susceptibility of having diabetes, perceived susceptibility of having complication, perceived self-efficacy to prevent diabetes, self-care behaviors to prevent diabetes and supportive behavior given to the patients for promoting the patient's self-care before and after the experiment by using Willcoxon Signed Ranks test, between the experimental group and the comparison group by using Mann-Whitney U test.

3. Compare the differences among average scores before and after the experiment by using Willcoxon Signed Ranks test in their hemoglobin A1c and fasting plasma glucose, between the experimental group and the comparison group by using Mann-Whitney U test.

In conclusion: The procedure of the research had performed by selected the samples and divided to the experimental group and the comparison group. Each group had 70 persons who were 35 diabetic patients and 35 family members. The data was collected before the experiment, during the health education program implementation, and after the experiment, then data analysis for test in the hypotheses was applied and result presented in chapter 4.

CHAPTER IV

RESULTS

This study was aimed to apply the Transtheoretical model in assessing and influencing self-care among diabetic patients in Tha-Ta Ko District Nakhonsawan Province. The samples, was 140 persons, were divided into the experimental group with 70 persons and the comparison group with 70 persons. Each group divided into the diabetic patient 35 persons and the family member 35 persons. After conducted the health education program, data from the pretest and posttest were analyzed and the outcomes are presented in 2 major categories as follows:

Part 1. General socio-demographic characteristics of the samples.

Part 2. Comparison of mean scores of pretest and posttest data from two samples groups: the diabetic patients and the family members. The data will be presented in each group as following aspects:

2.1 The diabetic patient group

2.1.1 Provided diabetic patient group by the Transtheoretical model.

2.1.2 Perceived susceptibility of having complications

2.1.3 Perceived efficacy in preventing complications

2.1.4 Self-care behaviors to prevent complications

2.1.5 Self care supported by family members

2.1.6 Hemoglobin A_{1C} level

2.2 The family member group

2.2.1 Perceived susceptibility of having diabetes

2.2.2 Perceived susceptibility of having complications

2.2.3 Perceived efficacy to prevent diabetes

2.2.4 Self-care behaviors to prevent diabetes mellitus

2.2.5 Supportive behavior given to the patients for promoting the patient's self-care

2.2.6 Fasting plasma glucose blood test result.

Part 1. General socio-demographic characteristics of the samples (Table 4)

1.1 The diabetic patient group

The socio-demographic characteristics of the experimental group and the comparison group were similar. Nearly 100% of both groups were female, the age ranged from 55 to 60 years old, married and education level were in the primary school level. Most of the samples in both groups were similar in family history of DM, family income less than 2,500 bath/month, diabetes mellitus's diagnosis when they presented themselves with abnormal symptom, and blood pressure in both groups between 120/60 – 140/100 mmHg. The means score of body weight was 60.40 kilogram in the experimental group and the comparison group was 66.71 kilogram. Some differences of the two groups were the occupation characteristics. While duration of diabetes mellitus of the experimental group ranged 1-4 years and the comparison group was ranged 1-4 years, 9-12 years. (Table 5)

1.2 The family member group

The socio-demographic characteristics of the family members were similar. Most of the samples in both groups were male and their age fell in the group of 55-60 years old. Nearly 100% of both groups were married and their education level was a primary level. Majority of them were a farmer, family income less than 2,500 bath/month and most of them had family history of DM. Their blood pressure were between 120/60 – 140/100 mmHg in both groups. The mean score of body weight was 57.60 kilogram in the experimental group and 59.60 kilogram in the comparison group. (See detail in table 5)

Part 1: The Demographic Characteristic of Samples are Present by Frequency and Percentage

Table 5 Demographic and Characteristics of Samples

Socio-demographic characteristic	Diabetic patient group (n=35)				Family member group (n=35)			
	Experimental group		Comparison group		Experimental group		Comparison group	
	n	%	n	%	n	%	n	%
1. Age (years)								
40-44	5	14.3	4	11.4	6	17.1	8	22.9
45-49	3	8.6	4	11.4	7	20.0	4	11.4
50-54	8	22.9	6	17.2	6	17.2	8	22.9
55-60	19	54.2	21	60.0	16	45.7	15	42.8
2. Gender								
Male	3	8.6	6	17.1	21	60.0	23	65.7
Female	32	91.4	29	82.9	14	40.0	22	34.3
3. Marital status								
Single	2	5.7	1	2.9	2	5.7	6	17.1
Marriage	27	77.1	25	71.4	33	94.3	29	82.9
Widowed	6	17.2	9	25.7	0	0.0	0	0.0
4. Education								
Primary school	33	94.2	28	80.0	33	94.2	27	77.1
Secondary school	1	2.9	4	11.4	1	2.9	3	14.3
Diploma	0	0.0	2	5.7	1	2.9	1	2.9
Bachelor degree	1	2.9	1	2.9	0	0.0	2	5.7
5. Family history of DM								
Have	13	37.1	15	42.9	22	62.9	20	57.1
No have	15	42.9	18	51.4	11	31.4	10	28.6
Not sure	3	8.6	1	2.9	2	5.7	5	14.3
Unknown	4	11.4	1	2.9	0	0.0	0	0.0

Table 5 (cont.) Demographic and Characteristics of Samples

Socio-demographic characteristic	Diabetic patient group (n=35)				Family member group (n=35)			
	Experimental group		Comparison group		Experimental group		Comparison group	
	n	%	n	%	n	%	n	%
6. Family income (Bath)								
< 2,500	22	62.9	18	51.4	22	62.9	17	48.6
2,500-5,000	11	31.3	12	34.3	11	31.4	9	25.7
5,001-10,000	1	2.9	1	2.9	2	5.7	5	14.3
> 10,000	1	2.9	4	11.4	0	0.0	4	11.4
7. Occupation								
Government employee	1	2.9	4	11.4	0	0.0	2	5.7
Merchant	0	0.0	8	22.9	3	8.6	4	11.4
Farmer/ Labour	24	68.5	8	22.9	31	88.5	28	80.0
Housewife	10	28.6	15	42.8	1	2.9	1	2.9
8. Duration of DM (years)								
1 – 4	17	48.6	12	34.3				
5 – 8	14	40.0	11	31.4				
9 – 12	4	11.4	12	34.3				
Mean ± SD	4.86±2.95		6.34±3.27					
9. DM's diagnosis								
Check health	6	17.1	7	20.0				
Check other disease	8	22.9	2	5.7				
Abnormal symptom e.g. vaginal infection tiredness	21	60.0	26	74.3				

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Table 5 (cont.) Demographic and Characteristics of Samples

Socio-demographic characteristic	Diabetic patient group (n=35)				Family member group (n=35)			
	Experimental group		Comparison group		Experimental group		Comparison group	
	n	%	n	%	n	%	n	%
10. Blood pressure Systolic/Diastolic (mmHg)								
170/100-150/90	5	14.3	1	2.9	1	2.9	2	5.7
140/100-120/60	21	60.0	22	62.9	21	60.0	20	57.2
110/80 - 90/60	9	25.7	12	34.2	13	37.1	13	37.1
11. Body weight (kilogram)								
40 – 60	16	45.7	14	40.0	24	68.6	24	68.6
61 – 80	19	54.3	17	48.6	11	31.4	11	31.4
81-100	0	0.0	4	11.4	0	0.0	0	0.0
Mean ±SD	59.63±8.71		67.23±10.54		57.60±7.64		59.60±5.68	

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Part II: Comparison of mean scores of the pretest and posttest data of the experimental group and comparison group.

2.1 The Diabetic Patient Group

Table 6 Number and percentage of the sample by opinion level about diabetes mellitus classified by the Transtheoretical model before the experiment

Stages of change of diabetic patient	The experimental group		The comparison group	
	n	%	n	%
1. Precontemplation stage	0	0.0	0	0.0
2. Contemplation stage	0	0.0	0	0.0
3. Preparation stage	1	2.9	0	0.0
4. Action stage	19	54.2	17	48.6
5. Maintenance stage	15	42.9	18	51.4
Total	**35**	**100**	**35**	**100**

Before the experiment, the data indicated that the samples in the experimental group were in the action stage the most, followed by the maintenance stage and the preparation stage, while the most of samples in the comparison group were in the maintenance stage at 51.4%, followed by action stage at 48.6%.

After applying the Transtheoretical model classification questionnaire to all samples in both groups, the researcher had modified the health education program to fit their stages, the adjusted program is presented had in appendix. (Page 207)

In addition, the researcher had assessed the samples behaviors such as dietary control, exercise, etc by using Transtheoretical model classification questionnaire, the results are presented in table 7.

Table 7 Number of diabetic patients classified by the Transtheoretical model in the experimental group before the experiment.

	The Experimental Group																								
	Before the experiment					After activity 1					After activity 2					After activity 3					After the experiment				
Stages of change	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
1.Dietary control	-	-	-	3	32	-	-	-	3	32	-	-	-	2	33	-	-	-	2	33	-	-	-	2	33
2. Exercise	5	-	-	14	16	-	-	5	14	16	-	-	-	18	17	-	-	-	15	20	-	-	-	13	22
3. Keeping appointment	-	-	-	5	30	-	-	-	5	30	-	-	-	5	30	-	-	-	4	31	-	-	-	3	32
4. Taking medicine	-	-	-	3	32	-	-	-	3	32	-	-	-	3	32	-	-	-	2	33	-	-	-	2	33
5. Foot care	3	-	-	3	29	-	-	3	3	29	-	-	-	6	29	-	-	-	5	30	-	-	-	5	30

Data in table 7 revealed that there were three and five samples of the foot care behavior and the exercise behavior who fell in the precontemplation stage. Therefore, the researcher had modified the program to move these samples forward and joined with the rest of the samples in the upper stages.

Perceived susceptibility of having complications in diabetic patients before the experiment

The experimental group

Before the experiment, the data indicated that most of the samples in the experimental group had perceived susceptibility of diabetes complication in terms of coronary artery stenosis, the feet infection with slowly healing sores the most (65.7%). The second most was perceived susceptibility in getting paralysis from cerebral artery stenosis (62.9%) and the third was perceived susceptibility in having blurred vision, ischemic heart disease and less sensitivity in hand and feet (60.0%).

For the unsure group, most of the samples reported that they were unsured about the following complications: cerebral artery stenosis (40.0%), blurred vision, retinopathy, chronic renal failure, paralysis from cerebral artery stenosis, sex organ infection, impotence (34.3%), ischemic heart disease, hand and feet infection with slowly healing sores (31.4%).

For the no perception of susceptibility group, the ischemic heart disease was reported the most (8.6%), followed by the impotence (5.7%), the retinopathy and less sensitivity in hand and feet (2.9%). (See detail in table 9)

The comparison group

Before the experiment, the data indicated that most of the samples in the comparison group had perceived susceptibility of diabetic complication in terms of having blurred vision the most (68.6%). The second most was perceived susceptibility in getting ischemic heart disease and coronary artery stenosis (65.7%) and the third

was perceived susceptibility in having chronic renal failure and the feet infection with slowly healing sores (62.9%).

For the unsure group, most of the samples reported that they were unsured about the following complications: retinopathy, cercbral artery stenosis, paralysis from cerebral artery stenosis and the feet infection with slowly healing sores (37.1%), renal artery stenosis, sex organ infection (34.3%), blurred vision, impotence (28.6%).

For the no perception of susceptibility group, less sensitivity in hand and feet was reported the most (17.1%), followed by ischemic heart disease, coronary artery stenosis, sex organ infection, impotence (11.4%), chronic renal failure, renal artery stenosis, cerebral artery stenosis and coronary artery stenosis (8.6%). (See table 9)

Perceived susceptibility of having complication in diabetic patients after the experiment

The experimental group

After the experiment, the data indicated that most of the samples in the experimental group had perceived susceptibility of diabetes complication in terms of blurred vision, less sensitivity in hand and feet and the feet infection with slowly healing sores the most (94.3%). The second most was perceived susceptibility in having chronic renal failure and paralysis from cerebral artery stenosis (91.4%) and the third was perceived susceptibility in getting renal artery stenosis, coronary artery stenosis, cerebral artery stenosis and impotence (88.6%).

For the unsure group, most of the samples reported that they were unsured about the following complications: retinopathy (14.3%), renal artery stenosis, ischemic

heart disease and sex organ infection (11.4%), chronic renal failure, paralysis from cerebral artery stenosis and sex organ infection (8.6%).

For the no perception of susceptibility group, impotence was reported the most (8.6%), following by ischemic heart disease (5.7%), coronary artery stenosis and sex organ infection (2.9%). (See detail in table 10)

The comparison group

After the experiment, the data indicated that most the of samples in the comparison group had perceived susceptibility of diabetic complication in terms of having blurred vision the most (68.6%). The second most was perceived susceptibility in having the feet infection with slowly healing sores (65.7%) and the third was perceived susceptibility in having retinopathy, chronic renal failure, coronary artery stenosis and less sensitivity in hand and feet (62.9%).

For the unsure group, most of the samples reported that they were unsured about the following complications: impotence (37.1%) retinopathy, cerebral artery stenosis and usually sex organ infection (34.3%), renal artery stenosis (31.4%).

For the no perception of susceptibility group, less sensitivity in hands and feet was reported the most (17.1%) following by the ischemic heart disease, coronary artery stenosis and cerebral artery stenosis (11.4%), chronic renal failure, renal artery stenosis, paralysis from cerebral artery stenosis, sex organ infection and impotence (8.6%). (See detail in table 10)

The perceived susceptibility of having complications in both groups can be summarized as follows: (See detail in table 8)

Table 8 The level of perceived susceptibility of having complications in both groups

The experimental group	The comparison group
Before the experiment	
Reported the first	**Reported the first**
1. Coronary artery stenosis	1. Blurred vision
2. The feet infection with slowly healing sores	
Reported the second	**Reported the second**
1. Paralysis from cerebral artery stenosis	1. Coronary artery stenosis
	2. Ischemic heart disease
Reported the third	**Reported the third**
1. Ischemic heart disease	1. Renal failure
2. Less sensitivity in hands and feet	2. The feet infection with slowly healing sores
After the experiment	
Reported the first	Reported the first
1. Blurred vision	1. Blurred vision
2. Less sensitivity in hands and feet	
3.The feet infection with slowly healing sore	
Reported the second	Reported the second
1. Chronic renal failure	1. The feet infection with slowly healing sores
2. Paralysis from cerebral artery stenosis	

Table 8 (cont.) The level of perceived susceptibility of having complications in both groups

The experimental group	The comparison group
Reported the third	**Reported the third**
1. Renal artery stenosis	1. Retinopathy
2. Coronary artery stenosis	2. Renal failure
3. Cerebral artery stenosis	3. Coronary artery stenosis
4. Impotence	4. Less sensitivity in hands and feet

After analysis, the differences of the arithmetic means of both groups before the experiment, was found that there was no statistical significance in both groups in perceived susceptibility of having complication. (See detail in table 12)

After the experiment, the experimental group had perceived susceptibility of having complication better than that the comparison group, data revealed the statistical significance at p-value < 0.001. (See detail in table 12)

Table 9 Number and percentage of diabetic patients classify by perceived susceptibility of having complications in the experimental group and the comparison group before the experiment

Perceived susceptibility of having disease complications	Experimental group (n = 35)						Comparison group (n = 35)					
	Yes		Unsure		No		Yes		Unsure		No	
	n	%	n	%	n	%	n	%	n	%	n	%
Complications to eye												
1. Blurred vision	21	60.0	12	34.3	2	5.7	24	68.6	10	28.6	1	2.9
2. Retinopathy	20	57.1	12	34.3	3	8.6	20	57.1	13	37.1	2	5.7
Complications to kidney												
3. Chronic renal failure	19	54.3	12	34.3	4	11.4	22	62.9	10	28.6	3	8.6
4. Renal artery stenosis	19	54.3	10	28.6	6	17.1	20	57.1	12	34.3	3	8.6
Complications to heart and vessel												
5. Ischemic heart disease	21	60.0	11	31.4	3	8.6	23	65.7	8	22.9	4	11.4
6. Coronary artery stenosis	23	65.7	9	25.7	3	8.6	23	65.7	8	22.9	4	11.4
Complications to brain												
7. Cerebral artery stenosis	20	57.1	14	40.0	1	2.9	19	54.3	13	37.1	3	8.6
8. Paralysis from Cerebral artery stenosis	22	62.9	12	34.3	1	2.9	19	54.3	13	37.1	3	8.6
Complications to foot												
9. Less sensitivity in hands and feet	21	60.0	9	25.7	5	14.3	21	60.0	8	22.9	6	17.1
10. The feet infection with slowly healing sore	23	65.7	11	31.4	1	2.9	22	62.9	13	37.1	0	0.0
Complications to skin and sexual organ												
11. Sex organ infection	20	57.1	12	34.3	3	8.6	19	54.3	12	34.3	4	11.4
12. Impotence	18	51.4	12	34.3	5	14.3	21	60.0	10	28.6	4	11.4

Table 10 Number and percentage of diabetic patients classify by perceived susceptibility of having complications in the experimental group and the comparison group after the experiment

Perceived susceptibility of having disease complications	Experimental group (n = 35)						Comparison group (n = 35)					
	Yes		Unsure		No		Yes		Unsure		No	
	n	%	n	%	n	%	n	%	n	%	n	%
Complications to eye												
1. Blurred vision	33	94.3	2	5.7	0	0.0	24	68.6	9	25.7	2	5.7
2. Retinopathy	30	85.7	5	14.3	0	0.0	22	62.9	12	34.3	0	0.0
Complications to kidney												
3. Chronic renal failure	32	91.4	3	8.6	0	0.0	22	62.9	10	28.6	3	8.6
4. Renal artery stenosis	31	88.6	4	11.4	0	0.0	21	60.0	11	31.4	3	8.6
Complications to heart and vessel												
5. Ischemic heart disease	30	85.7	4	11.4	1	2.9	21	60.0	10	28.6	4	11.4
6. Coronary artery stenosis	31	88.6	3	8.6	1	2.9	22	62.9	9	25.7	4	11.4
Complications to brain												
7. Cerebral artery stenosis	31	88.6	4	11.4	0	0.0	19	54.3	12	34.3	4	11.4
8. Paralysis from Cerebral artery stenosis	32	91.4	3	8.6	0	0.0	19	54.3	13	37.1	3	8.6
Complications to foot												
9. Less sensitivity in hands and feet	33	94.3	2	5.7	0	0.0	22	62.9	7	20.0	6	17.1
10. The feet infection with slowly healing sore	33	94.3	2	5.7	0	0.0	23	65.7	10	28.6	2	5.7
Complications to skin and sexual organ												
11. Sex organ infection	30	85.7	4	11.4	1	2.9	20	57.1	12	34.3	3	8.6
12. Impotence	31	88.6	2	5.7	2	5.7	19	54.3	13	37.1	3	8.6

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Table11 Number and percentage of diabetic patients classified by perceived susceptibility of having complications in the experimental group and the comparison group before and after the experiment.

Perceived susceptibility of having complications	The experimental group (n=35)		The comparison group (n=35)	
	n	%	n	%
Before the experiment (n=35)				
High level	25	71.4	26	75.3
Moderate level	10	28.6	9	25.7
Low level	0	0.0	0	10.0
Mean ± SD	30.000 ± 3.926		30.17 ± 3.922	
After the experiment (n=35)				
High level	35	100.0	28	80.0
Moderate level	0	0.0	5	14.3
Low level	0	0.0	2	5.7
Mean ± SD	34.629 ± 2.156		30.171± 4.649	

Before the experiment, the data showed that most of the experimental group and the comparison group had scored in high level of perceived susceptibility of having complications. (74.1% and 74.3% respectively)

After the experiment, the data showed that both groups still had high level of perceived susceptibility of having complications which increased from 71.4% to 100.0% in the experimental group and increased from 74.3% to 80.0% in the comparison group. (See detail in table 11)

Table 12 Comparing the difference of mean scores of perceived susceptibility of having complications between groups before and after the experiment.

Perceived susceptibility of having complications	Mann – Whitney U					
	Mean	S.D	M.d.	S.D.d	Z	p-value
Before the experiment (n=35)						
The experimental group	30.000	3.926	0.171	0.004	0.094	0.925
The comparison group	30.171	3.922				
After the experiment (n=35)						
The experimental group	34.629	2.156	4.458	3.507	5.047	< 0.001
The comparison group	30.171	4.469				

p-value ≤ 0.05

Before the experiment, the experimental group's mean score was 30.000, S.D. was 3.926 with the comparison group's mean score was 30.171, S.D. was 3.922. After applied the Mann-Whitney U test, the result indicated that there was no statistical significant difference. ($p > 0.05$)

After the experiment, the experimental group's mean score was 34.629, S.D. was 2.156 with the comparison group's mean score was 30.171, S.D. was 4.649. After administering the Mann-Whitney U test, the data revealed that the statistical significant level of mean score between the two groups were at $p < 0.001$. (Table 12)

Table 13 Comparison of mean score of perceived susceptibility of having complications within groups before and after the experiment.

Perceived susceptibility of having complications	Willcoxon Matched - Pairs			
	Mean	S.D	Z	p-value
The experimental group				
Before the experiment (n=35)	30.000	3.926	4.476	< 0.001
After the experiment (n=35)	34.629	2.156		
The comparison group				
Before the experiment (n=35)	30.171	3.921	0.047	0.961
After the experiment (n=35)	30.171	4.649		

p-value ≤ 0.05

The experimental group, the data revealed that before the experiment, the group had a mean score of 30.000, with 3.926 standard deviation and after the experiment, the group had a mean score of 34.629, with 2.156 standard deviation. After testing the differences by the Willcoxon Matched-Pairs, the data indicated that there was a statistical significant difference. ($p < 0.001$) (Table 13)

The comparison group, the data revealed that before the experiment, the group had a mean score of 30.171, with 3.921 standard deviation and after the experiment, the group had a mean score of 30.171, with 4.649 standard deviation. After testing the differences by the Willcoxon Matched-Pairs, the data indicated that there was no statistical significant difference.

Perceived efficacy to prevent complications of diabetic patient group before the experiment

The experimental group

Before the experiment, the data indicated that most of the samples in the experimental group had perceived efficacy to prevent complications in terms of taking medication regularly the most (88.6%). The second most was keeping appointment at all time and taking medicine on time (85.7%) and the third was visit the doctor before the medication ends and take the right dose of medicine (82.9%).

For the unsure group, most of the samples reported that they perceived unsurely about the following perceived efficacy to prevent complications: cleaning foot and checking any wound (40.0%), minimize sweetened food, minimize fatty from coconut milk (37.1%), minimize fried or greasy food, foot exercise everyday (31.4%).

For the no perception of efficacy group, exercise 3 times/week regularly, at least 20 minutes at a time, at the same time each day and foot exercise everyday at 8.6%. (See detail in table 15)

The comparison group

Data indicated that most of the samples had perceived efficacy to prevent complications in terms of taking medicine on time, right dose and regularly the most (85.7%). The second most was keeping appointment at all time (82.9%) and the third was perceived efficacy to prevent complication in term visit the doctor before the medicine ends (80.0%).

For the unsure group, most of the samples reported that they were unsured about the following perceived efficacy to prevent complications: exercise 3 times per

week regularly (45.7%), minimize sweetened food (34.3%), exercise at the same time each day, having foot exercise everyday, cleaning foot and checking any wound everyday (28.6%).

For the no perception of efficacy group, to exercise at least 20 minutes at a time was reported the most (11.4%) following by the exercise at the same time each day (8.6%) and having foot exercise everyday (5.7%). (See detail in table 15)

Perceived efficacy to prevent complications of diabetic patients after the experiment

The experimental group

After the experiment, the data indicated that all of the samples had perceived efficacy to prevent complications in terms of take the right dose of medication and regularly and the second was clean with soap and dried up every time (94.3%). The third was minimize fried and greasy food, cleaning foot and checking any wound, visit the doctor before the medication ends and keeping appointment at all time (91.4%).

For the unsure group, most of the samples reported that they were unsured about the following perceived efficacy to prevent complications: exercise 3 times per week regularly, at least 20 minutes at a time and take medication on time (14.3%), having foot exercise everyday (11.4%). Besides, data indicated that 8.6% excepted clean foot with soap with dried up every time (5.7%).

For the no perceived efficacy to prevent complication by minimize sweetened food, exercise 3 times per week everyday, exercise at least 20 minutes at a time, exercise at the same time each day and having foot exercise everyday (2.9%). (See detail in table 16)

The comparison group

Data indicated that most of the samples had perceived efficacy to prevent complications in terms of keeping appointment the most (85.7%), and the second was taking medicine on time and regularly (82.9%). The third was perceived efficacy to prevent complications of visit the doctor before the finishing medication (80.0%).

For the unsure group, most of the samples reported that they perceived unsurely about the following efficacy to prevent complications: exercise 3 times per week regularly (45.7%), minimize fried or greasy food (34.3%), exercise at the same time each day, having foot exercise everyday and cleaning foot, checking any wound (28.6%).

