THE STUDY OF PERCEIVED BENEFITS AND SITUATIONAL INFLUENCES TO EXERCISE BEHAVIOR IN THE ELDERLY WITH DIABETES MELLITUS

VARAPORN TOTERMSUCK

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Varaporn Totermsuck

Miss Varaporn Totermsuck

Candidate

Suvimol Kimpee

Asst.Prof. Suvimol Kimpee, M.Ed.

Major-Advisor

Sauvaluck Lekutai

Assoc.Prof.Sauvaluck Lekutai, M.Sc.

Co-advisor

Nantawon Suwonnaroop

Lect. Nantawon Suwonnaroop,Ph.D.

Co-advisor

Liangchai Limlomwongse

Prof. Liangchai Limlomwongse,

Ph.D.

Dean

Faculty of Graduate Studies

Kobkul Phancharoenworakul

Assoc.Prof.Kobkul Phancharoenworakul,

Ph.D.

Chairman

Master of Nursing Science

Faculty of Nursing

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on
May,19, 2000

Varaporn Totermsuck
Miss Varaporn Totermsuck
Candidate

Suvimol Kimpee
Asst.Prof. Suvimol Kimpee, M.Ed.
Chairman

Fongcum Tilokskulchai
Assoc.Prof.Fongcum Tilokskulchai,Ph.D.
Member

Sauvaluck Lekutai
Assoc.Prof.Sauvaluck Lekutai,M.Sc.
Member

Vilai Kuptniratsaikul
Assoc.Prof.Vilai Kuptniratsaikul,M.D.
Member

Nantawon Suwonnaroop
Lect. Nantawon Suwonnaroop,Ph.D.
Member

Liangchai Limlomwongse
Prof. Liangchai Limlomwongse,
Ph.D.
Dean
Faculty of Graduate Studies
Mahidol University

Kobkul Phancharoenworakul
Assoc.Prof.Kobkul Phancharoenworakul,
Ph.D.
Dean
Faculty of Nursing
Mahidol University

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Varaporn Totermsuck

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Exercise is health behavior that is neglected by most of the elderly with diabetes mellitus. If they don't exercise the severity of the may occur disease and the chances of mortality may increase. The purpose of this study was to investigate perceived benefits and situational influences to exercise behavior in the elderly with diabetes mellitus. The Health Promotion Model of Pender was used as a guideline in this study. This study was a descriptive research and the sample consisted of 140 randomly selected elderly with diabetes mellitus, from the membership of elderly clubs located at Central Ratchaburi Hospital, Boromarajonani College of Nursing,Ratchaburi, Damnoensaduak Hospital, Hinkong Sub-District, Donpai Sub-District, Buangaram Sub-District, Bangtanode Sub-District, Bansing Sub-District, and Donsai Sub-District. The subjects were interviewed and data was collected on characteristics data, exercise behavior, perceived benefits, and situational influences. Data were further analyzed by frequency distribution, percentage, arithmetic mean, standard deviation and stepwise multiple regression technique.

The results found that exercise behavior of the subjects was at a good level ($\bar{x}$ = 3.62, SD = 0.70), perceived benefits were at a good level ($\bar{x}$ =2.81, SD= 0.36), and situational influences were at a good level ($\bar{x}$ = 2.69, SD = 0.45). Perceived benefits, situational influences, and educational level could predict exercise behavior at 98% at a statistically significant level of 0.001.

The recommendation from this study is that in order to correctly care for diabetic elderly, nurses and health care providers should give information about the benefits of exercise, emphasize the correct practice of exercise, and encourage them to participate in exercise activity in the community.

4137093 NSAN/M : สาขาวิชา : การพยาบาลผู้ใหญ่ ; พย.ม. (การพยาบาลผู้ใหญ่)

วราภรณ์ โตเติมศักดิ์: การศึกษาการรับรู้ประโยชน์และอิทธิพลด้านสถานการณ์ต่อพฤติกรรมการออกกำลังกายในผู้สูงอายุโรคเบาหวาน (THE STUDY OF PERCEIVED BENEFITS AND SITUATIONAL INFLUENCES TO EXERCISE BEHAVIOR IN THE ELDERLY WITH DIABETES MELLITUS). คณะกรรมการควบคุมวิทยานิพนธ์ : สุวิมล กิมปี, ค.ม., เสาวลักษณ์ เล็กอุทัย, วท.ม. , นันทวัน สุวรรณรูป, Ph.D., 94 หน้า. ISBN 974-664-210-3