For the no perception group, exercise at least 20 minutes at a time was reported the most (14.3%) followed by the exercise 3 times per week everyday (11.4%), minimize fried or greasy food, exercise at the same time each day and taking medication on time (8.6%). (See detail in table 16)

The perceived efficacy to prevent complications in both groups can be summarized as follows: (See table 14)

Table 14 The level of perceived efficacy to prevent complications in both groups

The experimental group	**The comparison group**
Before the experiment	
Reported the first	**Reported the first**
1. Taking medicine regularly	1. Taking medicine on time
	2.Take the right dose of medicine
	3.Taking medicine regularly

Table 14 (cont.)The level of perceived efficacy to prevent complications in both groups

The experimental group	The comparison group
Reported the second	**Reported the second**
1. Keeping appointment at all time	1. Keeping appointment at all time
2. Taking medication on time	
Reported the third	**Reported the third**
1. Visit the doctor before the medication ends	1. Visit the doctor before the medication ends
After the experiment	
Reported the first	**Reported the first**
1. Take the right dose of medicine	1. Keeping appointment at all time
2. Taking medication regularly	
Reported the second	**Reported the second**
1. Cleaning foot with soap and dried up every time	1. Take the right dose of medicine
	2. Taking medication regularly
Reported the third	**Reported the third**
1. Minimize fried or greasy food	1. Visit the doctor before medication ends.
2. Minimize fatty food from coconut milk	
3. Cleaning foot and checking any wound everyday,	
4. Visit the doctor before the medication ends	
5. Keeping appointment at all time	

After analyzing differences of the arithmetic mean between before the experiment, it was found that there was no statistical difference in both groups in perceived efficacy to prevent complication. (See detail in table 18)

After the experiment, the experimental group had perceived efficacy to prevent complication better than that of the comparison group with the statistical significance differences. (p-value < 0.001) (See detail in table 18)

Table 15 Number and percentage of diabetic patients classify by perceived efficacy to prevent complications in the experimental group and the comparison group before the experiment

perceived efficacy to prevent complications	The experimental group (n=35)						The comparison group (n=35)					
	Can		Unsure		Cannot		Can		Unsure		Cannot	
	n	%	n	%	n	%	n	%	n	%	n	%
Dietary behavior												
1. Minimize fried or greasy food	24	68.6	11	31.4	0	0.0	25	71.4	9	25.7	1	2.9
2. Minimize sweetened food	22	62.9	13	37.1	0	0.0	21	60.0	13	37.1	1	2.9
3. Minimize fatty food from coconut milk	22	62.9	13	37.1	0	0.0	23	65.7	11	31.4	1	2.9
Physical Exercise												
4. To exercise 3 times/week regularly	22	62.9	10	28.6	3	8.6	21	60.0	10	28.6	4	11.4
5. To exercise at least 20 minutes at a time	22	62.9	10	28.6	3	8.6	21	60.0	10	28.6	4	11.4
6. To exercise at the same time each day	23	65.7	9	25.7	3	8.6	21	60.0	11	31.4	3	8.6
Foot exercise												
7. Having foot exercise everyday	21	60.0	11	31.4	3	8.6	20	57.1	13	37.1	2	5.7
8. Cleaning foot and checking any wound regularly	21	60.0	14	40.0	0	0.0	24	68.6	11	31.4	0	0.0
9. Clean with soap and dried up every time	23	65.7	12	34.3	0	0.0	24	68.6	11	31.4	0	0.0
Keeping appointment												
10. Visit the doctor before the medication ends	29	82.9	6	17.1	0	0.0	28	80.0	7	20.0	0	0.0
11. Keeping appointment at all time	30	85.7	5	14.3	0	0.0	29	82.9	6	17.1	0	0.0
Medication taking												
12. Taking medication on time	30	85.7	5	14.3	0	0.0	30	85.7	5	14.3	0	0.0
13. Take the right dose of medication	29	82.9	6	17.1	0	0.0	30	85.7	5	14.3	0	0.0
14. Taking medication regularly	31	88.6	4	11.4	0	0.0	30	85.7	5	14.3	0	0.0

Table 16 Number and percentage of diabetic patients classify by perceived efficacy to prevent complications in the experimental group and the comparison group after the experiment

perceived efficacy to prevent complications	The experimental group (n=35)						The comparison group (n=35)					
	Can		Unsure		Cannot		Can		Unsure		Cannot	
	n	%	n	%	n	%	n	%	n	%	n	%
Dietary behavior												
1. Minimize fried or greasy food	32	91.4	3	8.6	0	0.0	25	71.4	7	20.0	3	8.6
2. Minimize sweetened food	31	88.6	3	8.6	1	2.9	21	60.0	12	34.3	2	5.7
3. Minimize fatty food from coconut milk	32	91.4	3	8.6	0	0.0	23	65.7	10	28.6	2	5.7
Physical Exercise												
4. To exercise 3 times/week regularly	29	82.9	5	14.3	1	2.9	15	42.9	16	45.7	4	11.4
5. To exercise at least 20 minutes at a time	29	82.9	5	14.3	1	2.9	20	57.1	10	28.6	5	14.3
6. To exercise at the same time each day	31	88.6	3	8.6	1	2.9	21	60.0	11	31.4	3	8.6
Foot exercise												
7. Having foot exercise everyday	30	85.7	4	11.4	1	2.9	22	62.9	11	31.4	2	5.7
8. Cleaning foot and checking any wound regularly	32	91.4	3	8.6	0	0.0	24	68.6	11	31.4	0	0.0
9. Clean with soap and dried up every time	33	94.3	2	5.7	0	0.0	26	74.3	9	25.7	0	0.0
Keeping appointment												
10. Visit the doctor before the medication ends	32	91.4	3	8.6	0	0.0	28	80.0	7	20.0	0	0.0
11. Keeping appointment at all time	32	91.4	3	8.6	0	0.0	30	85.7	5	14.3	0	0.0
Medication taking												
12. Taking medication on time	30	85.7	5	14.3	0	0.0	26	74.3	6	17.1	3	8.6
13. Take the right dose of medication	35	100	0	0.0	0	0.0	29	82.9	6	17.1	0	0.0
14. Taking medication regularly	35	100	0	0.0	0	0.0	29	82.9	6	17.1	0	0.0

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Table 17 Number and percentage of diabetic patients group classified by perceived efficacy to prevent complications in the experimental and the comparison groups before and after the experiment.

Perceived efficacy to prevent complications	Experimental group(n=35)		Comparison group (n=35)	
	n	%	n	%
Before the experiment				
High level	31	88.6	33	82.9
Moderate level	4	11.4	2	5.7
Low level	0	0.0	0	0.0
Mean ± SD	37.629 ± 3.565		37.454 ± 3.720	
After the experiment				
High level	35	100	29	74.3
Moderate level	0	0.0	6	17.1
Low level	0	0.0	0	0.0
Mean ± SD	40.514 ± 2.422		37.000 ± 5.087	

Before the experiment, the data indicated that most of the samples in the experimental group and the comparison group had scored in the high level of perceived self-efficacy in preventing complications. (88.6% and 82.9%)

After the experiment, the data indicated that the samples in both groups still had a high level of perceived efficacy in preventing complications which increased from 88.6% to 100% in the experimental group and decreased from 82.9% to 74.3% in the comparison group. (See detail in table 17)

Table 18 Comparing the differences of mean scores of perceived efficacy in preventing complications between groups before and after experiment.

Perceived efficacy to prevent complications	Mean	S.D	Mann – Whitney U M.d.	S.D.d	Z	p-value
Before the experiment (n=35)						
The experimental group	37.629	3.565	0.171	0.155	0.159	0.873
The comparison group	37.457	3.720				
After the experiment (n=35)						
The experimental group	40.514	2.442	3.514	2.665	3.825	< 0.001
The comparison group	37.000	5.087				

p-value ≤ 0.05

Before the experiment, Mean score and standard deviation of the experimental group was 37.629 ± 3.565 and that of the comparison group was 37.457 ± 3.720. Mann-Whitney U test was applied and result showed no statistically significant difference.

After the experiment, Mean score and standard deviation of the experimental group was 40.514 ± 2.442 and that of the comparison group was 37.000 ± 5.087. Analysis was done by Mann Whitney U test, the result showed statistically significant differences at $p < 0.001$. (Table 18)

Table 19 Comparison of mean scores of perceived efficacy to prevent complications within groups before and after the experiment.

Perceived efficacy to prevent complications	Willcoxon Matched – Pairs			
	Mean	S.D	Z	p-value
The experimental group				
Before the experiment (n=35)	37.629	3.565	3.491	< 0.001
After the experiment (n=35)	40.514	2.442		
The comparison group				
Before the experiment (n=35)	37.457	3.720	0.215	0.830
After the experiment (n=35)	37.000	5.087		

p-value ≤ 0.05

The experimental group, the data revealed that before the experiment the group had a mean score of 37.629 with 3.565 S.D. and after the experiment, the mean score was increased to 40.514 with 2.442 S.D. The result revealed no statistical significant at $p < 0.001$ after the Willcoxon Matched-Pairs analysis test was applied.

The comparison group, the data revealed that before the experiment, the group had a mean score of 37.457 with 3.720 S.D. and after the experiment, the mean score was 37.000 with 5.087 S.D. The result revealed no statistical significant at $p > 0.05$ after the Willcoxon Matched-Pairs analysis test was applied. (See table 19)

Self-care behaviors to prevent complications of both groups in diabetic patients before the experiment

Dietary time: Most of both groups always and usually eating their meal on time at the percentage of 54.3 in the experimental group and 42.9 % in the comparison group. For the group which reported as "not on time", there were more in the comparison group that those in the experimental group (25.7% and 17.1%).

Taking fatty in a week: Most of the experimental group (65.7%) had eater fat diet less than 3 days/week while the comparison group was 51.4% and 17.1% of both groups reported eating non-fat diet in a week.

Sweet intake in a week: 11.4% of the experimental group reported that their of intake non-sweet more than that of the comparison group (8.6%). However 8.6% of the experimental group reported that they ate sweet everyday, while the comparison group reported none. (0.0%)

Sweet sweetened fruit intake in a week: Most of the experimental group never intake sweetened fruit and intake less than 3 times/week at 91.4%, while the comparison group was only 74.2%.

Soda / syrup intake in a week: Most of both groups had never take soda/syrup in a week at 85.7% in the experimental group and 77.2% in the comparison group and at 8.6% in both groups took soda/syrup everyday.

Dietary control in daily life: In the experimental group reported that they were able to control diet in daily life everyday while the comparison group was able only more than 3 day/week at 85.7%, while the comparison group was 72.2%. Both groups had equal in behavior that never control dietary in daily day was 5.7%.

Weekly exercise behavior: The comparison group exercise everyday which is higher than the experimental group, 31.4% and 14.3% respectively. The experimental group expressed uncertainty in their exercise at 60.0% while the comparison group was only 17.1%.

The period of time in each exercise: 42.9% of the comparison group had exercised longer than 30 minutes and more than 30 minutes, while the experimental group reported only 17.2%. Furthermore, the experimental group had exercises for 10 minutes at the percentage of 42.9% while the comparison group reported only 22.9%.

Level of sweat after exercise: The experimental group have a larger number of sweat after exercise at 68.5%, while the comparison group reported 54.3%. The experimental group had sweat sometime after exercise at 28.6% while the comparison group had reported 42.9%. Both groups reported no sweat after exercise at 2.9%.

Time table in each exercise: Most of the comparison group (65.8%) exercise regularly at the same time while the experimental group reported only 45.7%. For other timetable such as in difference time and almost the same time 54.3% of the experimental group reported that they did while 34.3% in the comparison group had reported the same.

Accompanied package when go into exercise: Most of both groups reported never have an accompany package when going the exercise, 82.8% in the experimental group and 77.1% in the comparison group. Both groups revealed never brought syrup/fruit juice when going the exercise.

Taking medication time table in the past two weeks ago: Majority of both groups always taking medication on time, 80.0% in the experimental group, 85.7% in the comparison group.

Experience in forgetting to take medicine in the past two weeks: Most of both groups never forgetting to take medicine at 77.1 in the experimental group and 60.0% in the comparison group.

Self-Adjusted dose of medicine: Majority in both groups reported no self-adjusted dose of medicine, 82.9% in the experimental group, 71.4% in the comparison group. 8.6% of the experimental group seldom adjusted dose of medicine by themselves, while 22.9% did that in the comparison group.

Keeping appointment in the past 6 months: Majority in both groups 91.4% in the experimental group and 77.1% in the comparison group reported keeping appointment every time, and 20.0% in the comparison group had missed the follow up1-3 times in 6 months while the experimental group was only 5.7%. Besides, 2.9% of both groups never go to follow up for 6 month ago.

Connot keep appointment due to prior engagement: Both groups were similar in connot keep, appointment due to prior engagement, 68.6% of both groups reported go to see the doctor before the medication ends, and 22.9% of both groups to had asked someone to go on the appointment day. Both groups (5.7%) reported that they go a week after the appointment and go whenever they had free time at 2.9%.

When having foot pain/memberess: The most of both groups (40.0%) reported that they have consulted the doctor, 48.6% in the experimental group, 45.7% in the comparison group had feet massage when having foot pain/memberess. In addition, 14.3% of the comparison group had soaked their feet in the warm water while the experimental group reported only 11.4%.

Foot exercise: 45.7% of the comparison group had exercised their feet everyday while the experimental group reported only 34.3%. Moreover, 34.3% in the

experimental group had no exercise their feet while the comparison group reported only 14.3%.

To wear shoe before go out: 94.3% in the experimental group and 82.9% in the comparison group reported wearing sandals. Only 5.7% in the experimental group reported wearing shoes while 17.1% of the comparison group reported the same. No barefoot behavior reported by both groups.

Foot care: 94.3% of the comparison group and 77.1% in the experimental group reported washing their feet with soap and dry it everyday. Moreover, 20.0% of the experimental group reported no foot care while the comparison group reported none. (See detail in table 20)

Self-care behaviors to prevent complications of both groups in diabetic patients after the experiment

Eating time: 57.1% of the experimental group usually eating their meals on time and 54.3% in the comparison group reported the same. Data reported that 14.3% in the comparison group had their meal in difference time while the experimental group did the same only 2.9%.

Fat intake in a week: Data revealed that 54.3% in the experimental group had never eaten fat in a week while the comparison group reported only 22.9%.

Sweet intake in a week: Data indicated that 34.3% in the experimental group had never taken sweet in a week while the comparison group was only 11.4%. For intake sweet more than 3 day/week, 14.3% in the comparison group reported frequency and 2.9% in the experimental group for that. For the group which reported "intake sweet everyday" were not found in both groups.

Sweetened fruit intake in a week: Most of the experimental group (68.6%) had never taken the sweetened fruit in a week and only 31.4% in the comparison group did the same. None of the sample in the experimental group had taken the sweetened fruit everyday or more than 3 day/week while 17.1% the comparison group did the same.

Soda /syrup intake in a week: Data indicated that most of the samples (80.0%) in the experimental group had never taken soda/syrup in a week while at only 48.6% in the comparison group reported the same. 20.0% in the comparison group reported took soda/syrup everyday while only 2.9% in the experimental group.

Dietary control in daily life: Most of both groups reported that they were able to control dietary everyday (62.9%). For the group which reported "dietary control more than 3 day/week" there was more in the experimental group than that those in the comparison group (37.1% and 28.6%). None of the sample in the experimental group had never dietary control or control less than 3 day/week while 8.6% in the comparison group reported they had dietary control less than 3 day/week.

Weekly exercise behavior: Data indicated that 31.4% of the experimental group had exercised everyday while only 22.9% did that in the comparison group. For the group which reported "uncertain in weekly exercise behavior" there was more in the comparison group (11.4%) than that those in the experimental group (2.9%).

Period of time in each exercise: Most of the samples exercise for 30 minutes, 77.2% in the experimental group and 71.5% in the comparison group reported that they have exercise longer than 30 minutes.

Level of sweat after exercise: Data indicated that 82.9% in the experimental group had a moderate sweat to high amount of in the comparison group they had only at 65.7%.

Time table in each exercise: Most of both groups usually exercise at the same time and always exercise at the same time at 80.0% in the experimental group and 82.8% in the comparison group. However the comparison group had exercised in difference time at 11.4% while the experimental group reported only at 2.9%.

Accompanied package when go into exercise: Majority in both groups reported that they have an accompanied package when going to exercise, 77.1% in the experimental group and 65.7% in the comparison group.

Medicine taking time table in the past two weeks: Data indicated that most of the samples in both groups always take medicine on time at 80.0% in the experimental group and 74.3% in the comparison group. For the group which reported "not on time" there was more in the comparison group that those in the experiment group (2.9% and 0.0%).

Experience in forgetting to take medicine in the past two weeks: Data indicated that most of the samples in both groups had never forgotten to take medicine at 91.4% in the experimental group and 77.1% in the comparison group. 20.0% in the comparison group reported forgetting to take less than 3 times while the experimental group reported only 2.9%.

Self-Adjusted dose of medicine: Data revealed that 94.3% in both groups have never done the self-adjusted dose of medicine.

Keeping appointment in the past 6 months: Most of the samples in both groups reported that they have been keeping appointment every time in the past 6 months at 91.4% in the experimental group and 88.6% in the comparison group. 8.6% of both groups revealed that they have missed the appointment less than 3 times. 2.9% of the comparison group reported "never keep appointment and miss appointment more than 3 times"

Connot keep appointment due to prior engagement: 94.3% of the experimental group and 77.1% in the comparison group reported going to see the doctor before the medicine ends.

When having foot pain / memberess: 94.2% in the experimental group reported that they use massage or consult the doctor while 85.7% of the comparison group have done in the same. Only 5.7% in the experimental group soak their feet in the warm water or heating pads while 14.3% of the comparison group.

Foot exercise: Most of the samples in the experimental group (74.3%) exercise their feet everyday while the comparison group was only 45.7% and 25.7% of the comparison group never exercise their feet while there was no reported in the experimental group.

To wear shoes before go out: Most of the samples in both groups wearing sandals at the percentage of 85.7 in the experimental group and 80.0% in the comparison group. 14.3% in the experimental group and 20.0% in the comparison group wearing shoes. None of the sample in both groups reported wearing boots or barefoot.

Foot care: The data indicated that 91.4% of the experimental group and 77.1% in the comparison group have cleaned their feet with soap and dried up everyday. (See detail in table 20)

Table 20 Number and percentage of diabetic patients classified by self-care behaviors to prevent complications before and after the experiment

Self-care behaviors to prevent complications	Before the experiment (n=35)				After the experiment (n=35)			
	Experimental group		Comparison group		Experimental group		Comparison group	
	n	%	n	%	n	%	n	%
1. Eating time								
Difference time everyday	6	17.1	9	25.7	1	2.9	5	14.3
Same time in someday	10	28.6	11	31.4	14	40.0	11	31.4
Usually on time	10	28.6	10	28.6	14	40.0	5	14.3
Always on time	9	25.7	5	14.3	6	17.1	14	40.0
2. Fatty intake in a week								
Everyday	2	5.7	0	0.0	0	0.0	0	0.0
More than 3 day/week	4	11.4	11	31.4	1	2.9	4	11.4
Less than 3 day/week	23	65.7	18	51.4	15	42.9	23	65.7
Never	6	17.1	6	17.1	19	54.3	8	22.9
3. Sweet intake in a week								
Everyday	3	8.6	0	0.0	0	0.0	0	0.0
More than 3 day/week	5	14.3	10	28.6	1	2.9	5	14.3
Less than 3 day/week	23	65.7	22	62.9	22	62.9	26	74.3
Never	4	11.4	3	8.6	12	34.3	4	11.4
4. Sweetened fruit intake in a week								
Everyday	1	2.9	0	0	0	0.0	0	0.0
More than 3 day/week	2	5.7	9	25.7	0	0.0	6	17.1
Less than 3 day/week	16	45.7	20	57.1	11	31.4	18	51.4
Never	16	45.7	6	17.1	14	68.4	11	31.4
5. Soda/syrup intake in a week								
Everyday	3	8.6	3	8.6	1	2.9	7	20.0
More than 3 day/week	0	0.0	1	2.9	0	0.0	1	2.9
Less than 3 day/week	9	25.7	15	42.9	6	17.1	10	28.6
Never	23	65.7	16	45.7	28	80.0	17	48.6

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Table 20 (cont.) Number and percentage of diabetic patients classified by self-care behaviors to prevent complications before and after the experiment

Self-care behaviors to prevent complications	Before the experiment (n=35)				After the experiment (n=35)			
	Experimental group		Comparison group		Experimental group		Comparison group	
	n	%	n	%	n	%	n	%
6. Dietary control in daily life								
Never	2	5.7	2	5.7	0	0.0	0	0.0
Less than 3 day/week	3	8.6	6	17.1	0	0.0	3	8.6
More than 3 day/week	16	45.7	8	22.9	13	37.1	10	28.6
Everyday	14	40.0	19	54.3	22	62.9	12	62.9
7. Weekly exercise behavior								
Uncertain	21	60.0	6	17.1	1	2.9	4	11.4
Less than 3 day/week	7	20.0	10	28.6	6	17.1	6	17.1
More than 3 day/week	2	5.7	8	22.9	17	48.6	17	48.6
Everyday	5	14.3	11	31.4	11	31.4	8	22.9
8. Period of time in each exercise								
10 minute	15	42.9	8	22.9	0	0.0	1	2.9
20 minute	14	40.0	12	34.3	8	22.9	9	25.7
30 minute	1	2.9	10	28.6	17	48.6	10	28.6
Longer than 30 minute	5	14.3	5	14.3	10	28.6	15	42.9
9. Level of sweat after exercise								
No sweat	1	2.9	1	2.9	0	0.0	0	0.0
Have sweat sometime	10	28.6	15	42.9	6	17.1	12	34.3
Have sweat moderate	20	57.1	17	48.6	26	74.3	19	54.3
Have many sweat	4	11.4	2	5.7	3	8.6	4	11.4
10. Time table in each exercise								
Difference time	7	20.0	2	5.7	2	5.7	4	11.4
Almost the same time each time	12	34.3	10	28.6	5	14.3	2	5.7
Usually at the same time	11	31.4	15	42.9	23	65.7	16	45.7
Always at the same time	5	14.3	8	22.9	5	14.3	13	37.1

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Table 20 (cont.) Number and percentage of diabetic patients classified by self-care behaviors to prevent complications before and after the experiment

Self-care behaviors to prevent complications	Before the experiment (n=35)				After the experiment (n=35)			
	Experimental group		Comparison group		Experimental group		Comparison group	
	n	%	n	%	n	%	n	%
11. Accompanied package when go into exercise								
Syrup, fruit juice	0	0.0	0	0.0	1	2.9	3	8.6
Toffy	6	17.1	8	22.9	3	8.6	6	17.1
Water	11	31.4	4	11.4	4	11.4	3	8.6
None	18	51.4	23	65.7	27	77.1	23	65.7
12. Taking medication time table in the past two weeks								
Always on time	28	80.0	30	85.7	28	80.0	26	74.3
Not on time less than 3 times/week	6	17.1	4	11.4	5	14.3	7	20.0
Not on time more than 3 times/week	1	2.9	1	2.9	2	5.7	1	2.9
Not on time	0	0.0	0	0.0	0	0.0	1	2.9
13.Experience in forgetting to take medicine in the past 2 weeks								
Never	27	77.1	21	60.0	32	91.4	27	77.1
Forgot less than 3 times/week	6	17.1	13	37.1	1	2.9	7	20.0
Forgot more than 3 times/week	1	2.9	1	2.9	2	5.7	1	2.9
Everyday	1	2.9	0	0.0	0	0.0	0	0.0
14. Self-Adjusted dose of medication								
Never	29	82.9	25	71.4	33	94.3	33	94.3
Seldom	3	8.6	8	22.9	0	0.0	1	2.9
Sometime	2	5.7	2	5.7	2	5.7	1	2.9
Regularly	1	2.9	0	0.0	0	0.0	0	0.0
15. Keeping appointment in the past 6 months								
Every time	32	91.4	27	77.1	32	91.4	31	88.6
Miss follow up less than 3 times	2	5.7	7	20.0	3	8.6	3	8.6
Miss follow up more than 3 times	0	0.0	0	0.0	0	0.0	1	2.9
Never go to follow up	1	2.9	1	2.9	0	0.0	0	0.0

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Table 20 (cont.) Number and percentage of diabetic patients classified by self-care behaviors to prevent complications before and after the experiment

Self-care behaviors to prevent complications	Before the experiment (n=35)				After the experiment (n=35)			
	Experimental group		Comparison group		Experimental group		Comparison group	
	n	%	n	%	n	%	n	%
16. Cannot keep appointment due to prior engagement								
Go before the medication ends	24	68.6	24	68.6	33	94.3	27	77.1
Ark to go on the appointment day	8	22.9	8	22.9	1	2.9	5	14.3
Go a week after the appointment	2	5.7	2	5.7	1	2.9	2	5.7
Go whenever freed time	1	2.9	1	2.9	0	0.0	1	2.9
17. When having foot pain/memberess								
Consult the doctor	14	40.0	14	40.0	13	37.1	18	51.4
Massage	17	48.6	16	45.7	20	57.1	12	34.3
Soak the foot in warm water	4	11.4	3	8.6	1	2.9	3	8.6
Place heating pad	0	0.0	2	5.7	1	2.9	2	5.7
18. Foot exercise								
Everyday	12	34.3	16	45.7	26	74.3	16	45.7
More than 3 times/week	3	8.6	6	17.1	8	22.9	3	8.6
Less than 3 time/week	8	22.9	8	22.9	1	2.9	7	20.0
Never	12	34.3	5	14.3	0	0.0	9	25.7
19. To wear shoes before go out								
Shoes	2	5.7	6	17.1	5	14.3	7	20.0
Boots	0	0.0	0	0.0	0	0.0	0	0.0
Sandal	33	94.3	29	82.9	30	85.7	28	80.0
Barefoot	0	0.0	0	0.0	0	0.0	0	0.0
20. Foot care								
Every time	16	45.7	19	54.3	32	91.4	27	77.1
Often	11	31.4	14	40.0	3	8.6	6	17.1
Sometime	1	2.9	2	5.7	0	0.0	2	5.7
Never	7	20.0	0	0.0	0	0.0	0	0.0

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Table 21 Number and percentage of diabetic patient group classified by self-care behaviors to prevent complications in the experimental group and the comparison group before and after the experiment.

Self-care behaviors to prevent complications	Experimental group(n=35)		Comparison group (n=35)	
	n	%	n	%
Before the experiment				
High level	15	42.9	15	42.9
Moderate level	20	57.1	20	57.1
Low level	0	0.0	0	0.0
Mean ± SD	58.314 ± 5.172		59.714 ± 6.528	
After the experiment				
High level	34	97.1	25	74.1
Moderate level	1	2.9	10	28.6
Low level	0	0.0	0	0.0
Mean ± SD	66.429 ± 3.118		63.086 ± 5.591	

Before the experiment, the data showed that most of the samples in the experimental group and the comparison group had equal score in the moderate level of self-care behaviors in preventing complications (57.1%).

After the experiment, the data showed that both groups had their scores in the high level of self-care behaviors in preventing complication which increased from 42.9% to 97.1% in the experimental group and 42.9% to 74.1% in the comparison group. (Table 21)

Table 22 Comparing the differences of mean scores of self-care behaviors to prevent complications between groups before and after experiment.

Self-care behaviors to prevent complications	Mann – Whitney U					
	Mean	S.D	M.d.	S.D.d	Z	p-value
Before the experiment (n=35)						
The experimental group	58.314	5.172	1.400	1.356	0.789	0.430
The comparison group	59.714	6.528				
After the experiment (n=35)						
The experimental group	66.429	3.118	3.343	2.473	2.718	< 0.007
The comparison group	63.086	5.591				

p-value ≤ 0.05

Before the experiment, the experimental group's mean score was 58.314, with 5.172 S.D. and the comparison group's mean score was 59.714, with 6.528 S.D. Analysis with Mann-Whitney U test, the result indicated that there was no statistical significant difference.

After the experiment, the experimental group's mean score was 66.429, with 3.118 S.D. and the comparison group's mean score was 63.086, with 5.591 S.D. Analysis with Mann-Whitney U test, the data revealed that the statistically significant of means score between the two groups are at $p < 0.001$. (Table 22)

Table 23 Comparison of mean scores of self-care behaviors to prevent complications within groups before and after the experiment.

Self-care behaviors to prevent complications	Willcoxon Matched – Pairs			
	Mean	S.D	Z	p-value
The experimental group				
Before the experiment (n=35)	58.314	5.172	5.016	< 0.001
After the experiment (n=35)	66.429	3.118		
The comparison group				
Before the experiment (n=35)	59.714	6.528	1.565	0.065
After the experiment (n=35)	62.085	5.591		

p-value ≤ 0.05

The experimental group, the data revealed that before the experiment the group had a mean score was 58.314, with 5.172 S.D. and after the experiment, the mean score was increased to 66.429, and the S.D. was 3.118. The Willcoxon Matched-Pairs test was applied, the result indicated that there was a statistically significant difference at $p < 0.001$. (Table 23)

The comparison group, the data revealed that before the experiment the group had a mean score was 59.714, with 6.528 S.D. and after the experiment, the mean score was increased to 62.085, and the S.D. was 5.591. The Willcoxon Matched-Pairs test was applied, the result indicated that there was no statistically significant difference. (Table 23)

The experimental Group

Samples reported that they had been supported to carry out self-care behavior the most on keeping appointment 42.2% followed by stimulating exercise (31.4%) and wearing shoes 20.0%.

Supportive behavior which reported that they had been done sometime included taking medicine on time, dietary control, and exercising in the consecutive order (60.0%, 57.1%, and 48.6%).

Supportive behavior which hardly behaved by the samples include wearing shoes, taking medicine on time, stimulating exercise and keeping appointment (51.4%, 22.9% and 20.0%). (See detail in table 25)

The Comparison Group

Samples reported that they had been supported to carry out self-care behavior on keeping appointment the most 42.9% followed by taking medicine on time (25.7%) and stimulating exercise 17.1%.

Supportive behavior which reported that they had been done sometime included dietary control, exercising and keeping appointment in the consecutive order (57.1%, 51.4% and 28.6%).

Supportive behavior which hardly behaved by the samples include wearing shoes, taking medicine on time and stimulating exercise (57.1%, 51.4% and 31.4%). (See detail in table 25)

Self-care supported by family members after the experiment

The Experimental Group

Samples reported that they had been supported to carry out self-care behavior on keeping appointment the most 97.1% followed by dietary control (80.0%) and taking medicine on time 71.4%.

Supportive behavior which reported that they had been done sometimes included stimulating on the exercise, wearing shoes and dietary control in the consecutive order (31.4%, 28.6% and 17.1%).

Supportive behavior which hardly behaved by the samples include wearing shoes, taking medicine on time and dietary control (20.0%, 14.3% and 2.9%). (See in table 26)

The Comparison Group

Samples reported that they had been supported to carry out self-care behavior on taking appointment the most 34.3% followed by taking medicine on time (28.6%) and stimulating on the exercise 25.7%.

Supportive behavior which reported that they had been done sometimes included dietary control, exercising and taking medicine on time in the consecutive order (37.1%, 34.1% and 20.0%).

Supportive behavior which hardly behaved by the samples include wearing shoes (68.6%), keeping appointment (60.0%) and taking medicine on time (51.4%). (See in table 26)

Self-care supported by family members in both groups can be summarized as follows: (See table 24)

Table 24 The level of self-care supported by family members in both groups

The experimental group	The comparison group
Before the experiment	
Reported the first	**Reported the first**
Keeping appointment	Keeping appointment
Reported the second	**Reported the second**
Taking medicine on time	Taking medicine on time
Reported the third	**Reported the third**
Reminding about the diet	Stimulating exercise
After the experiment	
Reported the first	**Reported the first**
Keeping appointment	Keeping appointment
Reported the second	**Reported the second**
Taking medicine on time	Wearing shoes
Reported the third	**Reported the third**
Reminding about the diet	Reminding about the diet

After the analysis, differences of the arithmetic means before the experiment, the result indicated that both groups revealed no statistical differences of the self-care behavior influenced by family members. (See detail in table 28)

After the experiment, the experimental group reported a higher number of carrying out self-care behavior influenced by family members more than that of the comparison group. (See detail in table 28)

Table 25 Number and percentage of reported self-care supported by family members among diabetic patients before the experiment

Self-care supported by family members	Experimental group (n=35)						Comparison group(n=35)					
	Frequency		Sometime		Never		Frequency		Sometime		Never	
	n	%	n	%	n	%	n	%	n	%	n	%
1. Reminding about diet	11	31.4	20	57.1	4	11.4	5	14.3	20	57.1	10	28.6
2. Stimulating on the exercise	11	31.4	17	48.6	7	20.0	6	17.1	18	51.4	11	31.4
3. Reminding to take medicine on time	6	17.1	21	60.0	8	22.9	9	25.7	8	22.9	18	51.4
4. Reminding on keeping appointment	15	42.9	13	37.1	7	20.0	15	42.9	10	28.6	10	28.6
5. Reminding on wearing shoes	7	20.0	10	28.6	18	51.4	5	14.3	10	28.6	20	57.1

Table 26 Number and percentage of reported self-care supported by family members among diabetic patients after the experiment

Self-care supported by family members	Experimental group (n=35)						Comparison group(n=35)					
	Frequency		Sometime		Never		Frequency		Sometime		Never	
	n	%	n	%	n	%	n	%	n	%	n	%
1. Reminding about diet	28	80.0	6	17.1	1	2.9	12	34.3	13	37.1	10	28.6
2. Stimulating on the exercise	24	68.6	11	31.4	0	0.0	9	25.7	12	34.3	14	40.0
3. Reminding to take medicine on time	25	71.4	5	14.3	5	14.3	10	28.6	7	20.0	18	51.4
4. Reminding on keeping appointment	34	97.1	1	2.9	0	0.0	12	34.3	2	5.7	21	60.0
5. Reminding on wearing shoes	18	51.4	10	28.6	7	20.0	4	11.4	7	20.0	24	68.6

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Table 27 Number and percentage of reported self-care supported by family members among diabetic patients in the experimental group and the comparison group before and after the experiment.

Self-care supported by family members	Experimental group(n=35)		Comparison group (n=35)	
	n	%	n	%
Before the experiment				
High level	10	28.6	7	20.0
Moderate level	21	60.0	18	51.4
Low level	4	11.4	10	28.6
Mean ± SD	10.171 ± 2.572		9.171 ± 2.538	
After the experiment				
High level	28	80.0	7	20.0
Moderate level	7	20.0	14	40.0
Low level	0	0.0	14	40.0
Mean ± SD	13.314 ± 1.922		8.857 ± 2.713	

Before the experiment, the data indicated that most of the samples in the experimental group and the comparison group were in the moderate level to promote self-care supported by family members (60.0% and 51.4%).

After the experiment, the data indicated that the samples in the experimental group had a higher level of self-care supported by family members score (80.0%) than that of the comparison group which was in the medium and low level (40.0%). (See detail in table 27)

Table 28 Comparison of mean scores of self-care supported by family members between groups before and after experiment.

Self-care supported by family members	Mann – Whitney U					
	Mean	S.D	M.d.	S.D.d	Z	p-value
Before the experiment (n=35)						
The experimental group	10.171	2.572	1.000	0.034	1.566	0.117
The comparison group	9.171	2.538				
After the experiment (n=35)						
The experimental group	13.314	1.922	4.457	0.791	5.657	↓0.001
The comparison group	8.857	2.713				

p-value ≤0.05

Before the experiment, the experimental group's mean score was 10.171, S.D. was 2.572 and the comparison group's mean score was 9.171, S.D. was 2.538. Analysis with Mann-Whitney U test, the result revealed no statistical significant difference.

After the experiment, the experimental group's mean score was 13.314, S.D. was 1.922 and the comparison group's mean score was 8.857, S.D. was 2.713. Analysis with Mann- Whitney U test, the result revealed that there was a statistical significant difference between the two groups at $p<0.001$. (Table 28)

Table 29 Comparison of mean scores of self-care supported by family members within groups before and after the experiment.

Self-care supported by family members	Willcoxon Matched - Pairs			
	Mean	S.D	Z	p-value
The experimental group				
Before the experiment (n=35)	10.171	2.572	4.275	↓0.001
After the experiment (n=35)	13.314	1.922		
The comparison group				
Before the experiment (n=35)	9.171	2.537	0.978	0.328
After the experiment (n=35)	8.857	2.713		

p-value ≤0.05

The experimental group, the data revealed that before the experiment the group had a mean score was 10.171, S.D. was 2.572 and after the experiment the mean score was increased to 13.314, S.D. was 1.922. The result of Willcoxon Matched–Pairs test indicated the statistical significant difference at $p < 0.001$ level. (Table 29)

The comparison group, the data revealed that before the experiment the group had a mean score was 9.171, S.D. was 2.517 and after the experiment the mean score was increased to 8.857, S.D. was 2.713. The result of Willcoxon Matched–Pairs test the data indicated that there is no statistical significant difference. (Table 29)

Table 30 Number and percentage of hemoglobin A_{1c} level among diabetic patients in

Table 30 Number and percentage of hemoglobin A_{1c} level among diabetic patients in the experimental and the comparison groups before and after the experiment.

Hemoglobin A_{1c} (normal = 4.8%-5.8%)	Experimental group (n=35)		Comparison group(n=35)	
	n	%	n	%
Before the experiment				
Good (< 6%)	0	0.0	1	2.9
Acceptable (6-7%)	6	17.1	3	8.6
Fair (>7%)	29	82.9	31	88.6
Mean ±SD	9.080 ± 1.874		9.703 ±2.263	
After the experiment				
Good (< 6%)	3	8.6	3	8.6
Acceptable (6-7%)	18	51.4	6	17.1
Fair (>7%)	14	40.0	26	74.3
Mean ±SD	7.566±1.527		7.969±1.519	

Before the experiment, the data indicated that most of samples in both groups had HbA_{1c} level in fair level (more than 7%) 82.9% in the experimental group and 88.6% in the comparison group.

After the experiment, the data indicated that the experimental group had HbA_{1c} level in the good level (less than 6%) increased from 0.0% to 8.6% and acceptable level (between 6-7%) increased from 17.1% to 51.4%, while the scored more than 7% decreased from 82.9% to 40.0%. The comparison group had HbA_{1c} score less than 6% increased from 2.9% to 8.6% and acceptable (6-7%) increased from 8.6% to 17.1% only, at the score more than 7% decreased only from 88.6% to 74.3%. (Table 30)

Table 31 Comparing the difference in mean score of hemoglobin A1c (HbA_{1c}) between groups before and after experiment.

Hemoglobin A_{1c} (normal = 4.8%- 5.8%)	Less than 6 %		Acceptable 6-7%		More than 7 %		Mann-Whitney U	
	n	%	n	%	n	%	Z	p-value
Before the experiment(n=35)								
The experimental group	0	0.0	6	17.1	29	82.9	0.905	0.366
The comparison group	1	2.9	3	8.6	31	88.6		
After the experiment(n=35)								
The experimental group	3	8.6	18	51.4	14	40.0	1.493	0.067
The comparison group	3	8.6	6	17.1	26	74.3		

p-value ≤ 0.05

Before the experiment, the experimental group no had the sample in a proportion of HbA_{1c} less than 6%, but 6 samples (17.1%) have a proportion of HbA_{1c} in the acceptable level (6-7%) and 29 samples (82.9%) have in the more than 7% while only one sample (2.9%) in the comparison group had proportion less than 6%. Analysis done by applying the Mann-Whitney U test revealed that there is no significant difference.

After the experiment, the experimental group had 3 samples (8.6%) have a proportion of HbA_{1c} less than 6%, 18 samples (51.4%) have in acceptable (6-7%) and 14 samples (40.0%) have in more than 7% while only 3 samples (8.6%) in the comparison group. Analysis done by applying the Mann-Whitney U test revealed that there is a significant difference. (See detail in table 31)

Table 32 Comparing the difference in mean scores of hemoglobin A_{1c} (HbA_{1c}) within groups before and after the experiment.

Hemoglobin A_{1c} (normal = 4.8%- 5.8%)	Less than 6 %		Acceptable 6-7%		More than 7 %		Willcoxon Matched - Pairs	
	n	%	n	%	n	%	Z	p-value
The experimental group								
Before the experiment (n=35)	0	0.0	6	17.1	29	82.9		
After the experiment (n=35	3	8.6	18	51.4	14	40.0	5.088	<0.001
The comparison group								
Before the experiment (n=35)	1	2.9	3	8.6	31	88.6		
After the experiment (n=35	3	8.6	6	17.1	26	74.3	1.635	0.053

p-value ≤ 0.05

The experimental group the data revealed that before the experiment, 17.1% of the group had a proportion of HbA_{1c} in the acceptable level and 82.9% were in the more than 7%. After the experiment, 8.6% of the group had a proportion of HbA_{1c} less than 6%, 51.4% were in the acceptable level (6-7%) and 40.0% were in the more than 7%. After testing the difference by the Willcoxon Match-Pairs, the data indicated that there was a statistical significant difference level at $p< 0.001$.

The comparison group the data revealed that before the experiment, 2.9% of the group had a proportion of HbA_{1c} less than 6%, 8.6% were in the acceptable level and 88.6% were in the more than 7%. After the experiment, 8.6% of the group had proportion of HbA_{1c} less than 6% was 8.6%, acceptable (6-7%) was 51.4% and more than 7% was 40.0%. After testing the difference by the Willcoxon Match-Pairs, the data indicated that there was a statistical significant difference level at $p< 0.001$.

(See detail in table 32)

2.2 The family member Group

Perceived susceptibility of having diabetes in the family members before the experiment

The experimental group

Before the experiment, the data indicated that most of the samples in the experimental group had perceived susceptibility of having diabetes in terms of no exercise the most (42.9%) and the second most was perceived susceptibility in getting family history of DM and intake fried or greasy food (31.4%). The third was perceived susceptibility in having the age over 40 years old (28.6%).

For the unsure group, most of the samples reported that they were unsured about the following factor: abnormal pregnancy or delivery baby over weight (62.9%), taking contraception (60.0%), the age over 40 years old (28.6%).

For the no perception of susceptibility group, obesity was reported the most (34.1%), followed by family history of DM and taking contraception (31.4%), the age over 40 years old and pancreatitis (28.6%). (See detail in table 34)

The comparison group

Data indicated that most of the samples had perceived susceptibility of having diabetes in terms of no exercise the most (42.9%) and the second most was perceived susceptibility in getting family history of DM (40.0%). The third was perceived susceptibility of having the age over 40 years old and obesity (37.1%).

For the unsure group, most of the samples reported that they were unsured about the following factor: pancreatitis (68.6%), abnormal pregnancy or delivery baby over weight, taking contraception (51.4%), family history of DM, the age over 40 years old and obesity (42.9%).

For the no perception of the susceptibility group, taking contraception was reported the most (48.6%), followed by intake fried or greasy food (40.0%), abnormal pregnancy or delivery baby over weight (37.1%). (See detail in table 34)

Perceived susceptibility of having diabetes in the family members after the experiment

The experiment group

Data indicated that after the experiment, most of the samples had perceived susceptibility of having diabetes in terms of the age over 40 years old the most (94.3%) and the second most was perceived susceptibility in getting no exercise (91.4%). The third was perceived susceptibility of having family history of DM (88.6%).

For the unsure group, most of the samples reported that they were unsured about the following factor: pancreatitis (20.0%), taking contraception (17.1%), obesity and no exercise (14.3%).

For the no perception of susceptibility group, the age over 40 years old was reported the most (5.7%), followed by family history of DM, abnormal pregnancy or delivery baby over weight, taking contraception and no exercise (2.9%). (See detail in table 35)

The Comparison group

Data indicated that the samples in the comparison group had perceived susceptibility of having diabetes in terms of family history of DM and no exercise the most (45.7%) and the second most was perceived susceptibility in getting obesity and intake fried or greasy food (42.9%). The third was perceived susceptibility of having the age over 40 years old (40.0%).

For the unsure group, most of the samples reported that they were unsured about the following factor: pancreatitis (74.3%), abnormal pregnancy or delivery baby over weight and taking contraception (54.3%), the age over 40 years old (45.7%).

For the no perception of susceptibility group, taking contraception was reported the most (45.7%), followed by abnormal pregnancy or delivery baby over weight (28.6%), no exercise (25.7%). (See details in table 35)

The perceived susceptibility of having diabetes in both groups can be summarized as follows: (See table 33)

Table 33 The level of perceived susceptibility of having diabetes in both groups

The experimental group	The comparison group
Before the experiment	
Reported the first	**Reported the first**
1. No exercise	1. No exercise
Reported the second	**Reported the second**
1. Family history of DM	1. Family history of DM
2. Intake fried or greasy food	
Reported the third	**Reported the third**
1. The age over 40 years old	1. The age over 40 years old
2. Obesity	2. Obesity
After the experiment	
Reported the first	**Reported the first**
1. The age over 40 years old	1. Family history of DM
	2. No exercise

Table 33 (cont.) The level of perceived susceptibility of having diabetes in both groups

The experimental group	The comparison group
After the experiment	
Reported the second	**Reported the second**
1. Intake fried or greasy food	1. Obesity
	2. Intake fried or greasy food
Reported the third	**Reported the third**
1. Obesity	1. The age over 40 years old
2. Abnormal pregnancy or delivery baby over weight	

After the analysis, differences of the arithmetic means of both groups before the experiment, there was no statistical difference in both groups. (See table 37)

After the experiment, the experimental group had perceived susceptibility of having diabetes better than the comparison group, the data revealed the statistical significant. (p-value < 0.001) (See detail in table 37)

Table 34 Number and percentage of the family member group classify by perceived susceptibility of having diabetes in the experimental and the comparison group before the experiment.

Perceived susceptibility of having diabetes	Experimental group (n=35)						Comparison group (n=35)					
	Yes		Unsure		No		Yes		Unsure		No	
	n	%	n	%	n	%	n	%	n	%	n	%
Genetics												
1. Family history of diabetes mellitus	11	31.4	17	48.6	7	20.0	14	40.0	15	42.9	6	17.1
Age												
2. Age over 40 years old	10	28.6	15	42.9	10	28.6	13	37.1	15	42.9	7	20.0
Obesity												
3. Obesity	10	28.6	13	37.1	12	34.3	13	37.1	15	42.9	7	20.0
Pregnancy												
4.Delivery baby overweight or abnormal pregnancy	4	11.4	22	62.9	9	25.7	4	11.4	18	51.4	13	37.1
Use of medications												
5. Taking contraception	3	8.6	21	60.0	11	31.4	0	0.0	18	51.4	17	48.6
Disease or virus infection												
6. Pancreatitis	6	17.1	19	51.3	10	28.6	6	17.1	24	68.6	5	14.3
Dietary behaviors												
7. Fried or greasy intake	11	31.4	18	57.4	6	17.1	11	31.4	10	28.6	14	40.0
Physical Exercise												
8. No exercise	15	42.9	12	34.3	8	22.9	15	42.9	12	34.3	8	22.9

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Table 35 Number and percentage of the family member group classify by perceived susceptibility of having diabetes in the experimental group and the comparison after the experiment.

Perceived susceptibility of having diabetes	Experimental group (n=35)						Comparison group (n=35)					
	Yes		Unsure		No		Yes		Unsure		No	
	n	%	n	%	n	%	n	%	n	%	n	%
Genetics												
1. Family history of diabetes mellitus	31	88.6	3	8.6	1	2.9	16	45.7	15	42.9	4	11.4
Age												
2. Age over 40 years old	33	94.3	0	0.0	2	5.7	14	40.0	16	45.7	5	14.3
Obesity												
3. Obesity	30	85.7	5	14.3	0	0.0	15	42.9	13	37.1	7	20.0
Pregnancy												
4. Delivery baby overweight or abnormal pregnancy	30	85.7	4	11.4	1	2.9	6	17.1	19	54.3	10	28.6
Use of medications												
5. Taking contraception	28	80.0	6	17.1	1	2.9	0	0.0	19	54.3	16	45.7
Disease or virus infection												
6. Pancreatitis	28	80.0	7	20.0	0	0.0	6	17.1	26	74.3	3	8.6
Dietary behaviors												
7. Intake fried or greasy food	32	91.4	2	5.7	1	2.9	15	42.9	12	34.3	8	22.9
Physical Exercise												
8. No exercise	29	82.9	5	14.3	1	2.9	16	45.7	10	28.6	9	25.7

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Table 36 Number and percentage of the family member group classified by perceived susceptibility of having diabetes in the experimental group and the comparison group before and after the experiment.

Perceived susceptibility of having diabetes	Experimental group (n=35)		Comparison group (n=35)	
	n	%	n	%
Before the experiment				
High level	10	28.6	10	28.6
Moderate level	14	40.0	16	45.7
Low level	11	31.4	9	25.7
Mean ± SD	15.914 ± 3.837		15.971 ± 3.674	
After the experiment				
High level	32	91.4	14	40.0
Moderate level	3	8.6	16	45.7
Low level	0	0.0	5	14.3
Mean ± SD	22.685 ± 1.890		16.742 ± 3.648	

Before the experiment, the data indicated that most of the samples in the experimental group and the comparison group had scored in the moderate level of perceived susceptibility of having diabetes (40.0% and 45.7%).

After the experiment, the data indicated that samples in both groups had scored in a high level of perceived susceptibility of having diabetes which increased from 28.6% to 91.4% in the experimental group and increased from 28.6% to 40.0% in the comparison group. (Table 36)

Table 37 Comparing the differences of mean scores of perceived susceptibility of having diabetes between groups before and after experiment.

Perceived susceptibility of having diabetes	Mean	S.D	Mann – Whitney U M.d.	S.D.d	Z	p-value
Before the experiment (n=35)						
The experimental group	15.914	3.837	0.003	0.163	0.041	0.967
The comparison group	15.917	3.674				
After the experiment (n=35)						
The experimental group	22.685	1.890	5.943	1.758	6.335	< 0.001
The comparison group	16.742	3.648				

p-value ≤ 0.05

Before the experiment, mean score of the experimental group was 15.914 with 3.837 standard deviation and the comparison group was 15.917 with 3.674 S.D. Mann-Whitney U test was applied and the result showed no significant difference.

After the experiment, means score of the experimental group was 22.685 with 1.890 standard deviation and the comparison group was 16.742 with 3.648 S.D. Analysis was done by Mann-Whitney U test, the result showed that statistical significant difference at $p < 0.001$. (Table 37)

Table 38 Comparison of mean scores of perceived susceptibility of having diabetes within groups before and after the experiment.

Perceived susceptibility of having diabetes	Willcoxon Matched – Pairs			
	Mean	S.D	Z	p-value
The experimental group				
Before the experiment (n=35)	15.914	3.837	5.124	< 0.001
After the experiment (n=35)	22.685	1.890		
The comparison group				
Before the experiment (n=35)	15.917	3.674	1.039	0.299
After the experiment (n=35)	16.742	3.648		

p-value ≤ 0.05

The experimental group, the data revealed that before the experiment, the group had a mean score of 15.914 with 3.837 S.D. and after the experiment, the group had a mean score of 22.685 with 1.890 S.D. After testing the difference by the Willcoxon Matched-Pairs, the data indicated that there was a statistical significant difference level at $p < 0.001$. (Table 38)

The comparison group, the data revealed that before the experiment, the group had a mean score of 15.917 with 3.674 S.D. and after the experiment, the group had a mean score of 16.742 with 3.648 S.D. After testing the difference by the Willcoxon Matched-Pairs, the data indicated that there was no statistical significant difference. (Table 38)

Perceived susceptibility of having complications in the family members before the experiment

The Experimental Group

Data indicated that most of the samples in the experimental group had perceived susceptibility of having complications in terms of the feet infection with slowly healing sores the most (51.4%) and the second most was perceived susceptibility in having blurred vision (45.7%). The third was perceived susceptibility of having complications in getting less sensitivity in hand and feet (28.6%).

For the unsure group, most of the samples reported that they were unsured about the following complications: cerebrai artery stenosis (65.7%), sex organ infection (60.0%), paralysis from cerebral artery stenosis (57.1%).

For the no perception of susceptibility group, the renal artery stenosis was reported the most (54.3%), followed by the renal failure (51.4%), the coronary artery stenosis and the impotence (48.6%). (See detail in table 40)

The Comparison Group

Data indicated that most of the samples had perceived susceptibility of having complications in terms of the foot infection with slowly healing sores the most (60.0%) and the second most was perceived susceptibility in having blurred vision (54.3%). The third was perceived susceptibility in getting less sensitivity in hand and feet (28.62%).

For the unsure group, most of the samples reported that they were unsured about the following complications: sex organ infection (65.7%), cerebral artery stenosis (60.0%), paralysis from cerebral artery stenosis and the impotence (57.1%).

For the no perception of susceptibility group, the ischemic heart disease was reported the most (57.1%), followed by the coronary artery stenosis (51.4%), the renal artery stenosis (45.7%). (See detail in table 40)

Perceived susceptibility of having complications in the family members after the experiment

The Experimental Group

Data indicated that the samples in the experimental group had perceived susceptibility of having complications in terms of blurred vision the most (91.4%) and the second most was perceived susceptibility in getting renal artery stenosis (88.6%). The third was perceived susceptibility in having retinopathy, sex organ infection, the feet infection with slowly healing sores (85.7%).

For the unsure group, most of the samples reported that they were unsured about the following complications: impotence (20.0%), less sensitivity in hands and feet (17.1%), ischemic heart disease, paralysis from cerebral artery stenosis, sex organ infection (14.3%).

For the no perception of susceptibility group, the ischemic heart disease and paralysis from cerebral artery stenosis were reported the most (8.6%), followed by the retinopathy, renal failure, renal artery stenosis, coronary artery stenosis, cerebral artery stenosis (5.7%), the feet infection with slowly healing sores and impotence (2.9%). (See detail in table 41)

The Comparison Group

Data indicated that most of the samples had perceived susceptibility of having complications in having blurred vision and the feet infection with slowly healing sore (65.7%) and the second most was perceived susceptibility in getting retinopathy (51.4%). The third was perceived susceptibility in having coronary artery stenosis (45.7%).

For the unsure group, most of the samples reported that they were unsured about the following complications: impotence (68.6%), renal failure (62.9%), renal artery stenosis and cerebral artery stenosis (60.0%).

For the no perception of susceptibility group, the ischemic heart disease was reported the most (42.9%), followed by coronary artery stenosis (40.0%) paralysis from cerebral artery stenosis (31.4%). (See detail in table 41)

The perceived susceptibility of having complications in both groups can be summarized as follows: (See table 39)

Table 39 The level of perceived susceptibility of having complications in the family member group

The experimental group	The comparison group
Before the experiment	
Reported the first	**Reported the first**
1. The feet infection with slowly healing sores	1. The feet infection with slowly healing sores
Reported the second	**Reported the second**
1. Blurred vision	1. Blurred vision
Reported the third	**Reported the third**
1. Less sensitivity in hands and feet	1. Less sensitivity in hands and feet

Table 39 (cont.)The level of perceived susceptibility of having complications in the family member group

The experimental group	The comparison group
After the experiment	
Reported the first	**Reported the first**
1. Blurred vision	1. Blurred vision
Reported the second	2. The feet infection with slowly healing sores
1. Renal artery stenosis	**Reported the second**
Reported the third	1. Retinopathy
1. Retinopathy	**Reported the third**
2. The feet infection with slowly healing sores	1. Coronary artery stenosis
3. Sex organ infection	

After the analysis, differences of the arithmetic means of both groups before the experiment, there was no statistical significant difference in both groups in perceived susceptibility of having complication. (See detail in table 43)

After the experiment, the experimental group had perceived susceptibility of having complication better than the comparison group, the data revealed the statistically significant difference. (p-value < 0.001) (See detail in table 43)

Table 40 Number and percentage of the family member group classify by perceived susceptibility of having complications in the experimental group and the comparison group before the experiment

Perceived susceptibility of having complications	Experimental group (n = 35)						Comparison group (n = 35)					
	Yes		Unsure		No		Yes		Unsure		No	
	n	%	n	%	n	%	n	%	n	%	n	%
Complications to eye												
1. Blurred vision	16	45.7	18	51.4	1	2.9	19	54.3	16	45.7	0	0.0
2. Retinopathy	8	22.9	17	48.6	10	28.6	11	31.4	15	42.9	9	25.7
Complications to kidney												
3. Chronic renal failure	4	11.4	13	37.1	18	51.4	4	11.4	16	45.7	15	42.9
4. Renal artery stenosis	3	8.6	13	37.1	19	54.3	2	5.7	17	48.6	16	45.7
Complications to heart and vessel												
5. Ischemic heart disease	3	8.6	17	48.6	15	42.9	7	20.0	8	22.9	20	57.1
6. Coronary artery stenosis	6	17.1	12	34.3	17	48.6	12	34.3	5	14.3	18	51.4
Complications to brain												
7. Cerebral artery stenosis	3	8.6	23	65.7	9	25.7	1	2.9	21	60.0	13	37.1
8. Paralysis from Cerebral artery stenosis	5	14.3	20	57.1	10	28.6	2	5.7	20	57.1	13	37.1
Complications to foot												
9. Less sensitivity in hands and feet	10	28.6	17	48.6	8	22.9	10	28.6	17	48.6	8	22.9
10. the feet ulcer with slowly healing sore	18	51.4	11	31.4	6	17.1	21	60.0	10	28.9	4	11.4
Complications to skin and sexual organ												
11. Sex organ infection	6	17.1	21	60.0	8	22.9	7	20.0	23	65.7	5	14.3
12. Impotence	4	11.4	15	42.9	16	45.7	1	2.9	20	57.1	14	40.0

Table 41 Number and percentage of the family member group classify by perceived susceptibility of having complications in the experimental group and the comparison group after the experiment

Perceived susceptibility of having complications	Experimental group (n = 35)						Comparison group (n = 35)					
	Yes		Unsure		No		Yes		Unsure		No	
	n	%	n	%	n	%	n	%	n	%	n	%
Complications to eye												
1. Blurred vision	32	91.4	3	8.6	0	0.0	23	65.7	12	34.3	0	0.0
2. Retinopathy	30	85.7	3	8.6	2	5.7	18	51.4	12	34.3	5	14.3
Complications to kidney												
3. Chronic renal failure	29	82.9	4	11.4	2	5.7	4	11.4	22	62.9	9	25.7
4. Renal artery stenosis	31	88.6	2	5.7	2	5.7	4	11.4	21	60.0	10	28.6
Complications to heart and vessel												
5. Ischemic heart disease	27	77.1	5	14.3	3	8.6	9	25.7	11	31.4	15	42.9
6. Coronary artery stenosis	29	82.9	4	11.4	2	5.7	16	45.7	5	14.3	14	40.0
Complications to brain												
7. Cerebral artery stenosis	29	82.9	4	11.4	2	5.7	6	17.1	21	60.0	8	22.9
8. Paralysis from Cerebral artery stenosis	27	77.1	5	14.3	3	8.6	8	22.9	16	45.7	11	31.4
Complications to foot												
9. Less sensitivity in hands and feet	29	82.9	6	17.1	0	0.0	13	37.1	20	57.1	2	5.7
10.The feet ulcer with slowly healing sore	30	85.7	4	11.4	1	2.9	23	65.7	10	28.6	2	5.7
Complications to skin and sexual organ												
11. Sex organ infection	30	85.7	5	14.3	0	0.0	13	37.1	19	54.3	3	8.6
12. Impotence	27	77.1	7	20.0	1	2.9	3	8.6	24	68.6	8	22.8

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Table 42 Number and percentage of the family member group classified by perceived susceptibility of having complications in the experimental group and the comparison group before and after the experiment.

Perceived susceptibility of having complications	Experimental group(n=35)		Comparison group (n=35)	
	n	%	n	%
Before the experiment				
High level	8	22.9	10	28.6
Moderate level	16	45.7	18	51.4
Low level	11	31.4	7	20.0
Mean ± SD	22.542 ± 4.822		22.914 ± 5.342	
After the experiment				
High level	31	88.6	15	42.9
Moderate level	4	114.4	11	31.4
Low level	0	0.0	9	25.7
Mean ± SD	33.585 ± 3.760		24.514 ± 5.457	

Before the experiment, the data reported most of the samples in the experimental group and the comparison group had scored in the moderate level of perceived susceptibility of having complications. (45.7% and 51.4% respectively)

After the experiment, the data revealed that the samples in both groups had scored in the high level of perceived susceptibility of having complications which increased from 22.9% to 88.6% in the experimental group and increased from 28.6% to 42.9% in the comparison group. (See detail in table 42)

Table 43 Comparing the difference of mean scores of perceived susceptibility of having complications between groups before and after experiment.

Perceived susceptibility of having complications	Mean	S.D	Mann – Whitney U M.d.	S.D.d	Z	p-value
Before the experiment (n=35)						
The experimental group	22.542	4.822	0.372	0.283	0.389	0.697
The comparison group	22.914	4.539				
After the experiment (n=35)						
The experimental group	33.485	3.760	7.971	1.785	5.667	< 0.001
The comparison group	24.514	5.457				

p-value ≤ 0.05

Before the experiment, the experimental group's mean score was 22.542, S.D. was 4.822 and the comparison group's mean score was 22.914, S.D. was 4.539. After applying the Mann-Whitney U test, the data indicated no statistical significant difference.

After the experiment, the experimental group's mean score was 33.485, S.D. was 3.760 while the comparison group's mean score was 24.514, S.D. was 5.457. After administering the Mann-Whitney U test, the data revealed that a statistically significant of means score between the two group at the p-value <0.001. (Table 43)

Table 44 Comparison of mean scores of perceived susceptibility of having complications within groups before and after the experiment.

Perceived susceptibility of having complications	Willcoxon Matched – Pairs			
	Mean	S.D	Z	p-value
The experimental group				
Before the experiment (n=35)	22.542	4.822	5.090	< 0.001
After the experiment (n=35)	33.485	3.760		
The comparison group				
Before the experiment (n=35)	22.914	4.539	1.987	0.053
After the experiment (n=35)	24.514	5.457		

p-value ≤ 0.05

The experimental group before the experiment, the data revealed that the group had a mean score of 22.542 with 4.822 S.D. and after the experiment, the group had a mean score of 33.485 with 3.760 S.D. After testing the differences by the Willcoxon Matched-Pairs, the data indicated that there was a statistical significant difference at p-value< 0.001. (Table 44)

The comparison group before the experiment, the data revealed that the group had a mean score of 22.914 with 4.539 S.D. and after the experiment, the group had a mean score of 24.514 with 5.457 S.D. After testing the differences by the Willcoxon Matched-Pairs data indicated that there was no statistical significant difference. (See details in table 44)

Perceived efficacy to prevent diabetes of the family members before the experiment

The Experimental Group

Data indicated that most of the samples had perceived efficacy to prevent diabetes in terms of minimized fried or greasy food the most (40.0%) and the second most was perceived efficacy in getting minimized fatty food from coconut milk (22.9%). The third was perceived efficacy in having minimized sweetened food (17.1%).

For the unsure group, most of the samples reported that they were unsured about the following of self-efficacy: minimized sweetened food (60.0%), minimized fried or greasy food, exercise at the same time (57.1%), exercise at least 20 minutes at a time (45.7%).

For the no perception of efficacy group, the exercise 3 times/weeks regularly was reported the most (54.3%), followed by the exercise at least 20 minutes at a time (45.7%), the minimized fatty from coconut milk (37.1%). (See in table 46)

The Comparison Group

Data revealed that most of the samples had perceived efficacy to prevent diabetes in terms of minimized fatty food from coconut milk the most (22.9%) and the second most was minimized fried or greasy food (20.0%). The third was perceived self-efficacy in having minimized sweetened food (17.1%).

For the unsure group, most of the samples reported that they were unsured about the following of efficacy: minimized fried or greasy food, exercise at the same time each day (71.4%), minimized sweetened food (60.0%), exercise at least 20 minutes at a time (48.6%).

For the no perception of efficacy group, the exercise 3 times/week regularly was reported the most (48.6%), followed by minimized fatty from coconut milk (45.7%), exercise at least 20 minutes at a time (40.0%). (See detail in table 46)

Perceived efficacy to prevent diabetes of the family members after the experiment

The Experimental Group

Data revealed that most of the samples had perceived efficacy to prevent diabetes in terms of minimized sweetened food the most (88.6%) and the second most was perceived efficacy in getting minimized fried or greasy food, exercise 3 times/week regularly (85.7%). The third was perceived efficacy in having exercise at the same time each day (82.9%).

For the unsure group, most of the samples reported that they were unsured about the following of efficacy: minimized fried or greasy food and fatty food from coconut milk, exercise 3 times/week regularly exercise at least 20 minutes at a time (14.3%), minimized sweetened food (8.6%), exercise at the same time each day (2.9%).

For the no-perception of efficacy group, minimized fatty from coconut milk was reported the most (5.7%), followed by sweetened food and exercise at the same time each day (2.9%). Besides, data reported that none of the sample was no perception. (See detail in table 47)

The comparison group

Data revealed that most of the samples had perceived efficacy to prevent diabetes in term of minimized fried or greasy food the most (37.1%) and the second

most was minimized fatty from coconut milk (34.3%). The third was minimized sweetened food (31.4%).

For the unsure group, most of the samples reported that they were unsured about the following in efficacy perception: minimized fried or greasy food, exercise at least 20 minutes at a time (57.1%), exercise 3 times/week regularly, exercise at the same time each day (45.7%), minimized sweetened food (37.1%).

For the no perception of perceived efficacy group, minimized fatty food from coconut milk was reported the most (42.9%), followed by exercise 3 times/week regularly, exercise at the same time each day (34.3%), minimized sweetened food (31.4%). (See detail in table 47)

The perceived efficacy to prevent diabetes in both groups can be summarized as follows: (See table 45)

Table 45 The level of perceived efficacy to prevent diabetes in both groups

The experimental group	**The comparison group**
Before the experiment	
Reported the first	**Reported the first**
1. Minimized fried or greasy food	1. Minimized fried or greasy food
Reported the second	**Reported the second**
1. Minimized fatty from coconut milk	1. Minimized fatty from coconut milk
Reported the third	**Reported the third**
1. Minimized sweetened	1. Minimized sweetened food

Table 45 (cont.) The level of perceived self-efficacy to prevent diabetes in both groups

The experimental group	The comparison group
After the experiment	
Reported the first	**Reported the first**
1. Minimized sweetened food	1. Minimized fried or greasy food
Reported the second	**Reported the second**
1. Minimized fried or greasy food	1. Minimized fatty from coconut milk
2. Exercise 3 times/week regularly	
3. Exercise at least 20 minute at a time	
Reported the third	**Reported the third**
1. Exercise at the same time each day	1. Minimized sweetened food

After the analysis, differences of the arithmetic means of both groups before the experiment, there was no statistical significant difference in both groups in perceived efficacy to prevent diabetes. (See detail in table 49)

After the experiment, the experimental group had perceived self-efficacy to prevent diabetes better than the comparison group, the data revealed the statistical significant difference. (p-value < 0.001) (See detail in table 49)

Table 46 Number and percentage of the family member group by perceived efficacy to prevent diabetes mellitus before the experiment

perceived efficacy to prevent complications	The experimental group (n=35)						The comparison group (n=35)					
	Can		Unsure		Cannot		Can		Unsure		Cannot	
	n	%	n	%	n	%	n	%	n	%	n	%
Dietary behavior												
1. Minimize fried or greasy food	14	40.0	20	57.1	1	2.9	7	20.0	25	71.4	3	8.6
2. Minimize sweetened food	6	17.1	21	60.0	8	22.9	6	17.1	21	60.0	8	22.9
3. Minimize fatty food from coconut milk	8	22.9	14	40.0	13	37.1	8	22.9	11	31.4	16	45.7
Physical Exercise												
4. To exercise 3 times/week regularly	3	8.6	13	37.1	19	54.3	3	8.6	15	42.9	17	48.6
5. To exercise at least 20 minutes at a time	3	8.6	16	45.7	16	45.7	4	11.4	17	48.6	14	40.0
6. To exercise at the same time each day	4	11.4	20	57.1	11	31.4	3	8.6	25	71.4	7	20.0

Table 47 Number and percentage of the family member group by perceived efficacy to prevent diabetes mellitus after the experiment

perceived efficacy to prevent complications	The experimental group (n=35)						The comparison group (n=35)					
	Can		Unsure		Cannot		Can		Unsure		Cannot	
	n	%	n	%	n	%	n	%	n	%	n	%
Dietary behavior												
1. Minimize fried or greasy food	30	85.7	5	14.3	0	0.0	13	37.1	20	57.1	2	5.7
2. Minimize sweetened food	31	88.6	3	8.6	1	2.9	11	31.4	13	37.1	11	31.4
3. Minimize fatty food from coconut milk	28	80.0	5	14.3	2	5.7	12	34.3	8	22.9	15	42.9
Physical Exercise												
4. To exercise 3 times/week regularly	30	85.7	5	14.3	0	0.0	7	20.0	16	45.7	12	34.3
5. To exercise at least 20 minutes at a time	30	85.7	5	14.3	0	0.0	5	14.3	20	57.1	10	28.6
6. To exercise at the same time each day	29	82.9	2	5.7	1	2.9	7	20.0	16	45.7	12	34.3

Table 48 Number and percentage of the family member group classify by perceived efficacy to prevent diabetes in the experimental group and the comparison group before and after the experiment.

Perceived efficacy to prevent complications	Experimental group(n=35)		Comparison group(n=35)	
	n	%	n	%
Before the experiment				
High level	9	25.7	7	20.0
Moderate level	14	40.0	17	48.6
Low level	12	34.3	11	31.4
Mean ± SD	11.142 ± 2.636		11.028 ± 2.332	
After the experiment				
High level	32	91.4	13	37.1
Moderate level	3	8.6	12	34.3
Low level	0	0.0	10	28.6
Mean ± SD	16.971 ± 1.932		11.800 ± 3.113	

Before the experiment, the data indicated that most of the samples in the experimental group and the comparison group had scored in the moderate level of perceived efficacy to prevent diabetes (40.0% and 48.6%).

After the experiment, the data revealed that the samples in the experimental group had scored in the high level of perceived efficacy to prevent diabetes which increased from 25.7% to 91.4% and increased from 20.0% to 37.1% in the comparison group. (Table 48)

Table 49 Comparing the differences of mean scores of perceived efficacy to prevent diabetes between the experimental group and the comparison group before and after experiment.

Perceived efficacy to prevent complications			Mann – Whitney U			
	Mean	S.D	M.d.	S.D.d	Z	p-value
Before the experiment (n=35)						
The experiment group	11.142	2.636	0.114	0.304	0.113	0.910
The comparison group	11.028	2.332				
After the experiment (n=35)						
The experiment group	16.971	1.932	5.171	1.181	6.053	<0.001
The comparison group	11.800	3.113				

p-value ≤ 0.05

Before the experiment, the experimental group's mean score was 11.142 with 2.363 S.D. and the comparison group's mean score was 11.028 with 2.332 S.D. Analysis was done by Mann-Whitney U test, the data revealed that there was no statistical significant difference ($p > 0.05$).

After the experiment, the experimental group's mean score was 16.971 with 1.932 S.D. and the comparison group's mean score was 11.800 with 3.113 S.D. Analysis was done by Mann-Whitney U test, the data revealed a statistically significant difference. (p-value > 0.05) (Table 49)

Table 50 Comparison of mean scores of perceived efficacy to prevent diabetes within groups before and after the experiment.

Perceived efficacy to prevent complications	Willcoxon Matched - Pairs			
	Mean	S.D	Z	p-value
The experimental group				
Before the experiment (n=35)	11.124	2.636	5.171	< 0.001
After the experiment (n=35)	16.971	1.932		
The comparison group				
Before the experiment (n=35)	11.028	2.332	0.999	0.318
After the experiment (n=35)	11.800	3.113		

p-value ≤ 0.05

The experimental group before the experiment, the data revealed that the group had a mean score of 11.142 with 2.636 S.D. and after the experiment, the group had a mean score of 16.971 with 1.932 S.D. After testing the differences by the Willcoxon Matched-Pairs, the data indicated that there was a statistically significant difference at $p < 0.001$. (Table 50)

The comparison group before the experiment, the data revealed that the group had a mean score of 11.028 with 2.332 S.D. and after the experiment the group had a mean score of 11.800 with 3.113 S.D. After testing the difference by the Willcoxon Matched-Pairs, the data indicated that there was no statistical significant difference. (Table 50)

Self-care behaviors to prevent diabetes mellitus of both groups in the family member group

Before the experiment

Dietary time: Majority of both groups had eaten diet at same time in someday at 48.6% in the experimental group and 37.1% in the comparison group. 31.4% of the experimental group reported that they were usually eating diet on time and always eating diet on time less than the comparison group (40.0%).

Taking fatty in a week: 2.9% of the experimental group reported that they taken fat everyday in a week while the comparison group reported none. Moreover, the comparison group (31.4%) had taken fat more than 3 day/week more than the experimental group (28.6). 5.7% of the experimental group had never taken fat in a week while the comparison group reported none.

Sweet intake in a week: 5.7% in the experimental group reported never intake sweet in a week while the comparison group reported only 2.9%. The samples in the comparison group (65.7%) reported taken sweet less than 3 day/week more than the experimental group (60.0%) and 5.7% of both groups reported taken sweet everyday.

Sweetened fruit intake in a week: 17.1% of the experimental reported that they never taken sweetened fruit while 14.3% in the comparison group. However, 71.4% of the comparison group had taken sweetened fruit less than 3 day/week while the experimental group reported 65.7%.

Soda/syrup intake in a week: Most of the experimental group (48.6%) had never take soda/syrup in a week while the comparison group reported only 31.4%. Only 11.4% in both groups reported took soda/syrup everyday and 2.9% in the

experimental group had take soda/syrup less than 3 day/week while the comparison group reported 11.4%.

Dietary control in daily life: Most of both groups (77.1% in the experimental group, 57.1% in the comparison group) never control dietary in 1 week. 8.6% of the comparison group was able control dietary in daily while the experimental group was able only 5.7%.

Weekly exercise behavior: 20.0% of the samples in both groups exercise everyday. 31.1% in the experimental group exercise more than 3 day/week which higher than the comparison group (17.1%) and most of the samples in both groups expressed uncertain in their exercise behaviors.

Period of time in each exercise: The samples in the comparison group (48.6%) exercise long 30 minute and longer than 30 minute while the experimental group reported only 42.9%. 57.1% in the experimental group exercise long 20 minute and exercise long 10 minute more than the comparison group (51.4%).

Level of sweat after exercise: The experimental group had reported a larger of number sweat after exercise more than the comparison group. (8.6% and 2.9% respectively) Most of the samples in both groups had reported moderate level of sweat after exercise while 74.3% in the experimental group and 54.3% in the comparison group.

Time table in each exercise: 22.9% in the experimental group always reported exercise at the same time while the comparison group reported only 14.3%. 54.3% in the experimental group usually reported exercise at the same time more than that of the comparison group (45.7%). 20.0% of the comparison group and 14.3% in the experimental group reported exercise in difference time.

Accompanied package when going to the exercise: Most of the samples in both groups never have an accompanied package when going to the exercise at 51.4% in the experimental group and 65.7% in the comparison group. 5.7% of the experimental group reported that they have bought toffy when going to the exercise while the comparison reported only 2.9%. (See in table 51)

Self-care behaviors to prevent diabetes mellitus of both groups in the family member group

After the experiment

Eating time: Most of the samples in the experimental group (40.0%) usually eating their meal on time while the comparison group reported only 31.4%. 28.6% in the experimental group always eating their meal on time while the comparison group reported 14.3% and 14.3% of the comparison group never eating their meal on time while the experimental group reported only 5.7%.

Fat intake in a week: 40.0% of the samples in the experimental group never taken fat in a week while the comparison group reported only 14.3%. Most of the samples in both groups 57.1% in the experimental group and 71.4% in the comparison group had taken fat less than 3 day/week. 14.3% in the comparison group had taken fat more than 3 day/week while the experimental group only 2.9%. None of the sample in both groups reported taken fat everyday.

Sweet intake in a week: 42.9% in the experimental group never taken sweet more than the comparison group (2.9%), however the comparison group (80.0%) had taken sweet less than 3 day/week higher than the experimental group (51.4%). 14.3%

in the comparison group reported taken sweet more than 3 day/week while the experimental reported only 5.7%.

Sweetened fruit intake in a week: 68.9% of the samples in the experimental group never intake sweetened fruit in a week while the comparison group reported only 22.9%. 65.7% in the comparison group reported that they intake sweetened fruit less than 3 day/week higher than the experimental group (31.4%). None of the sample in both groups reported intake sweetened fruit everyday.

Soda/syrup intake in a week: 71.4% of the samples in the experimental group had never take soda/syrup in a week while the comparison group only 48.6%. Only 11.4% of the samples in the experimental group reported taken soda/syrup everyday in a week while the comparison group reported 17.1%.

Dietary control in daily life: Most of the samples in both groups reported never dietary control in daily life at 51.4% in the experimental group and 57.1% in the comparison group and 34.3% in the experimental group reported dietary control everyday while the comparison group only 5.7%.

Weekly exercise behavior: 62.9% of the samples in the experimental group exercise everyday while the comparison group reported only 11.4%. However, 42.9% in the comparison group exercise more than 3 day/week higher than the experimental group (22.9%). Only 8.6% in the experimental group uncertain in their exercise while the comparison group 28.6%.

Period of time in each exercise: 85.7% of the samples in the experimental group exercise long 30 minutes and longer than 30 minutes while the comparison group only 65.8%. 5.7% of the samples in the experimental group reported exercise long 10 minutes while the comparison 20.0%.

Level of sweat after exercise: 22.9% in the experimental group have reported a larger of number sweat while the comparison group reported no sweat. 65.7% of both groups reported moderate level sweat after exercise. 34.3% in the comparison group reported no sweat after exercise while the experimental group reported only 11.4%.

Time table in each exercise: 31.4% of the experimental group always reported exercise at the same time while the comparison group reported only 11.4%. 57.1% in the comparison group usually reported exercise at the same time more than that of the experimental group (48.6%).

Accompanied package when going to the exercise: Most of the samples in both groups never accompanied package when going to the exercise at 48.6% in the experimental group and 60.0% in the comparison group. 42.9% of the samples in the experimental group and 37.1% in the comparison group reported accompanied water when going to the exercise and 8.6% in the experimental group accompanied syrup, fruit juice and toffy when going to the exercise while the comparison group only 2.9%. (See detail in table 51)

Table 51 Number and percentage of the family members classified by self-care behaviors to prevent diabetes mellitus before and after the experiment

Self-care behaviors to prevent complications	Before the experiment (n=35)				After the experiment (n=35)			
	Experimental group		Comparison group		Experimental group		Comparison group	
	n	%	n	%	n	%	n	%
1. Eating time								
Difference time everyday	7	20.0	8	22.9	2	5.7	5	14.3
Same time in someday	17	48.6	13	37.1	9	25.7	14	40.0
Usually on time	9	25.7	10	28.6	14	40.0	11	31.4
Always on time	2	5.7	4	11.4	10	28.6	5	14.3
2. Fat intake in a week								
Everyday	1	2.9	0	0.0	0	0.0	0	0.0
More than 3 day/week	11	31.4	10	28.6	1	2.9	5	14.3
Less than 3 day/week	21	60.0	25	71.4	20	57.1	25	71.4
Never	2	5.7	0	0.0	14	40.0	5	14.3
3. Sweet intake in a week								
Everyday	2	5.7	2	5.7	0	0.0	1	2.9
More than 3 day/week	10	28.6	9	25.7	2	5.7	5	14.3
Less than 3 day/week	21	60.0	23	65.7	18	51.4	28	80.0
Never	2	5.7	1	2.9	15	42.9	1	2.9
4. Sweetened fruit intake in a week								
Everyday	0	0.0	0	0.0	0	0.0	0	0.0
More than 3 day/week	6	17.1	5	14.3	0	0.0	4	11.4
Less than 3 day/week	23	65.7	25	71.4	11	31.4	23	65.7
Never	6	17.1	5	14.3	24	68.6	8	22.9

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Table 51 (cont.) Number and percentage of the family members classified by self-care behaviors to prevent diabetes mellitus before and after the experiment

Self-care behaviors to prevent complications	Before the experiment (n=35)				After the experiment (n=35)			
	Experimental group		Comparison group		Experimental group		Comparison group	
	n	%	n	%	n	%	n	%
5. Soda/syrup intake in a week								
Everyday	4	11.4	4	11.4	4	11.4	6	17.1
More than 3 day/week	1	2.9	4	11.4	0	0.0	2	5.7
Less than 3 day/week	13	37.1	16	45.7	6	17.1	10	28.6
Never	17	48.6	11	31.4	25	71.4	17	48.6
6. Dietary control in daily life								
Everyday	27	77.1	20	57.1	18	51.4	20	57.1
More than 3 day/week	5	14.3	10	28.6	3	8.6	9	25.7
Less than 3 day/week	1	2.9	2	5.7	2	5.7	4	11.4
Never	2	5.7	3	8.6	12	34.3	2	5.7
7. Weekly exercise behavior								
Uncertain	14	40.0	12	34.3	2	5.7	7	20.0
Less than 3 day/week	3	8.6	6	17.1	3	8.6	5	14.3
More than 3 day/week	11	31.4	10	28.6	17	48.6	15	42.9
Everyday	7	20.0	7	20.0	13	37.1	8	22.9
8. Period of time in each exercise								
10 minute	8	22.9	0	0.0	0	0.0	1	2.9
20 minute	12	34.3	15	42.9	4	11.4	11	31.4
30 minute	7	20.0	19	54.3	29	65.7	23	65.7
Longer than 30 minute	8	22.9	1	2.9	8	22.9	0	0.0

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Table 51 (cont.) Number and percentage of the family members classified by self-care behaviors to prevent diabetes mellitus before and after the experiment

Self-care behaviors to prevent complications	Before the experiment (n=35)				After the experiment (n=35)			
	Experimental group		Comparison group		Experimental group		Comparison group	
	n	%	n	%	n	%	n	%
9. Level of sweat after exercise								
No sweat	0	0.0	0	0.0	0	0.0	1	2.9
Have sweat sometime	6	17.1	15	42.9	4	11.4	11	31.4
Have sweat moderate	26	74.3	19	54.3	29	65.7	23	65.7
Have many sweat	3	8.6	1	2.9	8	22.9	0	0.0
10. Time table in each exercise								
Difference time	5	14.3	7	20.0	3	8.6	4	11.4
Almost the same time each time	3	8.6	7	20.0	4	11.4	7	20.0
Usually at the same time	19	54.3	16	45.7	17	48.6	20	57.1
Always at the same time	8	22.9	5	14.3	11	31.5	4	11.4
11.To take something when go exercise								
Nectar, fruit juice	0	0.0	0	0.0	0	0.0	0	0.0
Toffy	2	5.7	1	2.9	3	8.6	1	2.9
Water	15	42.9	11	31.4	15	42.9	13	37.1
None	18	51.4	23	65.7	17	48.6	21	60.0

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Table 52 Number and percentage of the family member group classified by self- care behaviors to prevent diabetes mellitus in the experimental group and the comparison group before and after the experiment.

Self-care behaviors to prevent diabetes mellitus	Experimental group(n=35)		Comparison group(n=35)	
	n	%	n	%
Before the experiment				
High level	3	8.6	5	14.3
Moderate level	29	82.9	28	80.0
Low level	3	8.6	2	5.7
Mean ± SD	27.171 ± 4.038		26.171 ± 4.126	
After the experiment				
High level	18	51.4	7	20.0
Moderate level	17	48.6	26	74.3
Low level	0	0.0	2	5.7
Mean ± SD	33.371 ± 3.598		27.942 ± 4.517	

Before the experiment, the data indicated that most of the samples in the experimental group and the comparison group had scored in a moderate level of self-care behaviors to prevent diabetes mellitus (82.9% and 80.0%).

After the experiment, the data indicated that the samples in the experimental group had scored in a high level of self-care behaviors (8.6% to 51.4%) than that of the comparison group which was in the moderate level (74.3%). (Table 52)

Table 53 Comparing the differences of mean scores of self-care behaviors to prevent diabetes mellitus between groups before and after experiment.

Self-care behaviors to prevent diabetes mellitus	Mean	S.D	Mann – Whitney U M.d.	S.D.d	Z	p-value
Before the experiment (n=35)						
The experimental group	27.171	4.038	1.000	0.043	1.174	0.241
The comparison group	26.171	4.126				
After the experiment (n=35)						
The experimental group	33.371	3.598	5.429	0.919	4.658	< 0.001
The comparison group	27.942	4.517				

p-value ≤ 0.05

Before the experiment, mean score of the experimental group was 27.171 with 4.038 S.D. and that of the comparison group was 26.171 with 4.126 S.D. Mann-Whitney U test was applied and showed no significant difference.

After the experiment, mean score of the experimental group was 33.371, S.D. was 3.598 and that of the comparison group was 27.942 and 4.517. Mann-Whitney U test, the result showed that a statistical significant difference at $p < 0.001$. (Table 53)

Table 54 Comparison of mean scores of self-care behaviors to prevent diabetes mellitus within groups before and after the experiment.

Self behaviors to prevent diabetes	Willcoxon Matched – Pairs			
	Mean	S.D	Z	p-value
The experimental group				
Before the experiment (n=35)	27.171	4.083	5.012	< 0.001
After the experiment (n=35)	33.371	3.598		
The comparison group				
Before the experiment (n=35)	26.171	4.126	1.966	0.067
After the experiment (n=35)	27.942	4.517		

p-value ≤ 0.05

The experimental group before the experiment, the data revealed that the group had a mean score of 27.171 with 4.083 S.D. and after the experiment, the group had a mean score of 33.371 with 3.598 S.D. After testing the differences by the Willcoxon Matched-Pairs, the data indicated that there was a statistical significant difference at $p < 0.001$. (Table 54)

The comparison group before the experiment, the data revealed that the group had a mean score of 26.171 with 4.126 S.D. and after the experiment, the group had a mean score of 27.942 with 4.517 S.D. After testing the differences by the Willcoxon Matched-Pairs, the data indicated that there was no statistical significant difference. (Table 54)

Supportive behavior given to the patient for promoting the patient's self-care of the family member group before the experiment

The Experimental Group

Data revealed that most of the samples had received support for promoting the patient's self-care behavior on keeping appointment the most 65.7% following by reminding about diet (34.3%) and reminding to take medicine on time (31.4%).

Support for promoting the patient's self-care behavior which reported that they had been done sometimes included exercising, dietary control, taking medicine on time, and keeping appointment, wearing shoes in the consecutive order (42.9%, 34.3% and 11.4%).

Support for promoting the patient's self-care behavior which hardly behaved by the samples include wearing shoes (71.4%), stimulate exercise (42.9%), and dietary control (31.4%). (See details in table 56)

The Comparison Group

The samples reported that they had been supported for promoting the patient's self-care behavior on keeping appointment the most 60.0%, reminding about diet (34.3%) and taking medicine on time (28.6%).

Support for promoting the patient's self-care behavior which samples reported they had been done sometimes included taking medicine on time (42.9%), exercising (40.0%), and dietary control (37.1%) in the consecutive order.

Support for promoting the patient's self-care behavior which hardly behaved by the samples include wearing shoes (71.4%), exercising (48.6%), dietary control, taking medicine on time (28.6%). (See details in table 56)

Supportive behavior given to the patient for promoting the patient's self-care of the family member group after the experiment

The Experimental Group

The samples in the experimental group, reported that they had been support the patient for promoting the patient's self-care behavior in keeping appointment the most 91.4% following by stimulating on the exercise (82.9%), taking medicine on time 80.0%.

Support for promoting the patient's self-care behavior which reported that they had been done sometimes included wearing shoes (22.9%), exercising (20.0%) and dietary control 17.1% in the consecutive order.

Support for promoting the patient's self-care behavior which hardly behaved by the samples include wearing shoes, keeping appointment, and taking medicine on time (5.7%). (See detail in table 57)

The Comparison Group

Data indicated that the most of the samples had been given support for promoting the patient's self-care behavior on keeping appointment the most 74.3% following by taking medicine on time (34.3%), wearing shoes (22.9%).

Support for promoting the patient's self-care behavior which had been done sometimes included dietary, exercising, and taking medicine on time in the consecutive order (77.1%, 68.6% and 48.6%).

Support for promoting the patient's self-care behavior which hardly behaved by the sample include wearing shoes (42.9%), exercising (22.9%) and taking medicine on time (17.1%). (See detail in table 57)

The support behavior given to the patient for promoting the patient's self-care of the family members in both groups can be summarized as follows: (Table 55)

Table 55 The level of supportive behavior given to the patient for promoting the patient's self-care in both groups

The experimental group	The comparison group
Before the experiment	
Reported the first	**Reported the first**
1. Keeping appointment	1. Keeping appointment
Reported the second	**Reported the second**
1. Dietary	1. Dietary
Reported the third	**Reported the third**
1. Taking medicine on time	1. Taking medicine on time
After the experiment	
Reported the first	**Reported the first**
1. Keeping appointment	1. Keeping appointment
Reported the second	**Reported the second**
1. Dietary	1. Taking medicine on time
Reported the third	**Reported the third**
1. Taking medicine on time	1. Wearing shoes
2. Stimulate exercise	

After the analysis, differences of the arithmetic means of both groups before the experiment, there was found that there was no statistical significant difference in both groups in supportive behavior given to the patient for promoting the patient's self-care. (See table 59)

After the experiment, the experimental group had carried out supportive behavior to the patient for promoting the patient's self-care better than that of the comparison group, with a statistical significant difference at p-value<0.001. (Table 59)

Table 56 Number and percentage reported by supportive behavior given to the patient for promoting the patient's self-care among the family members before the experiment

Supportive behavior given to the patient for promoting the patient's self-care	Experimental group (n=35)						Comparison group (n=35)					
	Frequency		Sometime		Never		Frequency		Sometime		Never	
	n	%	n	%	n	%	n	%	n	%	n	%
1. Reminding about the diet	12	34.3	12	34.3	11	31.4	12	34.3	13	37.1	10	28.6
2. Stimulating on the exercise	5	14.3	15	42.9	15	42.9	4	11.4	14	40.0	17	48.6
3. Reminding to take medicine on time	11	31.4	15	42.9	9	25.7	10	28.6	15	42.9	10	28.6
4. Reminding on keeping appointment	23	65.7	4	11.4	8	22.9	21	60.0	5	14.3	9	25.7
5. Reminding on wearing shoes	3	17.1	4	11.4	28	71.4	4	11.4	6	17.1	25	71.4

Table 57 Number and percentage reported by supportive behavior given to the patient for promoting the patient's self-care among the family members after the experiment.

Supportive behavior given to the patient for promoting the patient's self-care	Experimental group(n=35)						Comparison group(n=35)					
	Frequency		Sometime		Never		Frequency		Sometime		Never	
	n	%	n	%	n	%	n	%	n	%	n	%
1. Reminding about the diet	29	82.9	6	17.1	0	0.0	5	14.3	27	77.1	3	8.6
2. Stimulating on the exercise	28	80.0	7	20.0	0	0.0	3	8.6	24	68.6	8	22.9
3. Reminding to take medicine on time	28	80.0	5	14.3	2	5.7	12	34.3	17	48.6	6	17.1
4. Reminding on keeping appointment	32	91.4	1	2.9	2	5.7	26	74.3	4	11.4	5	14.3
5. Reminding on wearing shoes	25	71.4	8	22.9	2	5.7	8	22.9	12	34.3	15	42.9

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Table 58 Number and percentage of the family member group classified by supportive behavior given to the patient for promoting the patient's self-care in the experimental group and the comparison group before and after the experiment.

Supportive behavior given to the patient self-care	Experimental group(n=35)		Comparison group(n=35)	
	n	%	n	%
Before the experiment				
High level	7	20.0	9	25.7
Moderate level	19	54.3	15	42.9
Low level	9	25.7	11	34.3
Mean ± SD	9.514 ± 2.627		9.428 ± 2.558	
After the experiment				
High level	32	91.4	12	34.3
Moderate level	3	8.6	18	51.4
Low level	0	0.0	5	14.3
Mean ± SD	13.885 ± 1.490		10.485 ± 2.429	

Before the experiment, the data indicated that most of the samples in the experimental group had scored in a moderate level of supportive behavior given to the patient for promoting the patient's self-care. (54.3% and 42.9% respectively)

After the experiment, the data revealed that the experimental group had scored in a high level of supportive behavior given to the patient for promoting the patient's self-care which increased from 20.0% to 91.4% and the comparison group had scored in a moderate level which increased from 42.9% to 51.4%. (Table 58)

Table 59 Comparing the difference of mean scores of supportive behavior given to the patient for promoting the patient's self-care between groups before and after experiment.

Supportive behavior given to the patient self-care	Mean	S.D	Mann – Whitney U M.d.	S.D.d	Z	p-value
Before the experiment (n=35)						
The experimental group	9.514	2.627	0.026	0.069	0.243	0.803
The comparison group	9.488	2.558				
After the experiment (n=35)						
The experimental group	13.885	1.490	3.400	0.939	5.738	< 0.001
The comparison group	10.485	2.429				

p-value ≤ 0.05

Before the experiment, mean score of the experimental group was 9.514, S.D. was 2.627 and that of the comparison group was 9.428 and 2.558. Mann-Whitney U test was applied and showed no significant difference.

After the experiment, mean score of the experimental group was 13.885, S.D. was 1.490 and that of the comparison group was 10.485 and 2.492. Analysis was done by Mann-Whitney U test, the result indicated that there was a statistically significant difference at $p < 0.001$. (Table 59)

Table 60 Comparison of mean scores of supportive behavior given to the patient for promoting the patient's self-care within groups before and after the experiment.

Supportive behavior given To the patient self-care	Willcoxon Matched – Pairs			
	Mean	S.D	Z	p-value
The experimental group				
Before the experiment (n=35)	9.514	2.627	4.909	< 0.001
After the experiment (n=35)	13.885	1.490		
The comparison group				
Before the experiment (n=35)	9.428	2.558	1.915	0.152
After the experiment (n=35)	10.485	2.429		

p-value ≤ 0.05

The experiment group before the experiment, the data revealed that the group had a mean score of 9.514 with 2.627 S.D. and after the experiment, the mean score was increased to 13.885 and the S.D. was 1.490. The Willcoxon Matched-Pairs test was applied, the result indicated that there was a statistically significant difference at $p < 0.001$. (Table 60)

The comparison group before the experiment, the data revealed that the group had a mean score of 9.428 with 2.558 S.D. and after the experiment, the mean score was increased to 10.485 and the S.D. was 2.429. The Willcoxon Matched-Pairs test was applied, the result indicated that there was no statistically significant difference. (Table 60)

Table 61 Number and percentage of fasting plasma glucose level among the family members in the experimental group and the comparison groups before and after the experiment.

Fasting plasma glucose (normal<110 mg%)	Experimental group(n=35)		Comparison group(n=35)	
	n	%	n	%
Before the experiment				
≤ 126 mg%	31	88.6	34	97.1
≥ 126 mg%	4	11.4	1	2.9
Mean ± SD	104.34 ± 17.90		103.94 ± 8.74	
After the experiment				
≤ 126 mg%	33	94.3	34	97.1
≥ 126 mg%	2	5.7	1	2.9
Mean ± SD	100.17 ± 15791		103.60 ± 11.75	

Before the experiment, most of the samples in both groups had fasting plasma glucose scored ≤ 126 mmHg. (88.6% and 97.1% respectively)

After the experiment, the data indicated that both groups had fasting plasma glucose scored ≤ 126 mmHg (88.6% and 97.1%) which the experimental group was increased from 88.6% to 94.3% while the comparison group had fasting plasma glucose scored ≤ 126 mmHg. (Table 61)

Table 62 Comparing the difference of mean scores of fasting plasma glucose between groups before and after experiment.

Fasting plasma glucose (normal <110 mg%)	Mean	S.D	Mann – Whitney U M.d.	S.D.d	Z	p-value
Before the experiment (n=45)						
The experimental group	104.34	17.90	0.400	9.16	1.277	0.202
The comparison group	103.94	8.74				
After the experiment (n=45)						
The experimental group	100.17	15.91	3.340	4.160	2.049	0.020
The comparison group	103.60	11.75				

p-value ≤ 0.05

Before the experiment, Mean score of the experimental group was 104.34, S.D. was 17.90 and that of the comparison group was 103.94 and 8.74. Mann-Whitney U test was applied and showed no statistically significant difference.

After the experiment, Mean score of the experimental group was 100.17, S.D. was 15.91 and that of the comparison group was 103.60 and 11.75. Analysis was done by Mann-Whitney U test, the result showed no statistically significant difference. (Table 62)

Table 63 Comparison of mean scores of fasting plasma glucose level within groups before and after the experiment.

Fasting plasma glucose (normal <110 mg%)	Willcoxon Matched – Pairs			
	Mean	S.D	Z	p-value
The experimental group				
Before the experiment (n=35)	104.34	17.90	2.302	< 0.001
After the experiment (n=35)	100.17	15.91		
The comparison group				
Before the experiment (n=35)	103.94	8.76	0.976	0.329
After the experiment (n=35)	103.60	11.75		

p-value ≤ 0.05

The experimental group before the experiment, the data revealed that the group had a mean score of 104.34 with 17.90 S.D. and after the experiment, the mean score was decreased to 100.17 and the S.D. was 15.91. The Willcoxon Matched-Pairs test was applied, the result indicated that there was a statistically significant difference at $p < 0.001$. (Table 63)

The comparison group, the data revealed that before the experiment the group had a mean score of 103.94 with 8.76 S.D. and after the experiment, the mean score was 103.60 and the S.D. was 11.75. The Willcoxon Matched-Pairs test was applied, the result indicated that there was no statistically significant difference. (Table 63)

CHAPTER V

DISCUSSION

Health education program by applying the Transtheoretical model with participatory learning for self-care behaviors in diabetes mellitus at Tha-Ta Ko District, Nakonsawan Province. The results indicated that the samples in the experimental group had changed their behaviors both in the diabetic patients group and the family members group. Consequently, as a behavior change result, the samples have decreased Hba_{1C} level and fasting plasma glucose level.

Hypothesis 1 Health education program can enhance diabetic patients group and the family members group in changing their behaviors better than before the experiment and than that of the comparison group in the following aspects:

Part 1. Diabetic patient group

1.1 Perceived susceptibility of having complication:

Before the experiment, both groups had no statistical difference mean scores in perceived susceptibility of having complication.

After the experiment, the result indicated that the experimental group had a statistically significant and a better score on perceived susceptibility of having complications than before and than that of the comparison group. (Table 12,13) This finding supports the first hypothesis. The additional significant perceived susceptibility

of having complication included: (1) blurred vision, (2) renal failure, (3) renal artery stenosis, (4) less sensitivity in hands and feet, (5) the feet infection with slowly healing sore, (6) sex organ infection and (7) the impotence. (See details in table 9,10)

The improvement of perceived susceptibility of having complications may be due to the health education program that the researcher had assessed diabetic patients group by using stages of change model questionnaire before providing the health education program in order to divide them into the group. At the first step of the activity, the researcher aimed to get them acquainted to each other. After re-assessing the stages of change behaviors, result indicated that 5 persons and 3 persons were in pre-contemplation stage of exercise behavior and foot care behavior respectively. Hence, the researcher had performed activities by presented a VDO tape, which emphasized on complication and severity of diabetes mellitus, preventing complication of diabetes mellitus. Then, the researcher had divided the members into subgroups and asked them to discuss about caused of DM, complication of DM, and practice to prevent complication that they had watched from VDO tape, and their experiences followed by presented its to the group. In addition, the members let the group members to exchange their opinions to other group members. Afterwards, the researcher concluded any important issues discussed by the group members. After attending these activities the researcher had assessed the diabetic patients group and results indicated that all of them had moved to the ready for action stage in having awareness and perceived susceptibility of having complication more than that of before. In addition, the researcher distributed a practice guidebook "DM for risk population and diabetic patients" to help them on how to practice at home. All of activities had made the experimental group increased their perceived susceptibility of

having complication. This was consistent with the study of Suwan, P. (1983:125) illustrated that many factor such as model, other of opinion and experiences make the perception and develop to the practice.

This finding was also similar to the study of Jansuriyagool, S., (1993:114), Dumrongwanich, S., (1993:92-93), Nakkarung, K., (1997:113), and Cennoy, N., (1999:105) which indicated that the experimental group had increased in their perceived susceptibility after health education program statistically different from the comparison group. ($p<0.05$)

1.2 Perceived efficacy to prevent complication:

Before the experiment, both groups had no statistical difference in perceived efficacy to prevent complication.

After the experiment, the results indicated that the experimental group had a statistically significant and a better score on perceived efficacy to prevent complication than before and than that of the comparison group. This finding supports the first hypothesis. (Table 18,19). The additional significant perceived efficacy to prevent complications included: 1) minimized fried or greasy food, 2) minimized fatty food from coconut milk, 3) exercise at the same time each day, 4) having foot exercise everyday, 5) cleaning foot and checking any wound regularly, 6) visit the doctor before the medication ends, 7) keeping appointment at all time, 8) taking medication on time, take the right of medicine, and 9) take medicine everyday. (Table 15,16)

The improvement of perceived efficacy to prevent complications may be due to the health education program. The researcher had presented a live model who had a good performance in dietary control to share experiences on self-care behavior and let the

member asked about technique for self-care from a live model and the researcher. The majority of the group member usually asked a live model in subject: what food a lived model usually eat? How were a lived model cook? Dose banana make high blood sugar level or not? Dose calcium milk make high blood sugar level or not? The researcher had presented a VDO tape regarding dietary control, exercise and foot care. Consequently, divided the member into subgroup and demonstrated practice skill of dietary control. After skill training the researcher had assessed them again on the food selection skill.

Regarding exercise behavior, the researcher had discussed the advantage of exercise which made the patients perceived outcome of exercise. In addition, exercise skill included warming up, brisk walk and cooling down was done in order to help the patients in mastering their exercise experiences. Brisk walk was report as a good exercise because it was easy for practice and can modified it all time and place in life style. It made the patients feel very easy and comfort to practice. Also, the patients always received encouragement and support from the household members and the researcher in the area of dietary control, exercise, taking medicine, keeping appointment, and foot care. When the patients had increased their efficacy expectation and increased their outcome expectation. Both efficacy and outcome expectation had effect to the patients tendency to change their behavior by moving them, the experimental group from ready for action stage to action stage. (See detail in table 4) This finding is similar to the study of Plotnikoff, R.C., et al., (2000: 450-9), Wang, J.S., et al., (1998: 807-15), Via, P.S., & Salyer, J., (1999: 727-37), Dumrongwanich, S., (1993: 94), Naovarat, S., (1998: 82), Thumpenjit, S., (1998: 103), Singthong, P., (1998: 90) which indicated that the experimental group increased perceived self-efficacy to prevent complications after the experiment at the 0.05 statistical significant level.

1.3 Self-care behavior to prevent complication in the area of: dietary control, exercise, medication taking, keeping appointment and foot care.

Before the experiment, both groups had no statistical difference in their self-care behavior.

After the experiment, the results indicated that the experimental group had a significantly better self-care behavior to prevent complication than that of before, and than the comparison group. This finding supports first hypothesis. (Table 22,23). The additional of self-care behavior to prevent complication issues as: 1) fatty intake in a week, 2) sweet intake in a week, 3) sweetened fruit intake in a week, 4) soda/syrup intake in a week, 5) dietary control in daily life, 6) weekly exercise behavior, 7) period of time in each exercise, 8) foot exercise, and 9) foot care. (Table 20)

The improvement of self-care behavior to prevent complications may be due to the health education program, prior to the health education program the researcher had divided the samples into the group by the Transtheoretical model classification in order to assess the readiness of the samples for performing proper activities. The activities were VDO presentation follow by group discussion, experiences exchange that made the samples perceived susceptibility of having complication. Afterwards, presentation 3 lived models who were similar to diabetic patients and had proper behavior and good in controlling blood sugar and let the member asked a lived model regarding self-care behavior that emphasized on the effort to keep the same time table in carrying out self-care of diabetic patients, this finding consistent with Bandura theory (1977:175) and learning to stimulating control, social liberation. In this stage the researcher had presented VDO regarding dietary menu management, exercise and foot care. Consequently, demonstrate and training skill of dietary menu management and exercise.

Furthermore, the researcher suggested that the advantage of dietary control and exercise had shown the benefit in increasing outcome expectation of self-care practice in diabetic patients. Moreover, the researcher had conducted a group discussion on the issues reflected on the behavioral record and this experience increased self-efficacy and self care practice among diabetic patients. The reinforcement which made diabetic patients had permanent self-care behavior were the announcement made by the diabetic patients on their decision to perform self-care behavior to prevent complications. After attending these programs, the result indicated that all of the samples in the experimental group had self-care behaviors fallen in action stage and maintenance stage. The result was consistent with Prochaska study done in 1982 on stage and processes of self-change of smoking: Toward an integrative model of change and other study such as Fisher, L.,et al., (1998:599-607), Gafvels, C., (1999:2211-4), Dumrongwanich, S., (1993:95), Naovarat, S., (1998:84) Cennoy, N., (1999:109).

1.4 Self-care supported by family members:

Before the experiment, both groups had self-care supported by family members was not a significant difference.

After the experiment, the results indicated that the experimental group had a significantly better self-care supported by family members than before and than that of the comparison group. This finding supports the first hypothesis. (Table 28,29). The additional self-care supported by family members issues as: reminding about diet, stimulating on the exercise, reminding to taking medicine on time, reminding on keeping appointment, and reminding on wearing shoes. (See details in table 25,26)

The improvement of self-care supported by family members may be due to health education that the family member had received health education program with the patients by group discussion, and exchanged experiences. It made the family member's perception problem and barrier to perform self-care of diabetic patients better. Moreover, group discussion in the role issue of the family member to support diabetic patients regarding dietary control, exercise, medication taking, keeping appointment and foot care for promote the patients to help relationships and reinforcement the patients to changed their behavior. All of activities made the family members had sympathy, willingness to support and effort to remind the patients on dietary control, exercise, medication taking, keeping appointment and foot care. It was consistent with the social support concept suggested by House (1974:7) which consisted of informational support, instrument support, appraisal support, and emotional support which made the receiver satisfied and changed behavior.

Other studies which had similar result were conducted by Fisher, L.,et al., (1998:599-607), Penninx, B.W., et al., (1998:551). These studies indicated that the experimental group increased self-care behavior influenced by family members after the experiment and differed from the comparison group with statistical significance at $p < 0.05$ level.

Part 2. The family member group

2.1 Perceived susceptibility of having diabetes mellitus and Perceived susceptibility of having complication

Before the experiment, both groups had no statistical difference mean scores in perceived susceptibility of having diabetes mellitus and perceived susceptibility of having complication.

After the experiment, the results indicated that the experimental group had a statistically significant and a better score on perceived susceptibility of having diabetes mellitus and perceived susceptibility of having complication than before and than that of the comparison group. This finding supports the first hypothesis. (Table 37, 38, 43, 44). The additional significant perceived susceptibility of having diabetes mellitus in issue as: 1) age over 40 years old, 2) no exercise, 3) fatty intake. (Table 34,35) and the additional significant perceived susceptibility of having complication included 1) the feet infection with slowly healing sores, 2) blurred vision, 3) less sensitivity in hands and feet. (Table 40, 41)

The improvement of perceived susceptibility of having diabetes mellitus and perceived susceptibility of having complication may be due to health education program which the researcher had provided the activities by VDO presentation regarding diabetes mellitus disease follow by group discussion on the topics cause, sign, prevention and complication of diabetes mellitus. Consequently, the household member and diabetic patients had exchanged their experiences and opinion viewed from the VDO tape and their experiences. Afterwards, the researcher drew a conclusion on the issues of susceptibility and complication of diabetes mellitus and give out a practice guidebook about "DM for risk population and diabetic patients" for

letting them learn by themselves at home. Furthermore, the researcher had revisited the concept of susceptibility and complication of DM every time they come to the clinic. All of activities made the household member in the experimental group had increased their perceived susceptibility of having DM and perceived susceptibility of having complication after the experiment and was difference from the comparison group with a statistical difference at p-value < 0.05 level.

Similar result was found as the study of Jansuriyagol, S., (1996: 114), Dumrongwanich, S., (1993: 94), Thumpenjit, S., (1998: 103), Cennoy, N., (1999: 105) and Nakrak, K., (1997: 113) which indicated that the experimental group had perceived susceptibility better than before the experiment and than the comparison group with statistical difference.

2.2. Perceived efficacy to prevent diabetes mellitus:

Before the experiment, both groups had no difference mean scores of perceived efficacy to prevent diabetes mellitus.

After the experiment, the results indicated that the experimental group had a statistically significant and a better score on perceived efficacy to prevent diabetes mellitus than before and than that of the comparison group. This finding supports the first hypothesis. (Table 49, 50). The additional of perceived efficacy to prevent diabetes mellitus included 1) minimized fried or greasy food, 2) minimized sweetened food, 3) minimized fatty food from coconut milk, 4) exercise at least 20 minutes at a time, and 5) exercise at the same each day. (See details in table 46,47)

The improvement of perceived self-efficacy to prevent diabetes mellitus may be due to health education program. The research had presented 3 lived diabetic patients

model who are good in practice and in control blood sugar to share experiences followed by group discussion, experiences and opinion exchanged. Consequently, VDO presentation which emphasized on dietary control and exercise. Afterwards, demonstration and skill training session on dietary menu management and exercise which made the samples perceived and remembered the dietary menu. In addition, the demonstration and skill training increased the samples' confidence and outcome expectations. In addition, The family member group always received encouragement and supportive from their group and the researcher. Hence, the experimental group had gained higher level of perceived efficacy than before the experiment and than that of the comparison group. This finding was consistent with the study of Plotnikoff, R.C., et al., (2000: 450-9), Wang, J, S., et al., (1998: 807-15), Via, P, S., & Salyer, J. (1999: 727-37). Naovarat, S., (1998: 82), Dumrongwanich, S., (1993: 94), Thumpenjit, S., (1998: 103). Singthong, P., (1998: 90) which reported the lived model, training, group discussion and exchanged experiences and opinions sessions can increase perceived self-efficacy of the experimental group after the experiment and different from the comparison group with a statistical significance. (p-value <0.001)

2.3 Self-care behavior to prevent diabetes mellitus included: dietary control and exercise

Before the experiment, both groups had no difference in their mean scores of self-care behaviors to prevent diabetes mellitus.

After the experiment, the results indicated that the experimental group had a significantly better self-care behavior to prevent diabetes mellitus than before and than that of the comparison group. This finding supports the first hypothesis. (Table 53,

54). The additional of self-care behaviors to prevent diabetes mellitus issue as: eating time, fat intake in a week, sweet intake in a week, sweetened fruit intake in a week, weekly exercise behavior, period of time in each exercise, level of sweat of the exercise. (See details in table 51)

The improvement of self-care behavior to prevent diabetes mellitus may be due to the health education program that the researcher had presented VDO tape followed by a group discussion regarding cause, sign, complication and prevention that it made the experimental group had increased perceived susceptibility. Consequently, the researcher had presented a VDO tape regarding dietary menu management, exercise and the researcher add more detail about advantage of dietary control and exercise that it made the experimental group had perceived outcome expectation. In addition, the experimental group had attended the skill training session on dietary menu management and exercise which made them remember a dietary menu that should be avoided, can be taken unlimited and can be taken but needed to be careful on the quantity limit these exercise made the experimental group increased in their confident and self-efficacy. Furthermore, the experimental group always received support, stimulation, reminder from the family member group and the researcher. All activities had made the experimental group improved their self-care behavior to prevent diabetes mellitus after the experiment and different from the comparison group with a statistical significance. The finding was consistent with Fisher, L., et al., (1998: 599-607), Grfvels, C., (1999:2211-4), Klaidee, W., (1987:136), Naovarat, S., (1998: 82), Dumrongwanich, S., (1993: 94), Thumpenjit, S., (1998: 103) and Cennoy, N., (1999: 105).

2.4 Supportive behavior given to the patients for promoting the patient's self-care:

Before the experiment, both groups had no statistical difference mean scores in supportive behavior given to the patients for promoting the patient's self-care.

After the experiment, the results indicated that the experimental group had a statistical significant and better mean score in supportive behavior given to the patients for promoting the patient's self-care than before and than that of the comparison group. This finding supports the first hypothesis. (Table 59, 60). The additional supportive behavior promoting self-care in patients included: reminding about the diet, stimulating on the exercise, reminding to taking medicine on time, reminding on keeping appointment, reminding on wearing shoes. (See details in table 56,57)

The improvement of supportive behavior given to the patients to promote the patient's self-care may be due to the health education program. The samples had gained knowledge on complication and prevention of diabetes mellitus by a VDO tape followed by a group discussion between the household member and diabetic patients. Hence, the household member had sympathized with the patients and had aware of the severity of diabetes mellitus. Group discussion on the topic of "diabetic patients need to help" including the supportive behavior given by the researcher and the household member in stimulating, supporting and reminding the patients in dietary control, exercise, take medicine, keep appointment and foot care. Result was similar to those studies of Serensen G., Stoddara A. and Macario E., (1998: 586-598, Gafvels, C., (1999:2211-4), Fisher, L., et al., (1998:599-607), Penninx, B.W., et al.,(1998: 551), Chomsamut, K., (1992:89) and Channimit, D., (1995: 126) which reported that the experimental group had improved statistically significant different in supportive

behavior given to the patients for promoting the patient's self-care after health education program than that of the comparison group.

Hypothesis 2. After the experiment, level of hemoglobin A1c of diabetic patients who are in the experimental group will be lower than before the experiment and than that of the comparison group.

Hemoglobin A1c:

Before the experiment, both groups had no statistical difference in the level of hemoglobin A1c.

After the experiment, the results indicated that the experimental group had significantly proportionally in good level and acceptable level of hemoglobin A1c than that of before ($p<0.05$). This finding supports the second hypothesis on the same group analysis but not between group analysis. (Table 31, 32)

The decreased of hemoglobin A1c level may be due to the health education program which applied stages of change model with participatory learning that the researcher had performed 3 sessions of behavior change activities. All of activities increased their perceived susceptibility of having complication and perceived efficacy expectation to prevent complications such as dietary control, exercise and taking medicine in the experimental group. After the experiment, most of the diabetic patients reported that they have taken fatty food, sweetened food, soda/syrup, sweetened fruit less than before the experiment and than that of the comparison group. Most of the patients had controlled their diet more than before the experiment and than that of the comparison group. Regarding exercise behavior, after the experiment the diabetic patients reported weekly exercise behavior, longer period of time in each exercise and

higher level of sweat after exercise more than before the experiment and than that of the comparison group.

Similar findings were reported by Kassiou, K. & Tsamasiors. J., (1999:45-47), Chantamolee, S., (1992: 151-152) and Naovarat, S., (1998:85).

After the experiment, comparing between the experimental group and the comparison group the results indicated that there was no significant difference. This reject the second hypothesis. The experimental group had shown a proportion of HbA1c in a good and acceptable level more than that of the comparison group. The HbA1c level of the comparison group had decreased because it was a diabetes mellitus day (14^{th} November 2000) during the intervention implementation period. The comparison group may have received information on diabetes mellitus self-care from other sources such as television, radio and Tha-Ta Ko hospital had also have the exhibition about diabetes mellitus. For the comparison group, they had also have their fasting plasma glucose checked up for free of change. In addition, the comparison group was also form an old age club and conducted a group exercise in the evening everyday and anybody could join with the group for exercise. The member in the comparison group reported that they had enjoyed the exercise group. Perhaps all of activities made the comparison decreased in HbA1c after the experiment but the change was not sufficient to show statistical significant. (Table 31)

Similar findings were also reported by Jaithum, K., (1998: abstract) who did the study on the effect of goal setting for changing behavior related to blood sugar control among NIDDM at Yala hospital. It was found that after the experiment, the

experimental group and the comparison group's hemoglobin A1c level showed no statistical significance.

Hypothesis 3. After the experiment, the level of fasting plasma glucose of the family members who are in the experimental group will be lower than before the experiment and than that of the comparison group.

Fasting plasma glucose blood test result

Before the experiment, both groups had no statistical difference mean scores of fasting plasma glucose level.

After the experiment, the results indicated that the experimental group had a statistical significant level of decreased fasting plasma glucose than before and than that of the comparison group. This finding supports the third hypothesis. (See details in table 62, 63)

The decrease of fasting plasma glucose level may be due to the health education program. The researcher had performed 3 sessions of activities which aimed to increase their perceived susceptibility of having diabetes mellitus and perceived self-efficacy to prevent diabetes mellitus. Other similar findings included the studies of Dumrongwanich, S., (1993: 95), Thumpenjit, S., (1998: 106) and Cennoy, N., (1999: 109).

CHAPTER VI

CONCLUSION AND RECOMMENDATION

This research was the quasi-experimental research that aimed to change self-care behaviors of diabetic patients in controlling blood sugar based on the Transtheoretical model and participatory learning health education program.

The samples population in this study consists of diabetic patients and the family members who lived in Tha-Ta Ko District, Nakhonsawan Province. Population selected was composed of 140 persons and divided into 2 groups. The experimental group was consisted of diabetic patients 35 persons and the family members 35 persons, and the comparison group was consisted of patients 35 persons and the family members 35 persons. The health education program by using group discussion, experience exchanged, video type about diabetes mellitus and conception for practice, hand book about DM, demonstrate and training skill of dietary menu and exercise was applied after assessing the samples stages of change. The comparison group received no activity. This program took 12 weeks from 22th November 2000 to 19th January 2001. The data were collected by an interview before and after the experiment with blood test. Data were analyzed by using percentage, mean, standard deviation, Willcoxon Signed Ranks test, Mann Whitney-U test by SPSS version 10.0 (Statistical package for the social science program) with the 95 percent confidence level. (p-value <0.05) Conclusions and recommendations were presented as follows:

Summary of findings

1. Socio-demographic characteristics of the samples:

The socio-demographic characteristics of the experimental group and the comparison group were similar. Nearly 100% of both groups were female and education level were in the primary school level. Majority of both groups were married, the age range from 55-60 years old, farmer except the patients of the comparison group was a housewife, family income less than 2,500 bath/month. Most of the diabetic patients of both groups had no family history of DM but most of the households member of both groups had family history of DM while duration of DM in the experimental group was 1-4 years, in the comparison group was 1-4 years and 9-12 years. Most of both groups had blood pressure level between 120/60-140/100 mmHg and the mean score of body weight was 57-66 kilogram.

Diabetic patient group

2. Perceived susceptibility of having complications:

After the experiment: mean scores of perceived susceptibility of having complications in the experimental group better than before and than that of the comparison group with statistical significance. This accepts the first hypothesis.

3. Perceived efficacy to prevent complication:

After the experiment: the experimental group had mean scores of perceived efficacy to prevent complications better than before and than that of the comparison group with statistical significance. This accepts the first hypothesis.

4. Self-care behaviors to prevent complication:

After the experiment: the experimental group had mean scores of self-care behaviors to prevent complications better than before and than that of the comparison group with statistical significance. This accepts the first hypothesis.

5. Taking self-care supported by family members:

After the experiment: the experimental group had mean scores of taking self-care supported by family members better than before and than that of the comparison group with statistical significance. This accepts the first hypothesis.

The family member group

6. Perceived susceptibility of having diabetes:

After the experiment: the experimental group had mean scores of perceived susceptibility of having diabetes better than before and than that of the comparison group with statistical significance. This accepts the first hypothesis.

7. Perceived susceptibility of having complication:

After the experiment: the experimental group had mean scores of perceived susceptibility of having complication better than before and than that of the comparison group with statistical significance. This accepts the first hypothesis.

8. Perceived efficacy to prevent diabetes:

After the experiment: the experimental group had mean scores of perceived efficacy to prevent diabetes better than before and than that of the comparison group with statistical significance. This accepts the first hypothesis.

9. Self-care behaviors to prevent diabetes mellitus:

After the experiment: the experimental group had mean scores of self-care behaviors to prevent diabetes better than before and than that of the comparison group with statistical significance. This accepts the first hypothesis.

10. Supportive behavior given to the patients for promoting the patient's self-care:

After the experiment: the experimental group had mean scores of supportive behavior given to the patient for promoting the patient's self-care better than before and than that of the comparison group with statistical significance. This accepts the first hypothesis.

11. Hemoglobin A1c:

After the experiment: the experimental group had proportionally of hemoglobin A1c in good level and acceptable level of hemoglobin A1c than that before with statistical significance but not difference from the comparison group. This rejects the second hypothesis.

12. Fasting plasma glucose:

After the experiment: the experimental group had mean scores of fasting plasma glucose level fewer than before and than that of the comparison group with statistical significance. This accepts the third hypothesis.

Recommendations for Health Education Program

1. In applying the stages of change model, the health educators should assess the level of stages of change after each session to monitor the effect of behavior change activities.

2. For evaluation, the health educator should collect data during carrying out the activity for process evaluation in order to make changes after the pilot phase.

3. The health education program should apply stages of change model to assess the samples in the diagnosis phase before carrying out or designing the health education program.

Recommendations for the further research

1. Due to the limitation of time in this research, it is recommended to conduct a study in a longer period (at least 6 months) especially in research implementation in the future.

2. The study of health promotion and health education program should also be conducted in other groups of patients such as new patients, patients with age of 60 or over, and other chronic disease patients.

3. To study the effectiveness of health promotion and preventive program should also be conducted in other risk population who are susceptible to diabetes mellitus or other chronic diseases.

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APPENDIX

แผนการดำเนินการทดลอง

หลังจากการวิเคราะห์จำแนกพฤติกรรมของกลุ่มตัวอย่างในกลุ่มทดลองแล้วพบว่า กลุ่มตัวอย่างส่วนใหญ่มีพฤติกรรมอยู่ในขั้นปฏิบัติ 19 คน ขั้นคงไว้ซึ่งพฤติกรรม 15 คน และขั้นพร้อมจะปฏิบัติ 1 คน ดังนั้นผู้วิจัยจึงทำการปรับแผนการดำเนินงานกิจกรรมเป็นขั้นตอนดังต่อไปนี้

การจัดกิจกรรม	กลุ่มเป้าหมาย	กิจกรรม	วัตถุประสงค์	ผลการดำเนินการทดลอง
ครั้งที่ 1	-ผู้ป่วยที่มีพฤติกรรมอยู่ในขั้นพร้อมจะปฏิบัติและขั้นปฏิบัติ	1.พูดคุยแลกเปลี่ยนประสบการณ์เกี่ยวกับปัญหาที่เกิดจากโรคเบาหวาน 2.อภิปรายถึงปัญหาและอุปสรรคของการปฏิบัติ และร่วมกันหาแนวทางการแก้ไข 3.ดูวีดีโอเกี่ยวกับเบาหวาน ซึ่งมีเนื้อหาเน้นในเรื่องของการปฏิบัติ (10 นาที) 4.ผู้วิจัยสรุป 5.แจกแบบบันทึกพฤติกรรม	-เพื่อกระตุ้นอารมณ์ให้ผู้ป่วยเกิดการรับรู้โอกาสเสี่ยงของการเกิดโรคแทรกซ้อน -ส่งเสริมการรับรู้ความสามารถตนเองและคาดหวังในผลลัพธ์ของการปฏิบัติ -เพื่อสร้างแนวคิดในการปฏิบัติ	-จากการซักถาม พบว่าผู้ป่วยและญาติรับรู้ถึงโอกาสเสี่ยงต่อการเกิดโรคแทรกซ้อนมากขึ้น โดยสามารถบอกถึงภาวะแทรกซ้อนของโรคเบาหวานได้และคาดหวังในความสามารถตนเองและมั่นใจในความสามารถตนเองมากขึ้น
	-ผู้ป่วยที่มีพฤติกรรมอยู่ในขั้นคงไว้ซึ่งพฤติกรรม	1.พูดคุยแลกเปลี่ยนประสบการณ์เกี่ยวกับปัญหาที่เกิดจากโรคเบาหวาน 2.ดูวีดีโอเกี่ยวกับเบาหวาน ซึ่งมีเนื้อหาเน้นในเรื่องของการปฏิบัติ (10 นาที) 3.อภิปรายแลกเปลี่ยนความคิดเห็น ประสบการณ์ และเทคนิคในการดูแลตนเอง 4.ผู้วิจัยสรุป 5.แจกแบบบันทึกพฤติกรรม	-เพื่อกระตุ้นการรับรู้โอกาสเสี่ยง -เพื่อสร้างความคาดหวังในผลลัพธ์ -เพื่อค้นหาตัวแบบและเพื่อส่งเสริมการรับรู้ความสามารถของตนเองและบรรทัดฐานการปฏิบัติของสังคม -เพื่อสร้างแนวคิดในการปฏิบัติ	-จากการซักถาม พบว่าผู้ป่วยและญาติรับรู้ถึงโอกาสเสี่ยงต่อการเกิดโรคแทรกซ้อนมากขึ้น โดยสามารถบอกถึงภาวะแทรกซ้อนของโรคเบาหวานได้และคาดหวังในความสามารถตนเองและมั่นใจในความสามารถตนเองมากขึ้นและรับรู้ถึงบรรทัดฐานของการปฏิบัติ

แผนการดำเนินการทดลอง (ต่อ)

การจัดกิจกรรม	กลุ่มเป้าหมาย	กิจกรรม	วัตถุประสงค์	ผลการดำเนินการทดลอง
	ญาติ	1.ดูวีดีโอเรื่องโรคเบาหวาน ซึ่งมีเนื้อหาเน้นในเรื่องของอาการภาวะแทรกซ้อนของเบาหวาน และวิธีการป้องกันภาวะแทรกซ้อน (20 นาที)	-เพื่อกระตุ้นอารมณ์ให้เกิดการรับรู้อันตรายและโอกาสเสี่ยงของการเกิดโรคเบาหวาน	-รับรู้โอกาสเสี่ยงต่อการเกิดโรคเบาหวานเพิ่มขึ้น
		2.อภิปรายเรื่องโอกาสเสี่ยงของการเกิดโรค เบาหวาน สาเหตุ อาการ ภาวะแทรกซ้อน และวิธีการป้องกัน จากที่ได้เห็นจากวีดีทัศน์และจากประสบการณ์ของตน	-เพื่อให้เกิดความคิดรวบยอดเกี่ยวกับโอกาสเสี่ยงของการเกิดโรคเบาหวานและโรคแทรกซ้อนจากเบาหวาน	
		3.ผู้วิจัยบรรยายสรุปเกี่ยวกับโรคเบาหวานและการป้องกันโรคแทรกซ้อน พร้อมทั้งชี้แนะถึงข้อดี ข้อเสียของการปฏิบัติ		
ครั้งที่ 2	-ผู้ป่วยทั้งหมดและญาติ	1.อภิปรายข้อมูลที่ได้จากแบบบันทึกพฤติกรรม	-สร้างบรรทัดฐานทางสังคมเรื่องการปฏิบัติ สร้างเงื่อนไขในการปฏิบัติตัวจากประสบการณ์ที่ได้ทำมา	-ผู้ป่วยและญาติรับรู้ความสามารถตนเองเพิ่มมากขึ้น และจากการซักถามพบว่าผู้ป่วยมีความคาดหวังในผลดีของการปฏิบัติและมั่นใจในการเลือกอาหาร และการออกกำลังกายมากขึ้น
		2.นำเสนอตัวแบบผู้ป่วยที่ปฏิบัติตนดีในเรื่องการควบคุมอาหารเพื่อควบคุมระดับน้ำตาลในเลือด จำนวน 2-3 คน	-ส่งเสริมให้เกิดการรับรู้ความสามารถของตนเอง	
		3.เปิดโอกาสให้สมาชิกในกลุ่มซักถามเทคนิค วิธีการดูแลตนเองของผู้ป่วยและญาติ จากตัวแบบและจากผู้วิจัย	-ส่งเสริมการเรียนรู้ในการควบคุมสิ่งเร้า และสร้างบรรทัดฐานของสังคม	
		4.ดูวีดีทัศน์การจัดเมนูอาหารและออกกำลังกายสำหรับผู้ป่วยเบาหวาน	-เพื่อสร้างความคาดหวังในความสามารถตนเอง	

แผนการดำเนินการทดลอง (ต่อ)

การจัดกิจกรรม	กลุ่มเป้าหมาย	กิจกรรม	วัตถุประสงค์	ผลการดำเนินการทดลอง
		5.อภิปรายผลทางการแพทย์ถ้าผู้ป่วยเบาหวานควบคุมอาหารและออกกำลังกาย	-เพื่อสร้างความคาดหวังในผลลัพธ์ที่อาจเกิดขึ้นจากปฏิบัติ	
		6.แบ่งกลุ่มการจัดอาหาร	-เพื่อส่งเสริมให้เกิดการรับรู้ความสามารถตนเองในการจัดอาหารที่เหมาะสม	
		7.จัดกิจกรรมฝึกการออกกำลังกายและจับชีพจร	-เพื่อสร้างบรรทัดฐานของสังคมในการออกกำลังกาย	
	ญาติ	-อภิปรายประเด็นที่ผู้ป่วยต้องการความช่วยเหลือ	-เพื่อสร้างความสัมพันธ์แบบช่วยเหลือและเสริมแรงในการปฏิบัติ	
ครั้งที่ 3	ผู้ป่วย	1.อภิปรายข้อมูลที่ได้จากแบบบันทึกพฤติกรรม	-สร้างบรรทัดฐานทางสังคมเรื่องการปฏิบัติ สร้างเงื่อนไขในการปฏิบัติตัวจากประสบการณ์ที่ได้ทำมา	-ประเมินจากการซักถามและจากแบบบันทึกพฤติกรรมพบว่าผู้ป่วยมีพฤติกรรมในการเลือกอาหารรับประทานและการออกกำลังกายถูกต้องมากขึ้นและความมั่นใจในความสามารถตนเองมากยิ่งขึ้น ส่วนญาติได้ประเมินโดยการซักถามพบว่าให้ความสนใจ ดูแลคอยกระตุ้นเตือนผู้ป่วยบ่อยขึ้น
	ญาติ	2.อภิปรายประเด็นที่ผู้ป่วยต้องการความช่วยเหลือเพื่อปฏิบัติกิจกรรมการดูแลตนเอง	-สร้างแนวทางในการให้การสนับสนุนและการช่วยเหลือผู้ป่วยในทางที่เหมาะสมและเป็นจริง	
	ผู้ป่วยและญาติ	3.เลือกอาหารรับประทาน 4.ฝึกทักษะการออกกำลังกาย	-สร้างความเชื่อมั่นในความสามารถของตนเองและบรรทัดฐานในการเลือกอาหารและออกกำลังกาย	
	ผู้ป่วย	4.ประกาศตนเองในส่วนที่เกี่ยวกับ"การดูแลตนเอง" ที่ผู้ป่วยจะปฏิบัติ	-ประกาศอิสระภาพในสังคม	

แผนการดำเนินการทดลอง ของผู้ป่วยขั้นก่อนชั่งใจ (พฤติกรรมการออกกำลังกายและการดูแลเท้า)

การจัดกิจกรรม	กลุ่มเป้าหมาย	กิจกรรม	วัตถุประสงค์	ผลการดำเนินการทดลอง
ครั้งที่ 1	ผู้ป่วยที่อยู่ในขั้นก่อนชั่งใจในพฤติกรรมการออกกำลังกายและการดูแลเท้า และญาติ	1.พูดคุยซักถามถึงปัญหาที่เกิดจากโรคเบาหวาน 2.ดูวีดีโอเรื่องโรคเบาหวาน ซึ่งมีเนื้อหาเน้นในเรื่องของภาวะแทรกซ้อนของเบาหวานและวิธีการป้องกันภาวะแทรกซ้อน (20 นาที) 3.อภิปรายถึง ภาวะแทรกซ้อนและวิธีการป้องกัน จากที่ได้เห็นจากวีดีโอ และจากประสบการณ์ของตน 4.ผู้วิจัยบรรยายสรุปเกี่ยวกับโรคแทรกซ้อนของเบาหวานและการป้องกันโรคแทรกซ้อน พร้อมทั้งชี้แนะถึงข้อดี ข้อเสียของการปฏิบัติในการออกกำลังกาย และการดูแลเท้า 5.แจกแบบบันทึกพฤติกรรม	-กระตุ้นอารมณ์เพื่อให้เกิดการรับรู้ถึงโอกาสเสี่ยงของการเกิดโรคเบาหวาน -เพื่อให้เกิดการรับรู้ถึงบรรทัดฐานของชุมชนหรือสังคม -ส่งเสริมให้เกิดความคาดหวังในการปฏิบัติ	-จากการซักถาม พบว่าผู้ป่วยและญาติรับรู้ถึงโอกาสเสี่ยงต่อการเกิดโรคแทรกซ้อนมากขึ้น โดยสามารถบอกถึงภาวะแทรกซ้อนของโรคเบาหวานได้ และจากการประเมินโดยใช้แบบทดสอบของ stages of change พบว่าผู้ป่วยทั้งหมดเลื่อนไปสู่ขั้นพร้อมจะปฏิบัติ(ด้านการออกกำลังกายและการดูแลเท้า)
ครั้งที่ 2	ผู้ป่วยและญาติ	1.พูดคุยซักถามถึงปัญหาและอุปสรรคในการปฏิบัติพร้อมทั้งอภิปรายข้อมูลที่ได้จากแบบบันทึกพฤติกรรม 2.ดูวีดีโอเรื่องอาหารสำหรับผู้ป่วยเบาหวานซึ่งมีเนื้อหาเน้นเกี่ยวกับการจัดเมนูอาหารการเลือกอาหารรับประทานและเรื่องเบาหวานกับการออกกำลังกายและการดูแลเท้า(20 นาที) 3.ฝึกทักษะการจัดรายการอาหารและการออกกำลังกาย 4.ผู้วิจัยสรุป	-เพื่อสร้างบรรทัดฐานของสังคมเรื่องการปฏิบัติและเงื่อนไขในการปฏิบัติจากประสบการณ์ที่ผ่านมา -ส่งเสริมให้เกิดการรับรู้ความสามารถตนเองและเพื่อฝึกทักษะของการปฏิบัติ สร้างความคิดรวบยอด	-จากการซักถามผู้ป่วยมีความเชื่อมั่นและคาดหวังในความสามารถตนเองเพิ่มมากขึ้น และจากการประเมินโดยใช้แบบทดสอบของ stages of change พบว่าผู้ป่วยทั้งหมดเลื่อนสู่ขั้นปฏิบัติ

แผนการดำเนินการทดลอง ของผู้ป่วยขั้นก่อนชั่งใจ **(ต่อ)**

การจัดกิจกรรม	กลุ่มเป้าหมาย	กิจกรรม	วัตถุประสงค์	ผลการดำเนินการทดลอง
	ญาติ	5.แจกแบบบันทึกพฤติกรรม -อภิปรายประเด็นที่ผู้ป่วยต้องการความช่วยเหลือ	-เพื่อสร้างความสัมพันธ์แบบช่วยเหลือและเสริมแรงในการปฏิบัติ	
ครั้งที่ 3	ผู้ป่วย และญาติ	1.พูดคุยซักถามถึงปัญหาและอุปสรรคในการปฏิบัติ พร้อมทั้งอภิปรายข้อมลที่ได้จากแบบบันทึกพฤติกรรม 2.เปิดโอกาสให้พูดคุยซักถาม แลกเปลี่ยนประสบการณ์และเทคนิคในการดูแลตนเองระหว่างผู้ป่วยและญาติ 3.ผู้วิจัยสรุป 4.ฝึกทักษะการจัดอาหารและการออกกำลังกาย	-เพื่อสร้างบรรทัดฐานของสังคมเรื่องการปฏิบัติและเงื่อนไขในการปฏิบัติจากประสบการณ์ที่ผ่านมา -ส่งเสริมให้เกิดการเรียนรู้ในการควบคุมสิ่งเร้าและสร้างบรรทัดฐานของสังคมในการดูแลตนเอง -สร้างความเชื่อมั่นในความสามารถตนเองและบรรทัดฐานในการเลือกอาหารและการออกกำลังกาย	-ประเมินจากการซักถามและจากแบบบันทึกพฤติกรรมพบว่าผู้ป่วยมีพฤติกรรมในการเลือกอาหารรับประทานและการออกกำลังกายถูกต้องมากขึ้น -ส่วนญาติได้ประเมินโดยการซักถามพบว่าให้ความสนใจ ดูแลคอยกระตุ้นเตือนผู้ป่วยบ่อยขึ้น
	ผู้ป่วย	-ประกาศตนในส่วนที่เกี่ยวกับ “การดูแลตนเอง” ที่ผู้ป่วยจะปฏิบัติ	-ประกาศอิสระภาพในสังคม	
	ญาติ	--อภิปรายประเด็นที่ผู้ป่วยต้องการความช่วยเหลือ	--เพื่อสร้างความสัมพันธ์แบบช่วยเหลือและเสริมแรงในการปฏิบัติ	

แบบสัมภาษณ์สำหรับวิทยานิพนธ์

เรื่อง การประยุกต์ทฤษฎีขั้นตอนการเปลี่ยนแปลงพฤติกรรมเพื่อดูแลโรคเบาหวานด้วยตนเอง อำเภอท่าตะโก จังหวัดนครสวรรค์

ผู้วิจัย นางสาวอุมาภรณ์ สานุสันติ รหัส 4236382 PHPH/M

คำชี้แจง แบบสอบถามชุดนี้ประกอบด้วยแบบสอบถาม 7 ส่วน (สำหรับผู้ป่วยเบาหวาน)

ส่วนที่ 1 ข้อมูลทั่วไป

ส่วนที่ 2 การแยกกลุ่มเป้าหมายตามทฤษฎีขั้นตอนการเปลี่ยนแปลงพฤติกรรม

ส่วนที่ 3 การประเมินขั้นตอนการเปลี่ยนแปลงพฤติกรรม

ส่วนที่ 4 การรับรู้โอกาสเสี่ยงต่อการเกิดโรคแทรกซ้อน

ส่วนที่ 5 การรับรู้ความสามารถตนเองในการปฏิบัติเพื่อป้องกันเพื่อป้องกันโรคแทรกซ้อน

ส่วนที่ 6 พฤติกรรมการดูแลตนเองเพื่อป้องกันโรคแทรกซ้อน

ส่วนที่ 7 พฤติกรรมที่ได้รับการสนับสนุนการดูแลตนเองจากญาติ

แบบสัมภาษณ์ผู้ป่วยเบาหวาน

ชื่อ – นามสกุล .....(ID) .....(Gr).....ครั้งที่ .....

บ้านเลขที่ .....หมู่ที่..... ตำบล .....อำเภอท่าตะโก จังหวัดนครสวรรค์

ส่วนที่ 1 ข้อมูลทั่วไป

คำชี้แจง โปรดทำเครื่องหมาย ✓ หน้าข้อความที่ตรงกับความต้องการ

1) อายุของท่าน ..... ปี

2) เพศ ( ) 1. ชาย ( ) 2. หญิง

3) สถานภาพสมรส ( ) 1.โสด ( ) 2.คู่

( ) 3.ม่าย ( ) 4. หย่า/แยก

ระดับการศึกษา ( ) 1.ประถมศึกษา ( ) 2.มัธยมศึกษา

( ) 3.อนุปริญญา ( ) 4.ปริญญาตรี

( ) 6.อื่นๆ ระบุ.....

5) อาชีพ ( ) 1.รับราชการ/รัฐวิสาหกิจ ( ) 2.ค้าขาย

( ) 3.รับจ้าง/เกษตรกร ( ) 4.พ่อบ้าน/แม่บ้าน

( ) 5.อื่นๆ ระบุ.....

6) ครอบครัวท่านมีรายได้เดือนละเท่าไร

( ) 1 น้อยกว่า 2,500 บาท ( ) 2 ตั้งแต่ 2,501-5,000 บาท

( ) 3. ตั้งแต่ 5,001-10,000 บาท ( ) 4. ตั้งแต่ 10,000 บาทขึ้นไป

7) ท่านเป็นโรคเบาหวานมานาน .....ปี

8) ท่านมีญาติสายตรงเป็นเบาหวานหรือไม่

( ) 1.มี ( ) 2ไม่มี

( ) 3.ไม่แน่ใจ ( ) 4.ไม่ทราบ

9) ท่านทราบว่าเป็นโรคเบาหวานได้อย่างไร

( ) 1. จากการตรวจสุขภาพประจำปี

( ) 2. จากการไปตรวจรักษาโรคอื่น ได้แก่ โรค.....

( ) 3. เนื่องจากมีความผิดปกติ ได้แก่ .....และไปตรวจครั้งแรกที่.....

( ) 4. อื่นๆ ระบุ.....

10) ค่าน้ำตาลสะสมในเม็ดเลือดแดง .....%

11) ค่าความดันโลหิต.....mmhg

12) น้ำหนักตัว.....กิโลกรัม

ส่วนที่ 2 แบบสัมภาษณ์เพื่อแยกกลุ่มเป้าหมายตามทฤษฎีขั้นตอนการเปลี่ยนแปลงพฤติกรรม

ข้อความที่ท่านจะได้ฟังต่อไปนี้ เป็นการถามเพื่อทำความรู้จักท่าน ผู้ที่มีความสำคัญในครอบครัว และในการควบคุมป้องกันโรคเบาหวาน คำตอบของท่านจะช่วยในการปฏิบัติงานของเจ้าหน้าที่ ดังนั้น **โปรดตอบคำถามทุกข้อตามความรู้สึกที่เป็นจริง**

ข้อความ	ไม่เห็นด้วยอย่างยิ่ง	ไม่เห็นด้วย	ไม่แน่ใจ	เห็นด้วย	เห็นด้วยอย่างยิ่ง
1) ท่านคิดว่าปัญหาเรื่องโรคแทรกซ้อนของเบาหวานไม่เกี่ยวข้องกับตัวท่าน					
2) ท่านกำลังป้องกันโรคแทรกซ้อนของเบาหวานไม่ให้มาสู่ตัวท่าน					
3) ท่านคิดว่าการควบคุมระดับน้ำตาลในเลือดมีความสำคัญสำหรับท่าน					
4) ท่านคิดว่าท่านต้องเริ่มปฏิบัติตัวเพื่อป้องกันโรคแทรกซ้อนอย่างจริงจัง					
5) ท่านตัดสินใจแล้วที่จะควบคุมระดับน้ำตาลในเลือดเพื่อป้องกันโรคแทรกซ้อน					
6) ท่านคิดว่าท่านจะต้องปรับเปลี่ยนการอะไรบางอย่างในตัวท่านเพื่อควบคุมระดับน้ำตาลในเลือด					
7) การมาที่นี่ทำให้ท่านเสียเวลามากเพราะโรคเบาหวานไม่ได้น่ากลัวแต่อย่างใด					
8) ท่านคิดว่าโรคเบาหวานก็เป็นปัญหาแต่ท่านก็ไม่มีความจำเป็นที่จะต้องปรับตัวแต่อย่างใด					
9) ท่านคิดว่าท่านกำลังพยายามควบคุมระดับน้ำตาลในเลือด					
10) ท่านคิดว่าโรคเบาหวานเป็นปัญหาของท่านและท่านก็ควรที่จะควบคุมระดับน้ำตาลในเลือด					
11) ท่านไม่ได้ควบคุมระดับน้ำตาลในเลือดโดยการควบคุมอาหารและการออกกำลังกายอย่างต่อเนื่องตามที่คาดหวังไว้ ท่านจึงมาที่นี่เพื่อหาทางป้องกันไม่ให้ท่านกลับไปมีพฤติกรรมเดิมอีก					

ส่วนที่ 2 แบบสัมภาษณ์เพื่อแยกกลุ่มเป้าหมายตามทฤษฎีขั้นตอนการเปลี่ยนแปลงพฤติกรรม(ต่อ)

ข้อความที่ท่านจะได้ฟังต่อไปนี้ เป็นการถามเพื่อทำความรู้จักท่าน ผู้ที่มีความสำคัญในครอบครัว และในการควบคุมป้องกันโรคเบาหวาน คำตอบของท่านจะช่วยในการปฏิบัติงานของเจ้าหน้าที่ **ดังนั้น** โปรดตอบคำถามทุกข้อตามความรู้สึกที่เป็นจริง

ข้อความ	ไม่เห็นด้วยอย่างยิ่ง	ไม่เห็นด้วย	ไม่แน่ใจ	เห็นด้วย	เห็นด้วยอย่างยิ่ง
12) แม้ว่าท่านจะยังไม่ประสบผลสำเร็จในการควบคุมระดับน้ำตาลโดยการควบคุมอาหารหรือการออกกำลังกายแต่ท่านก็ยังพยายามอยู่					
13) ท่านคิดว่าถ้าท่านควบคุมระดับน้ำตาลในเลือดได้สำเร็จ ท่านจะปลอดภัยแต่บางครั้งท่านก็ต้องต่อสู้กับการปฏิบัติอย่างมาก					
14) ท่านเริ่มปฏิบัติตัวเพื่อควบคุมระดับน้ำตาลในเลือดแล้วแต่ก็ยังต้องการการสนับสนุนด้วย					
15) บางทีที่นี่จะช่วยให้ท่านสามารถควบคุมระดับน้ำตาลในเลือดได้					
16) ท่านต้องการแรงสนับสนุน เพื่อให้ท่านมีการเปลี่ยนแปลงตนเองเพื่อควบคุมระดับน้ำตาลในเลือด					
17) ท่านคิดว่าบางทีคนที่นี่จะมีคำแนะนำวิธีการควบคุมระดับน้ำตาลในเลือดให้กับท่าน					
18) ท่านคิดว่าไม่ควรเสียเวลาไปกังวลกับการควบคุมระดับน้ำตาลในเลือดด้วย					
19) ท่านกำลังปฏิบัติตัวเพื่อป้องกันโรคแทรกซ้อนจากเบาหวานอย่างจริงจัง					
20) หลังจากที่ท่านพยายามปฏิบัติตัว เพื่อควบคุมระดับน้ำตาลในเลือดแล้วแต่ความกังวลเกี่ยวกับโรคแทรกซ้อนของเบาหวานก็ยังทำให้ท่านไม่สบายใจอีก					

ส่วนที่ 3 แบบสัมภาษณ์ เพื่อประเมินขั้นตอนการเปลี่ยนแปลงพฤติกรรม

คำชี้แจง โปรดฟังข้อความในแต่ละข้อและเลือกคำตอบที่ตรงกับความคิดและการปฏิบัติของท่าน

ขั้นตอนการเปลี่ยนแปลงพฤติกรรม	ใช่	ไม่ใช่
1. ท่านได้ควบคุมปริมาณการรับประทานอาหารของท่านเป็นเวลานานเท่าใด ก. ยังไม่คิดที่จะควบคุมปริมาณการรับประทานอาหารเลย **ข. คิดว่าจะควบคุมปริมาณการรับประทานอาหารภายใน 3 เดือนข้างหน้า** ค. วางแผนไว้ว่าจะเริ่มควบคุมปริมาณการรับประทานอาหารภายใน 1 เดือน ง. ได้มีการควบคุมปริมาณการรับประทานอาหารมา ภายใน 6 เดือนที่ผ่านมา จ. ได้มีการควบคุมปริมาณการรับประทานอาหารมานานกว่า 6 เดือนแล้ว **ถ้าท่านตอบ ข้อ (ค) (ง) (จ) ทำข้อ 1.1**		
1.1 อาหารที่ท่านควบคุมเป็นอาหารประเภทใด ก. อาหารจำพวกแป้ง น้ำตาล ขนมปัง ข้าว โรตี ข. อาหารมัน เช่น หมูทอด ไก่ทอด กากหมู หมูสามชั้น กุนเชียงทอด ค. อาหารหวาน เช่น ลอดช่อง เต้าส่วน ข้าวเหนียวมะม่วง กล้วยบวดชี ทองหยิบ ทองหยอด ฝอยทอง ขนมหม้อแกง ง. พวกผลไม้รสหวาน เช่น มะม่วง ทุเรียน มังคุด กล้วยสุก มะขามหวาน แตงโม เงาะ ละมุด		
2. ท่านได้มีการออกกำลังกายมานานเท่าใด ก. ยังไม่คิดที่จะออกกำลังกาย ข. คิดว่าจะออกกำลังกายในอีก 3 เดือน ข้างหน้า ค. วางแผนว่าจะออกกำลังกายภายใน 1 เดือนนี้ ง. ได้มีการออกกำลังกายภายใน 6 เดือนที่ผ่านมา จ. ได้มีการออกกำลังกายมานานกว่า 6 เดือนแล้ว		
2.1 ท่านได้วางแผนหรือว่าออกกำลังกายแบบใดอยู่ ก. เดินเร็ว ข. วิ่ง ค. เต้นแอโรบิค ง. ปั่นจักรยาน จ. อื่นๆ ระบุ		

ส่วนที่ 3 แบบสัมภาษณ์ เพื่อประเมินขั้นตอนการเปลี่ยนแปลงพฤติกรรม(ต่อ)

คำชี้แจง โปรดฟังข้อความในแต่ละข้อและเลือกคำตอบที่ตรงกับความคิดและการปฏิบัติของท่าน

ขั้นตอนการเปลี่ยนแปลงพฤติกรรม	ใช่	ไม่ใช่
2.2 ท่านได้ออกกำลังกายอย่างไร ก. อย่างน้อย 30 นาที /วัน ข. 3 ครั้ง/สัปดาห์เป็นอย่างน้อย ค. มีเหงื่อออกหลังออกกำลังกายทุกครั้ง ง. ออกกำลังกายอย่างสม่ำเสมอในเวลาเดียวกัน จ. มีการอบอุ่นร่างกายก่อนออกกำลังกายและผ่อนคลายกล้ามเนื้อภายหลังการออกกำลังกาย		
3. ท่านได้ปฏิบัติตัวอย่างไรในการไปตรวจตามแพทย์นัด ก. คิดว่าไม่จำเป็น ต้องไปตามนัด ข. คิดว่าอีก 3เดือนข้างหน้าจะไปตรวจตามแพทย์นัด ค. เดือนหน้านี้จะไปตรวจตามแพทย์นัด ง. ภายใน 6 เดือนที่ผ่านมา ได้ไปตรวจตามแพทย์นัดทุกครั้ง จ. ได้ไปตรวจตามแพทย์นัดมานานมากกว่า 6 เดือนแล้ว		
4. ท่านได้ปฏิบัติตัวในการรับประทานยาตามที่แพทย์สั่งอย่างไร ก. คิดว่าไม่จำเป็น ต้องรับประทานยาตามแพทย์สั่งอย่างเคร่งครัด ข. คิดว่าอีก 3 เดือนข้างหน้านี้จะเริ่มรับประทานตามแพทย์สั่งอย่างเคร่งครัด ค. คิดว่าจะเริ่มรับประทานอย่างเคร่งครัดภายใน 1 เดือนนี้ ง. ภายใน 6 เดือนที่ผ่านมาได้รับประทานยาอย่างเคร่งครัด จ. ได้รับประทานยาอย่างเคร่งครัดมานานมากกว่า 6 เดือนแล้ว		
5. ท่านได้มีการดูแลเท้าของท่านมานานเท่าใด ก. ไม่ได้ดูแลเลย คิดว่าไม่มีความจำเป็น ข. คิดว่าอีก 3 เดือนข้างหน้าจะเริ่มดูแลเท้า ค. วางแผนว่าภายใน 1 เดือนนี้จะเริ่มดูแลเท้าอย่างจริงจัง ง. ภายใน 6 เดือนที่ผ่านมาได้ดูแลเท้าอย่างจริงจัง จ. ได้ดูแลเท้าอย่างจริงจังมานานมากกว่า 6 เดือนแล้ว		

ส่วนที่ 4 การรับรู้โอกาสเสี่ยงต่อการเกิดโรคแทรกซ้อนจากเบาหวาน

คำชี้แจง **โปรดเขียนเครื่องหมาย ✓ ลงในช่องว่างที่ตรงกับคำตอบของท่านโดยเลือกเพียงคำตอบเดียว**

ใช่ หมายถึง ข้อความนั้นตรงกับความเชื่อของท่าน

ไม่แน่ใจ หมายถึง ข้อความนั้นตรงกับความเชื่อของท่านแต่ไม่แน่ใจว่าถูกต้องหรือไม่

ไม่ใช่ หมายถึง ข้อความนั้นไม่ตรงกับความเชื่อของท่าน

ข้อความ	ระดับความคิดเห็น		
	ใช่	ไม่แน่ใจ	ไม่ใช่
ข้อคำถามต่อไปนี้เป็นโอกาสเสี่ยงของการเกิดโรคแทรกซ้อนของผู้ป่วยเบาหวานเบาหวานใช่หรือไม่			
โรคแทรกซ้อนต่อตา			
1) เวลาที่ท่านไม่ควบคุมระดับน้ำตาลให้ดีท่านมักรู้สึกตาพร่ามัวมองไม่ชัด	.....	.....	.....
2) ถ้าท่านมีระดับน้ำตาลในเลือดสูงนานๆอาจทำให้ท่านจอตาเสื่อม และตาบอดได้	.....	.....	.....
โรคแทรกซ้อนต่อไต			
3) ถ้าท่านควบคุมระดับน้ำตาลในเลือดไม่ได้เป็นเวลานานๆจะทำให้ท่านมักมีอาการอ่อนเพลีย ซีด ปัสสาวะไม่ออกและมีผลทำให้เกิดไตวายเรื้อรัง	.....	.....	.....
4) ถ้าท่านควบคุมระดับน้ำตาลในเลือดไม่ได้นานๆจะทำให้ท่านมีภาวะหลอดเลือดที่ไตตีบตันได้ง่าย	.....	.....	.....
โรคแทรกซ้อนต่อหัวใจและหลอดเลือด			
5) ถ้าท่านมีระดับน้ำตาลในเลือดสูงนานๆมีผลทำให้ท่านเป็นโรคหัวใจขาดเลือดได้	.....	.....	.....
6) ถ้าท่านมีระดับไขมันในเลือดสูงร่วมด้วยจะทำให้ท่านเสี่ยงต่อการเป็นโรคหลอดเลือดหัวใจตีบตันได้ง่าย	.....	.....	.....
โรคแทรกซ้อนต่อสมอง			
7) เวลาที่ท่านควบคุมระดับน้ำตาลในเลือดได้ไม่ดีจะทำให้ท่านเสี่ยงต่อการเป็นหลอดเลือดสมองตีบตันได้ง่าย	.....	.....	.....
8) ถ้าท่านไม่ควบคุมระดับน้ำตาลในเลือดให้ดีจะทำให้ท่านเป็นอัมพาตจากหลอดเลือดสมองตีบตันได้	.....	.....	.....

ส่วนที่ 4 การรับรู้โอกาสเสี่ยงต่อการเกิดโรคแทรกซ้อนจากเบาหวาน (ต่อ)

คำชี้แจง **โปรดเขียนเครื่องหมาย ✓ ลงในช่องว่างที่ตรงกับคำตอบของท่านโดยเลือกเพียงคำตอบเดียว**

ใช่ หมายถึง ข้อความนั้นตรงกับความเชื่อของท่าน

ไม่แน่ใจ หมายถึง ข้อความนั้นตรงกับความเชื่อของท่านแต่ไม่แน่ใจว่าถูกต้องหรือไม่

ไม่ใช่ หมายถึง ข้อความนั้นไม่ตรงกับความเชื่อของท่าน

ข้อความ	ระดับความคิดเห็น		
	ใช่	ไม่แน่ใจ	ไม่ใช่
โรคแทรกซ้อนต่อเท้า			
9) เวลาที่ท่านควบคุมระดับน้ำตาลในเลือดได้ไม่ดีท่านมักรู้สึกชาตามมือและเท้า	.....	.....	.....
10) เวลาที่ท่านไม่รักษาความสะอาดของเท้าท่านอาจเป็นแผลได้ง่าย แต่แผลของท่านจะหายช้า	.....	.....	.....
ผิวหนังและสมรรถภาพทางเพศ			
11) เวลาที่ท่านไม่รักษาความสะอาดของร่างกายท่านอาจมีปัญหาเรื่องการติดเชื้อที่อวัยวะสืบพันธ์ได้บ่อยๆ	.....	.....	.....
12) เวลาที่ท่านมีระดับน้ำตาลในเลือดสูงๆอาจทำให้ท่านมีสมรรถภาพทางเพศลดลง			

ส่วนที่ 5 การรับรู้ความสามารถตนเองในการปฏิบัติตัวเพื่อป้องกันโรคแทรกซ้อน

คำชี้แจง **โปรดเขียนเครื่องหมาย ✓ ลงในช่องว่างที่ตรงกับคำตอบของท่านโดยเลือกเพียงคำตอบเดียว**

ทำได้ หมายถึง ข้อความนั้นตรงกับความเชื่อในตัวของท่านว่าสามารถปฏิบัติได้แน่นอน

ไม่แน่ใจ หมายถึง ข้อความนั้นตรงกับความเชื่อของท่านแต่ไม่แน่ใจว่าจะปฏิบัติได้หรือไม่

ทำไม่ได้ หมายถึง ข้อความนั้นท่านคิดว่าไม่สามารถปฏิบัติได้อย่างแน่นอน

ข้อความ	ระดับความคิดเห็น		
	ทำได้	**ไม่แน่ใจ**	**ทำไม่ได้**
ข้อความที่ต่อไปนี้ท่านคิดว่าท่านสามารถทำได้ด้วยตนเองหรือไม่			
ด้านการรับประทานอาหาร			
1. ลดการรับประทานอาหารประเภททอด อาหารมันได้ เช่น ข้าวมันไก่ ข้าวขาหมู หมูทอด ไก่ทอด กุนเชียงทอด	.....	.....	.....
2. ลดการรับประทานอาหารหวานได้	.....	.....	.....
3. ลดการรับประทานอาหารใส่กะทิได้ เช่น แกงกะทิ แกงเขียวหวาน	.....	.....	.....
ด้านการออกกำลังกาย			
4. ออกกำลังกายได้สม่ำเสมอ 3 ครั้ง/สัปดาห์	.....	.....	.....
5. ออกกำลังกายได้นานครั้งละ 20 นาที	.....	.....	.....
6. ออกกำลังกายได้ในเวลาใกล้เคียงกันทุกครั้ง	.....	.....	.....
ด้านการดูแลเท้า			
7. บริหารเท้าได้ทุกวัน	.....	.....	.....
8. ดูแลความสะอาดของเท้าและสำรวจดูการเกิดแผลที่เท้าได้ทุกวัน	.....	.....	.....
9. ดูแลเท้าโดยการฟอกสบู่ ล้างน้ำและเช็ดให้แห้งได้ทุกวัน	.....	.....	.....
การไปตรวจตามแพทย์นัด			
10. ไปพบแพทย์ก่อนยาหมดได้ทุกครั้ง แม้ว่างานจะยุ่งมาก	.....	.....	.....
11. ไปตามที่แพทย์นัดได้ทุกครั้ง	.....	.....	.....
การรับประทานยา			
12. รับประทานยาได้ตรงเวลาทุกมื้อ	.....	.....	.....
13. รับประทานยาได้ถูกต้องตามที่แพทย์สั่ง	.....	.....	.....
14. รับประทานยาได้ตลอดและต่อเนื่องตามที่แพทย์แนะนำ	.....	.....	.....

ส่วนที่ 6 พฤติกรรมการดูแลตนเองในด้านการควบคุมอาหาร การออกกำลังกาย การรับประทานยา การมาตรวจตามแพทย์นัด การดูแลเท้า

คำชี้แจง โปรดทำเครื่องหมาย ✓ หน้าข้อความที่ตรงกับการปฏิบัติของท่าน และกรอกข้อความลงในช่องว่างที่กำหนดตามความเป็นจริง

ด้านการรับประทานอาหาร

1) โดยปกติท่านรับประทานอาหารตรงเวลาทุกวันหรือไม่
   ( ) ไม่ตรงเวลาแล้วแต่จะหิว
   ( ) ตรงเวลาบางครั้ง
   ( ) ตรงเวลาเป็นส่วนมาก
   ( ) ตรงเวลาสม่ำเสมอ
2) ใน 1 สัปดาห์ท่านรับประทานอาหารที่มีไขมันมากๆ เช่น เนื้อหมู กุนเชียง เนื้อทอด แกงกะทิ มากน้อยเพียงใด?
   ( ) รับประทานทุกวัน
   ( ) รับประทานมากกว่า 3 วัน/สัปดาห์
   ( ) รับประทานน้อยกว่า 3 วัน/สัปดาห์
   ( ) ไม่รับประทานเลย
3) ในสัปดาห์ที่ผ่านมาท่านรับประทานอาหารหวานที่มีส่วนผสมของแป้ง น้ำตาล กะทิ มากน้อยเพียงใด?
   ( ) รับประทานทุกวัน
   ( ) รับประทานมากกว่า 3 วัน/สัปดาห์
   ( ) รับประทานน้อยกว่า 3 วัน/สัปดาห์
   ( ) ไม่รับประทานเลย
4) โดยปกติท่านรับประทานผลไม้ที่มีรสหวานจัดบ่อยเพียงใด? เช่น ทุเรียน ลำไย เงาะ ละมุด
   ( ) รับประทานทุกวัน
   ( ) รับประทานมากกว่า 3 วัน/สัปดาห์
   ( ) รับประทานน้อยกว่า 3 วัน/สัปดาห์
   ( ) ไม่รับประทานเลย

5) ในสัปดาห์ที่ผ่านมาท่านดื่มน้ำหวาน โอเลี้ยง น้ำอัดลม กาแฟเย็น โอวัลติน/ไมโล บ่อยเพียงใด?

( ) ดื่มทุกวัน

( ) ดื่มมากกว่า 3 วัน/สัปดาห์

( ) ดื่มน้อยกว่า 3 วัน/สัปดาห์

( ) ไม่ดื่มเลย

6) ในชีวิตประจำวันของท่านได้ควบคุมการรับประทานอาหารของท่านบ่อยเพียงใด?

( ) ไม่ควบคุมเลย

( ) ควบคุมน้อยกว่า 3 วัน/สัปดาห์

( ) ควบคุมมากกว่า 3 วัน/สัปดาห์

( ) ควบคุมทุกวัน

ด้านการออกกำลังกาย

7) โดยปกติท่านออกกำลังกายหรือออกแรงทำงานบ่อยเพียงใด?

( ) ทำบ้าง ไม่ทำบ้าง ไม่แน่นอน

( ) น้อยกว่า 3 วัน/สัปดาห์

( ) มากกว่า 3 วัน/สัปดาห์

( ) ทุกวัน

8) ท่านใช้เวลาออกกำลังกายในแต่ละครั้งนานเท่าใด?

( ) 10 นาที

( ) 20 นาที

( ) 30 นาที

( ) นานมากกว่า 30 นาที

9) หลังการออกกำลังกายทุกครั้งมีเหงื่อออกมากน้อยเพียงใด?

( ) ไม่มีเหงื่อออกเลย

( ) มีเหงื่อออกเป็นบางครั้ง

( ) มีเหงื่อออกพอสมควร

( ) มีเหงื่อออกมาก

10) ท่านออกกำลังกายหรือออกแรงทำกิจกรรมต่างๆในช่วงเวลาใด? เป็นส่วนมาก

( ) ช่วงเวลาที่แตกต่างกัน

( ) ช่วงใกล้เคียงกับเวลาที่เคยทำเป็นบางครั้ง

( ) ช่วงเวลาที่ใกล้เคียงกันเป็นส่วนมาก ( ) ช่วงเวลาที่ใกล้เคียงกันทุกครั้ง

11) เมื่อท่านไปออกกำลังกายสิ่งที่ท่านนำติดตัวไปด้วยคือ

( ) น้ำหวานหรือน้ำผลไม้

( ) ลูกอม

( ) น้ำดื่ม

( ) อื่นๆ ระบุ .....

( ) ไม่ได้นำอะไรไปเลย

ด้านการรับประทานยา

12) ใน 2 สัปดาห์ที่ผ่านมาท่านรับประทานยาไม่ตรงเวลา ตามที่แพทย์สั่งกี่ครั้ง?

( ) ตรงเวลาทุกครั้ง

( ) ไม่ตรงเวลาน้อยกว่า 3 ครั้ง

( ) ไม่ตรงเวลามากกว่า 3 ครั้ง

( ) ไม่ตรงเวลาเลย

13) ใน 2 สัปดาห์ที่ผ่านมาท่านเคยลืมรับประทานยาหรือไม่?

( ) ไม่เคยลืมเลย

( ) ลืมน้อยกว่า 3 ครั้ง

( ) ลืมมากกว่า 3 ครั้ง

( ) ลืมทุกวัน

14) ท่านเคยลดยาหรือเพิ่มขนาดยาเองหรือไม่?

( ) ไม่เคยเลย

( ) เคยเป็นบางมื้อ

( ) นานๆครั้ง

( ) เคยทำเป็นประจำ

การไปตรวจตามแพทย์นัด

15) ในรอบ 6 เดือนที่ผ่านมา ท่านไปตรวจตามแพทย์นัดทุกครั้งก่อนยาหมดหรือไม่?

( ) ไปตามนัดทุกครั้ง

( ) ผิดนัด 1 – 3 ครั้ง

( ) ผิดนัดมากกว่า 3 ครั้ง

( ) ไม่เคยไปตามนัดเลย

16) ถ้าวันที่แพทย์นัดท่านมีธุระไม่สามารถไปพบแพทย์ได้ท่านจะทำอย่างไร

( ) ไปพบแพทย์ก่อนยาหมดในวันที่ว่าง

( ) ให้ญาติไปรับยาแทนในวันที่แพทย์นัด

( ) ไปทำธุระก่อน แล้วไปพบแพทย์อาทิตย์ถัดไป

( ) ไปทำธุระ ว่างเมื่อไรจึงค่อยไปพบแพทย์

ด้านการดูแลเท้า

17) ถ้ามีอาการปวดเท้า ชาเท้า หรือเมื่อยเท้า ท่านทำอย่างไร?

( ) ปรึกษาแพทย์

( ) นวดเท้า

( ) แช่เท้าในน้ำอุ่น

( ) ใช้กระเป๋าน้ำร้อนวางบนเท้าหรือ

18) ท่านบริหารเท้าทุกวันหรือไม่ บ่อยเพียงใด?

( ) ทุกวัน

( ) บ่อยครั้ง (มากกว่า 3 ครั้ง/สัปดาห์)

( ) นานครั้ง (น้อยกว่า 3 ครั้ง/สัปดาห์)

( ) ไม่เคยบริหารเท้าเลย

19) เวลาที่ท่านออกนอกบ้าน ท่านสวมรองเท้าแบบใดเป็นประจำ?

( ) รองเท้าหุ้มส้นหรือหุ้มเท้า

( ) รองเท้าบู๊ต

( ) รองเท้าฟองน้ำหรือรองเท้าแตะที่ทำด้วยยางรถยนต์

( ) ไม่ใส่เลย

20) ปกติท่านดูแลเท้าโดยการทำความสะอาดด้วยน้ำและฟอกสบู่เวลาอาบน้ำแล้วเช็ดง่ามนิ้วเท้าให้แห้งบ่อยเพียงใด?

( ) ทุกครั้ง

( ) บ่อยครั้ง (มากกว่า 3 ครั้ง/สัปดาห์)

( ) นานครั้ง (น้อยกว่า 3 ครั้ง/สัปดาห์)

( ) ไม่ได้ทำเลย

ส่วนที่ 7 พฤติกรรมที่ได้รับการสนับสนุนการดูแลตนเองจากญาติ

คำชี้แจง กรุณาทำเครื่องหมาย ✓ ลงในช่องที่ตรงกับการกระทำของท่าน โดยเลือกเพียงตำตอบเดียว

เป็นประจำ หมายถึง กระทำมากกว่า 3 ครั้ง ต่อสัปดาห์
เป็นบางครั้ง หมายถึง กระทำน้อยกว่า 3 ครั้ง ต่อสัปดาห์
ไม่ปฏิบัติ หมายถึง ไม่ได้กระทำพฤติกรรมนั้นเลย

ข้อความ	ระดับความสม่ำเสมอ		
	เป็นประจำ	บางครั้ง	ไม่ได้รับ
ข้อความที่ท่านจะได้ฟังต่อไปนี้เป็นการถามว่าผู้ที่ได้เข้าร่วมกิจกรรมสุขศึกษากับท่านได้ทำกิจกรรมเหล่านี้แก่ท่านหรือไม่			
1) เตือนท่านเรื่องการรับประทานอาหารหวาน ผลไม้รสหวาน อาหารมัน ให้น้อยลง	.....	.....	.....
2) กระตุ้นท่านให้ออกกำลังกาย	.....	.....	.....
3) เตือนท่านให้รับประทานยาตรงเวลา	.....	.....	.....
4) เตือนท่านหรือพาท่านไปตรวจตามแพทย์นัด	.....	.....	.....
5) เตือนท่านให้สวมรองเท้าก่อนออกนอกบ้านทุกวัน	.....	.....	.....

แบบสัมภาษณ์สำหรับวิทยานิพนธ์

เรื่อง การประยุกต์ทฤษฎีขั้นตอนการเปลี่ยนแปลงพฤติกรรมเพื่อดูแลโรคเบาหวานด้วยตนเอง อำเภอท่าตะโก จังหวัดนครสวรรค์

ผู้วิจัย นางสาวอุมาภรณ์ สานุสันติ รหัส 4236382 PHPH/M

คำชี้แจง แบบสอบถามชุดนี้ประกอบด้วยแบบสอบถาม 6 ส่วน (สำหรับญาติ)

ส่วนที่ 1 ข้อมูลทั่วไป

ส่วนที่ 2 การรับรู้โอกาสเสี่ยงต่อการเกิดโรคเบาหวาน

ส่วนที่ 3 การรับรู้โอกาสเสี่ยงต่อการเกิดโรคแทรกซ้อน

ส่วนที่ 4 การรับรู้ความสามารถตนเองในการปฏิบัติเพื่อป้องกันโรคเบาหวาน

ส่วนที่ 5 พฤติกรรมการดูแลตนเองเพื่อป้องกันโรคเบาหวาน

ส่วนที่ 6 พฤติกรรมให้การสนับสนุนการดูแลตนเอง

แบบสัมภาษณ์ญาติ

ชื่อ – นามสกุล .....(ID).....(Gr).....ครั้งที่.....
บ้านเลขที่ .....หมู่ที่..... ตำบล .....อำเภอท่าตะโก จังหวัดนครสวรรค์
โทรศัพท์ .....

ส่วนที่ 1 ข้อมูลทั่วไป

คำชี้แจง โปรดทำเครื่องหมาย ✓ หน้าข้อความที่ตรงกับความต้องการ

อายุของท่าน ..... ปี

เพศ ( ) 1. ชาย ( ) 2. หญิง

3) สถานภาพสมรส ( ) 1.โสด ( ) 2.คู่
( ) 3.ม่าย ( ) 4. หย่า/แยก

4) ระดับการศึกษา ( ) 1.ประถมศึกษา ( ) 2.มัธยมศึกษา
( ) 3.อนุปริญญา ( ) 4.ปริญญาตรี
( ) 6.อื่นๆ ระบุ.....

5) อาชีพ ( ) 1.รับราชการ/รัฐวิสาหกิจ ( ) 2.ค้าขาย
( ) 3.รับจ้าง/เกษตรกร ( ) 4.พ่อบ้าน/แม่บ้าน
( ) 5.อื่นๆ ระบุ.....

ครอบครัวท่านมีรายได้เดือนละเท่าไร

( ) 1 น้อยกว่า 2,500 บาท ( ) 2 ตั้งแต่ 2,501-5,000 บาท
( ) 3. ตั้งแต่ 5,001-10,000 บาท ( ) 4. ตั้งแต่ 10,000 บาทขึ้นไป

ท่านมีญาติสายตรงเป็นเบาหวานหรือไม่

( ) 1.มี ( ) 2ไม่มี
( ) 3.ไม่แน่ใจ ( ) 4.ไม่ทราบ

ระดับความดันโลหิต.....mmhg

น้ำหนักตัว.....กิโลกรัม

ค่าระดับน้ำตาลในเลือดก่อนอาหารเช้า .....mg%

ส่วนที่ 2 การรับรู้โอกาสเสี่ยงต่อการเกิดโรคเบาหวาน

คำชี้แจง **โปรดเขียนเครื่องหมาย ✓ ลงในช่องว่างที่ตรงกับคำตอบของท่านโดยเลือกเพียงคำตอบเดียว**

ใช่ หมายถึง ข้อความนั้นตรงกับความเชื่อของท่าน

ไม่แน่ใจ หมายถึง ข้อความนั้นตรงกับความเชื่อของท่านแต่ไม่แน่ใจว่าถูกต้องหรือไม่

ไม่ใช่ หมายถึง ข้อความนั้นไม่ตรงกับความเชื่อของท่าน

ข้อความ	ระดับความคิดเห็น		
	ใช่	ไม่แน่ใจ	ไม่ใช่
ข้อคำถามต่อไปนี้เป็นโอกาสเสี่ยงต่อการเกิดโรคเบาหวานใช่หรือไม่			
ด้านกรรมพันธุ์			
1) ถ้าท่านมีญาติสายตรงป่วยเป็นเบาหวานท่านมีโอกาสป่วยเป็นโรคเบาหวานได้มากกว่าคนอื่น	....	.....	.....
ด้านอายุ			
2) เมื่อท่านมีอายุ40ปีขึ้นไปท่านจะมีโอกาสเป็นเบาหวานได้มากกว่าคนที่มีอายุน้อยกว่า40ปี	....	.....	....
ความอ้วน			
3) ถ้าท่านอ้วนท่านจะมีโอกาสเป็นโรคเบาหวานได้มากกว่าคนผอม	....	.....	.....
การตั้งครรภ์			
4) ถ้าท่านหรือญาติของท่านคลอดบุตรน้ำหนักมากกว่า 4 กิโลกรัมหรือเคยตั้งครรภ์ผิดปกติจะเสี่ยงต่อการเป็นโรคเบาหวานได้มาก	...	.....	.....
การรับประทานยาบางชนิด			
5) ถ้าท่านหรือญาติของท่านรับประทานยาคุมกำเนิดนานๆทำให้เสี่ยงต่อการเกิดโรคเบาหวานได้มาก	...	.....	.....
การเป็นโรคหรือการติดเชื้อไวรัสบางชนิด			
6) ถ้าท่านหรือญาติของท่านป่วยเป็นโรคตับอ่อนอักเสบทำให้เสี่ยงต่อการเกิดโรคเบาหวานมากกว่าคนปกติ	...	.....	.....
การรับประทานอาหาร			
7) ถ้าท่านรับประทานอาหารมัน เช่น หมูทอด ไก่ทอด หมูสามชั้น บ่อยๆอาจทำให้ท่านเป็นโรคเบาหวานได้มาก	...	.....	.....
การออกกำลังกาย			
8) ถ้าท่านไม่ได้ออกกำลังกายเป็นประจำทำให้ท่านเสี่ยงต่อการเป็นโรค เบาหวานมากกว่าคนที่ออกกำลังกายเป็นประจำ	...	.....	.....

ส่วนที่ 3 การรับรู้โอกาสเสี่ยงต่อการเกิดโรคแทรกซ้อนจากเบาหวาน

คำชี้แจง **โปรดเขียนเครื่องหมาย ✓ ลงในช่องว่างที่ตรงกับคำตอบของท่านโดยเลือกเพียงคำตอบเดียว**

ใช่ หมายถึง ข้อความนั้นตรงกับความเชื่อของท่าน

ไม่แน่ใจ หมายถึง ข้อความนั้นตรงกับความเชื่อของท่านแต่ไม่แน่ใจว่าถูกต้องหรือไม่

ไม่ใช่ หมายถึง ข้อความนั้นไม่ตรงกับความเชื่อของท่าน

ไม่ใช่ หมายถึง ข้อความนั้นไม่ตรงกับความเชื่อของท่าน

ข้อความ	ระดับความคิดเห็น		
	ใช่	ไม่แน่ใจ	ไม่ใช่
ข้อคำถามต่อไปนี้เป็นโอกาสเสี่ยงของการเกิดโรคแทรกซ้อนของผู้ป่วยเบาหวานเบาหวานใช่หรือไม่			
โรคแทรกซ้อนต่อตา			
1) เวลาที่ท่านไม่ควบคุมระดับน้ำตาลให้ดีท่านมักรู้สึกตาพร่ามัวมองไม่ชัด	.....	.....	.....
2) ถ้าท่านมีระดับน้ำตาลในเลือดสูงนานๆอาจทำให้ท่านจอตาเสื่อมและตาบอดได้	.....	.....	.....
โรคแทรกซ้อนต่อไต			
3) ถ้าท่านควบคุมระดับน้ำตาลในเลือดไม่ได้เป็นเวลานานๆจะทำให้ท่านมักมีอาการอ่อนเพลีย ซีด ปัสสาวะไม่ออกและมีผลทำให้เกิดไตวายเรื้อรัง	.....	.....	.....
4) ถ้าท่านควบคุมระดับน้ำตาลในเลือดไม่ได้นานๆจะทำให้ท่านมีภาวะหลอดเลือดที่ไตตีบตันได้ง่าย	.....	.....	.....
โรคแทรกซ้อนต่อหัวใจและหลอดเลือด			
5) ถ้าท่านมีระดับน้ำตาลในเลือดสูงนานๆมีผลทำให้ท่านเป็นโรคหัวใจขาดเลือดได้	.....	.....	.....
6) ถ้าท่านมีระดับไขมันในเลือดสูงร่วมด้วยจะทำให้ท่านเสี่ยงต่อการเป็นโรคหลอดเลือดหัวใจตีบตันได้ง่าย	.....	.....	.....
โรคแทรกซ้อนต่อสมอง			
7) เวลาที่ท่านควบคุมระดับน้ำตาลในเลือดได้ไม่ดีจะทำให้ท่านเสี่ยงต่อการเป็นหลอดเลือดสมองตีบตันได้ง่าย	.....	.....	.....
8) ถ้าท่านไม่ควบคุมระดับน้ำตาลในเลือดให้ดีจะทำให้ท่านเป็นอัมพาตจากหลอดเลือดสมองตีบตันได้	.....	.....	.....

ส่วนที่ 3 การรับรู้โอกาสเสี่ยงต่อการเกิดโรคแทรกซ้อนจากเบาหวาน (ต่อ)

คำชี้แจง **โปรดเขียนเครื่องหมาย ✓ ลงในช่องว่างที่ตรงกับคำตอบของท่านโดยเลือกเพียงคำตอบเดียว**

ใช่ หมายถึง ข้อความนั้นตรงกับความเชื่อของท่าน

ไม่แน่ใจ หมายถึง ข้อความนั้นตรงกับความเชื่อของท่านแต่ไม่แน่ใจว่าถูกต้องหรือไม่

ไม่ใช่ หมายถึง ข้อความนั้นไม่ตรงกับความเชื่อของท่าน

ข้อความ	ระดับความคิดเห็น		
	ใช่	ไม่แน่ใจ	ไม่ใช่
โรคแทรกซ้อนต่อเท้า			
9) เวลาที่ท่านควบคุมระดับน้ำตาลในเลือดได้ไม่ดีท่านมักรู้สึกชาตามมือและเท้า	.....	.....	.....
10) เวลาที่ท่านไม่รักษาความสะอาดของเท้าท่านอาจเป็นแผลได้ง่าย แต่แผลของท่านจะหายช้า	.....	.....	.....
ผิวหนังและสมรรถภาพทางเพศ			
11)เวลาที่ท่านไม่รักษาความสะอาดของร่างกายท่านอาจมีปัญหาเรื่องการติดเชื้อที่อวัยวะสืบพันธ์ได้บ่อยๆ	.....	.....	.....
12)เวลาที่ท่านมีระดับน้ำตาลในเลือดสูงๆอาจทำให้ท่านมีสมรรถภาพทางเพศลดลง			

ส่วนที่ 4 การรับรู้ความสามารถตนเองในการปฏิบัติตัวเพื่อป้องกันโรคแทรกซ้อน

คำชี้แจง **โปรดเขียนเครื่องหมาย ✓ ลงในช่องว่างที่ตรงกับคำตอบของท่านโดยเลือกเพียงคำตอบเดียว**

ทำได้ หมายถึง ข้อความนั้นตรงกับความเชื่อในตัวของท่านว่าสามารถปฏิบัติได้แน่นอน

ไม่แน่ใจ หมายถึง ข้อความนั้นตรงกับความเชื่อของท่านแต่ไม่แน่ใจว่าจะปฏิบัติได้หรือไม่

ทำไม่ได้ หมายถึง ข้อความนั้นท่านคิดว่าไม่สามารถปฏิบัติได้อย่างแน่นอน

ข้อความ	ระดับความคิดเห็น		
	ทำได้	ไม่แน่ใจ	ทำไม่ได้
ข้อความที่ต่อไปนี้ท่านคิดว่าท่านสามารถทำได้ด้วยตนเองหรือไม่			
ด้านการรับประทานอาหาร			
1) ลดการรับประทานอาหารประเภททอด อาหารมันได้ เช่น ข้าวมันไก่ ข้าวขาหมู หมูทอด ไก่ทอด กุนเชียงทอด	.....	.....	.....
2) ลดการรับประทานอาหารหวาน เช่น แป้ง น้ำตาล น้ำหวาน ได้	.....	.....	.....
3) ลดการรับประทานอาหารใส่กะทิได้ เช่น แกงกะทิ แกงเขียวหวาน	.....	.....	.....
ด้านการออกกำลังกาย			
4) ออกกำลังกายได้สม่ำเสมอ 3 ครั้ง/สัปดาห์	.....	.....	.....
5) ออกกำลังได้นานครั้งละ 20 นาที	.....	.....	.....
6) ออกกำลังกายได้ในเวลาใกล้เคียงกันทุกครั้ง	.....	.....	.....

ส่วนที่ 5 พฤติกรรมการดูแลตนเองในด้านการรับประทานอาหาร การออกกำลังกาย

คำชี้แจง โปรดทำเครื่องหมาย ✓ หน้าข้อความที่ตรงกับการปฏิบัติของท่าน และกรอกข้อความลงในช่องว่างที่กำหนดตามความเป็นจริง

ด้านการรับประทานอาหาร

1) โดยปกติท่านรับประทานอาหารตรงเวลาทุกวันหรือไม่
   ( ) ไม่ตรงเวลาแล้วแต่จะหิว
   ( ) ตรงเวลาบางครั้ง
   ( ) ตรงเวลาเป็นส่วนมาก
   ( ) ตรงเวลาสม่ำเสมอ
2) ใน 1 สัปดาห์ท่านรับประทานอาหารที่มีไขมันมากๆ เช่น เนื้อหมู กุนเชียง เนื้อทอด แกงกะทิ มากน้อยเพียงใด?
   ( ) รับประทานทุกวัน
   ( ) รับประทานมากกว่า 3 วัน/สัปดาห์
   ( ) รับประทานน้อยกว่า 3 วัน/สัปดาห์
   ( ) ไม่รับประทานเลย
3) ในสัปดาห์ที่ผ่านมาท่านรับประทานอาหารหวานที่มีส่วนผสมของแป้ง น้ำตาล มากน้อยเพียงใด?
   ( ) รับประทานทุกวัน
   ( ) รับประทานมากกว่า 3 วัน/สัปดาห์
   ( ) รับประทานน้อยกว่า 3 วัน/สัปดาห์
   ( ) ไม่รับประทานเลย
4) โดยปกติท่านรับประทานผลไม้ที่มีรสหวานจัดบ่อยเพียงใด? เช่น ทุเรียน ลำไย เงาะ ละมุด
   ( ) รับประทานทุกวัน
   ( ) รับประทานมากกว่า 3 วัน/สัปดาห์
   ( ) รับประทานน้อยกว่า 3 วัน/สัปดาห์
   ( ) ไม่รับประทานเลย

5) ในสัปดาห์ที่ผ่านมาท่านดื่มน้ำหวาน โอเลี้ยง น้ำอัดลม กาแฟเย็น โอวัลติน/ไมโล บ่อยเพียงใด?

( ) ดื่มทุกวัน

( ) ดื่มมากกว่า 3 วัน/สัปดาห์

( ) ดื่มน้อยกว่า 3 วัน/สัปดาห์

( ) ไม่ดื่มเลย

6) ในชีวิตประจำวันของท่านได้ควบคุมการรับประทานอาหารของท่านบ่อยเพียงใด?

( ) ไม่ควบคุมเลย

( ) ควบคุมน้อยกว่า 3 วัน/สัปดาห์

( ) ควบคุมมากกว่า 3 วัน/สัปดาห์

( ) ควบคุมทุกวัน

ด้านการออกกำลังกาย

7) โดยปกติท่านออกกำลังกายหรือออกแรงทำงานบ่อยเพียงใด?

( ) ทำบ้าง ไม่ทำบ้าง ไม่แน่นอน

( ) น้อยกว่า 3 วัน/สัปดาห์

( ) มากกว่า 3 วัน/สัปดาห์

( ) ทุกวัน

8) ท่านใช้เวลาออกกำลังกายในแต่ละครั้งนานเท่าใด?

( ) 10 นาที

( ) 20 นาที

( ) 30 นาที

( ) นานมากกว่า 30 นาที

9) หลังการออกกำลังกายทุกครั้งมีเหงื่อออกมากน้อยเพียงใด?

( ) ไม่มีเหงื่อออกเลย

( ) มีเหงื่อออกเป็นบางครั้ง

( ) มีเหงื่อออกพอสมควร

( ) มีเหงื่อออกมาก

10) ท่านออกกำลังกายหรือออกแรงทำกิจกรรมต่างๆในช่วงเวลาใด? เป็นส่วนมาก

( ) ช่วงเวลาที่แตกต่างกัน

( ) ช่วงใกล้เคียงกับเวลาที่เคยทำเป็นบางครั้ง

( ) ช่วงเวลาที่ใกล้เคียงกันเป็นส่วนมาก

( ) ช่วงเวลาที่ใกล้เคียงกันทุกครั้ง

11) เมื่อท่านไปออกกำลังกายสิ่งที่ท่านนำติดตัวไปด้วยคือ

( ) น้ำหวานหรือน้ำผลไม้

( ) ลูกอม

( ) น้ำดื่ม

( ) อื่นๆ ระบุ .....

( ) ไม่ได้นำอะไรไปเลย

ส่วนที่ 6 พฤติกรรมให้การสนับสนุนการดูแลตนเองแก่ผู้ป่วยเบาหวาน

คำชี้แจง กรุณาทำเครื่องหมาย ✓ ลงในช่องที่ตรงกับการกระทำของท่าน โดยเลือกเพียงคำตอบเดียว

เป็นประจำ หมายถึง กระทำมากกว่า 3 ครั้ง ต่อสัปดาห์

เป็นบางครั้ง หมายถึง กระทำน้อยกว่า 3 ครั้ง ต่อสัปดาห์

ไม่ปฏิบัติ หมายถึง ไม่ได้กระทำพฤติกรรมนั้นเลย

ข้อความ	ระดับความสม่ำเสมอ		
	เป็นประจำ	บางครั้ง	ไม่ปฏิบัติ
ข้อความที่ท่านจะได้ฟังต่อไปนี้ ท่านได้ปฏิบัติต่อผู้ป่วยเบาหวานมากน้อยเพียงใด			
1) เตือนผู้ป่วยเบาหวานให้รับประทานอาหารหวาน ผลไม้รสหวาน อาหารมัน ให้น้อยลง	.....	.....	.....
2) เตือนผู้ป่วยเบาหวานให้ออกกำลังกาย	.....	.....	.....
3) เตือนให้ผู้ป่วยเบาหวานรับประทานยาให้ตรงเวลา	.....	.....	.....
4) เตือนหรือพาผู้ป่วยเบาหวานไปตรวจตามแพทย์นัด	.....	.....	.....
5) เตือนผู้ป่วยเบาหวานให้สวมรองเท้าก่อนออกนอกบ้านทุกครั้ง	.....	.....	.....

ค่าความเที่ยงของแบบสอบถามของผู้ป่วยเบาหวาน

ส่วนที่ 4 การรับรู้โอกาสเสี่ยงต่อการเกิดโรคแทรกซ้อนจากเบาหวาน

Item-total Statistics

ข้อความ	Scale Mean If Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
1. ตาพร่ามัว มองไม่ชัด	27.4857	13.2389	.3853	.7003
2. จอตาเสื่อม ตาบอด	27.5857	12.5070	.5096	.6829
3. ไตวายเรื้อรัง	27.6000	12.9391	.3674	.7018
4. หลอดเลือดที่ไตตีบตัน	27.6571	13.1561	.2927	.7128
5. โรคหัวใจขาดเลือด	27.5571	12.4822	.4703	.6871
6. โรคหลอดเลือดหัวใจตีบตัน	27.5286	12.7455	.4124	.6954
7. หลอดเลือดสมองตีบตัน	27.5857	13.4056	.3158	.7085
8. อัมพาตจากหลอดเลือดสมองตีบตัน	27.5571	13.5257	.2880	.7119
9. ชาตามมือและเท้า	27.6429	13.7112	.1612	.7332
10. เท้าเป็นแผลได้ง่ายแต่หายช้า	27.4571	13.1213	.4802	.6913
11. ติดเชื้อที่อวัยวะสืบพันธ์ได้บ่อยๆ	27.6286	12.8455	.3891	.6987
12. สมรรถภาพทางเพศลดลง	27.6571	13.2720	.2692	.7161

Reliability Coefficients

N of Cases = 70.0 N of Items = 12

Alpha = .7215

ส่วนที่ 5 การรับรู้ความสามารถตนเองในการปฏิบัติเพื่อป้องกันโรคแทรกซ้อน

Item-total Statistics

ข้อความ	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
1. ลดการรับประทานอาหารทอด อาหารมัน	34.8571	11.1967	.4949	.7552
2. ลดการรับประทานอาหารหวาน	34.9429	11.3590	.4152	.7622
3. ลดการรับประทานอาหารใส่กะทิ	34.9143	11.3549	.4235	.7615
4. สม่ำเสมอ 3 ครั้ง/สัปดาห์	35.0286	10.1731	.5716	.7444
5 นานครั้งละ 20 นาที	35.0286	10.1731	.5716	.7444
6. เวลาที่ใกล้เคียงกันทุกครั้ง	35.0000	10.4638	.5219	.7506
7. บริหารเท้าทุกวัน	35.0286	10.5789	.5152	.7514
8.ทำความสะอาดของเท้าและสำรวจดูการเกิดแผล	34.9000	11.8014	.3191	.7706
9. ฟอกสบู่ล้างน้ำและเช็ดเท้าให้แห้ง	34.8714	11.5340	.4153	.7625
10. ไปพบแพทย์ก่อนยาหมด	34.7286	12.2296	.2589	.7745
11.ไปตามที่แพทย์นัดได้ทุกครั้ง	34.7000	12.2420	.2791	.7732
12. ตรงเวลาทุกมื้อ	34.6857	12.6534	.1255	.7824
13. ถูกต้อง	34.7000	12.5319	.1642	.7803
14. ตลอดและต่อเนื่อง	34.6714	12.4557	.2198	.7767

Reliability Coefficients

N of Cases = 70.0 N of Items = 14

Alpha = .7776

ค่าความเที่ยงพฤติกรรมที่ได้รับการสนับสนุนการดูแลตนเองจากญาติ

Item-total Statistics

ข้อความ	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
เตือนเรื่องการรับประทานอาหาร	7.6429	4.6097	.5811	.6660
กระตุ้นเรื่องการออกกำลังกาย	7.6857	4.6534	.4971	.6932
เตือนให้รับประทานยาให้ตรงเวลา	7.8286	4.4050	.5411	.6759
เตือนหรือพาไปตรวจตามนัด	7.4857	4.2534	.5393	.6767
เตือนให้สวมรองเท้า	8.0429	4.8822	.3613	.7444

Reliability Coefficients

N of Cases = 70.0 N of Items = 5

Alpha = .7377

ค่าความเที่ยงการรับรู้โอกาสเสี่ยงต่อการเกิดโรคเบาหวาน

Item-total Statistics

ข้อความ	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
1. ญาติสายตรงเป็นเบาหวาน	14.2111	11.2920	.4721	.8023
2. อายุ 40 ปี ขึ้นไป	14.2889	10.3875	.6393	.7776
3. คนอ้วน	14.3000	10.4596	.5647	.7894
4. คลอดบุตรน้ำหนักมากหรือเคยตั้งครรภ์ผิดปกติ	14.5667	11.5966	.4581	.8038
5. ยาคุมกำเนิด	14.7111	11.7808	.4943	.8002
6. โรคตับอ่อนอักเสบ	14.4444	11.4856	.5197	.7964
7. อาหารประเภททอด อาหารมัน	14.3444	10.9699	.4616	.8056
8. การไม่ออกกำลังกาย	14.1667	10.0506	.6636	.7730

Reliability Coefficients

N of Cases = 70.0 N of Items = 8

Alpha = .8151

ค่าความเที่ยงการรับรู้โอกาสเสี่ยงต่อการเกิดโรคแทรกซ้อน

Item-total Statistics

ข้อความ	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
1. ตาพร่ามัว มองไม่ชัด	21.5444	26.2059	.6091	.8653
2. จอตาเสื่อม ตาบอด	21.9556	24.0429	.7050	.8570
3. ไตวายเรื้อรัง	22.3222	24.4456	.6748	.8592
4. หลอดเลือดที่ไตตีบตัน	22.4111	25.1662	.6186	.8630
5. โรคหัวใจขาดเลือด	22.3556	24.3216	.6468	.8608
6. โรคหลอดเลือดหัวใจตีบตัน	22.2444	22.8609	.7505	.8531
7. หลอดเลือดสมองตีบตัน	22.2667	25.5685	.5795	.8654
8. อัมพาตจากหลอดเลือดสมองตีบตัน	22.2000	25.5775	.5291	.8682
9. ชาตามมือและเท้า	21.9111	27.1156	.2724	.8839
10. เท้าเป็นแผลได้ง่ายแต่หายช้า	21.5778	26.9433	.3223	.8801
11. ติดเชื้อที่อวัยวะสืบพันธ์ได้บ่อยๆ	21.9333	25.6584	.5294	.8681
12. สมรรถภาพทางเพศลดลง	22.3778	25.2714	.6134	.8634

Reliability Coefficients

N of Cases = 70.0 N of Items = 12

Alpha = .8758

ค่าความเที่ยงการรับรู้ความสามารถตนเองในการปฏิบัติเพื่อป้องกันโรคเบาหวาน

Item-total Statistics

ข้อความ	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
1. ลดการรับประทานอาหารทอด อาหารมัน	9.0333	5.4034	.3459	.7522
2. ลดการรับประทานอาหารหวาน	9.2889	4.8370	.4654	.7253
3. ลดการรับประทานอาหารใส่กะทิ	9.4000	4.0854	.5872	.6907
4. สม่ำเสมอ 3 ครั้ง/สัปดาห์	9.6333	4.2348	.6837	.6626
5 นานครั้งละ 20 นาที	9.5111	4.4549	.5608	.6986
6. เวลาที่ใกล้เคียงกันทุกครั้ง	9.3556	5.3104	.3214	.7591

Reliability Coefficients

N of Cases = 70.0 N of Items = 6

Alpha = .7536

ค่าความเที่ยงพฤติกรรมการให้การสนับสนุนการดูแลตนเองแก่ผู้ป่วยเบาหวาน

Item-total Statistics

ข้อความ	Scale Mean If Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
เตือนเรื่องการรับประทานอาหาร	8.1000	6.2034	.5202	.7879
กระตุ้นเรื่องการออกกำลังกาย	8.2333	6.0685	.5710	.7738
เตือนให้รับประทานยาให้ตรงเวลา	8.0222	5.1456	.7412	.7166
เตือนหรือพาไปตรวจตามนัด	7.6889	5.6774	.5758	.7726
เตือนให้สวมรองเท้า	8.4889	5.8032	.5497	.7806

Reliability Coefficients

N of Cases = 70.0 N of Items = 5

Alpha = .8052

BIOGRAPHY

NAME	Miss Umaporn Sanusanti
DATE OF BIRTH	10 July 1966
PLACE OF BIRTH	Nakhonsawan, Thailand
INSTITUTIONS ATTENDED	Boromarajonani collage of Nursing Buddhachinaraj, Phitsanulok 1991-1993 : Bachelor degree of nursing Mahidol University, 1999-2001: Master of Science Public Health
POSITION & OFFICE	1993-present : Banphotphisai Hospital, Nakhonsawan, Thailand Position :Registered Nurse Tel. 056-279028