การออกกำลังกายเป็นพฤติกรรมสุขภาพซึ่งผู้สูงอายุโรคเบาหวานส่วนใหญ่ละเลย ซึ่งถ้าขาดการออกกำลังกายจะทำให้อาการของโรครุนแรงและทำให้อัตราตายเพิ่มขึ้น การวิจัยครั้งนี้มีวัตถุประสงค์เพื่อศึกษาการรับรู้ประโยชน์และอิทธิพลด้านสถานการณ์ต่อพฤติกรรมการออกกำลังกายในผู้สูงอายุโรคเบาหวาน ผู้วิจัยนำกรอบแนวคิดของเพนเดอร์มาเป็นแนวทางในการศึกษา โดยใช้การวิจัยเชิงบรรยายและเลือกกลุ่มตัวอย่างจากผู้สูงอายุโรคเบาหวาน ที่เป็นสมาชิกชมรมผู้สูงอายุโรงพยาบาลศูนย์ราชบุรี วิทยาลัยพยาบาลบรมราชชนนี ราชบุรี โรงพยาบาลดำเนินสะดวก ตำบลหินกอง ตำบลดอนไผ่ ตำบลบัวงาม ตำบลบางตะโหนด ตำบลบ้านสิงห์ ตำบลดอนทราย จำนวน 140 ราย เก็บรวบรวมข้อมูลโดยใช้แบบสัมภาษณ์ที่ผู้วิจัยสร้างขึ้นประกอบด้วยข้อมูลคุณลักษณะทางบุคคล พฤติกรรมการออกกำลังกาย การรับรู้ประโยชน์และอิทธิพลด้านสถานการณ์ วิเคราะห์ข้อมูล โดยหาการแจกแจงความถี่ ร้อยละ ค่าเฉลี่ย ส่วนเบี่ยงเบนมาตรฐานและหาอำนาจการทำนายโดยการวิเคราะห์ถดถอยพหุคูณแบบขั้นตอน

ผลการวิจัยพบว่า คะแนนพฤติกรรมการออกกำลังกายโดยรวมอยู่ในระดับดี ($\bar{X}$ = 3.62, SD= 0.70) คะแนนการรับรู้ประโยชน์โดยรวมอยู่ในระดับดี ($\bar{X}$=2.81, SD=0.36) คะแนนอิทธิพลด้านสถานการณ์โดยรวมอยู่ในระดับดี ($\bar{X}$=2.69, SD=0.45) การรับรู้ประโยชน์ อิทธิพลด้านสถานการณ์ และระดับการศึกษา สามารถทำนายพฤติกรรมการออกกำลังกายได้ 98% ที่ระดับความมีนัยสำคัญ 0.001

จากผลการศึกษาครั้งนี้ผู้วิจัยมีข้อเสนอแนะว่า พยาบาลและเจ้าหน้าที่ด้านสาธารณสุขอื่น ๆ ควรเน้นให้ผู้สูงอายุโรคเบาหวานมีพฤติกรรมการออกกำลังกายตามหลักการการออกกำลังกายที่ถูกต้อง และส่งเสริมให้ผู้สูงอายุมีส่วนร่วมในกิจกรรมการออกกำลังกายของชุมชน รวมทั้งให้ข้อมูลเกี่ยวกับประโยชน์ในการออกกำลังกายแก่ผู้สูงอายุ

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CHAPTER I

INTRODUCTION

Background and Significance of the Study

With advanced technologies of medical and public health, people tend to live longer. The average life expectancy in Thailand were 69.6 years for men and 74.9 years for women (Institute for Population and Social Research, Mahidol University, 1999). Data from the population survey of Thailand in the year 1999 reported that the age population was estimated to be 5,165,000 peoples of 61,470,000 total population (Institute for Population and Social Research, Mahidol University, 1999). By 2015, the number of elderly population is expected to increase to 8.4 million peoples (Division of Public Health Statistics, 1999)

The increasing number of the aged have direct effects on the policy and public health plan of Thailand. Due to changes in physical, mental and social health, the elderly are affected with various problems, including degenerative disease (Tianprapas,J.,& Tunsiri,P.1993: 93-95). Therefore, aging population is the major concern of health care policy when compared to other various aged groups (Bruke, 1992 : 10 -11, cited in Tumpenjit, S.1998: 8). Thongcharoen,V.(1998:127) found that 75.9 % of the elderly experienced at least one chronic illnesses such as hypertension, bone and muscular disease, heart disease, and diabetes.

Diabetes is often found in aging and is one of chronic diseases that are rising up with severity (Bureau of Health Policy and Planning, 1997: 53). In 1997, Health Systems Research Institute reported that the diabetic patients in Thailand were about

900,000 people. In over 60 years age groups, diabetic was estimated to be 9 - 15.3 % (Juntaraprasert,S.1993:94) and 99% of diabetic patients were non-insulin dependent diabetes mellitus (Himathongkum,T.1996: 15). Common symptoms of diabetes including polydipsia, polyuria, polyphagia, eating a lot of food, weight loss and elevate blood glucose level. If it is occurred over a long period of time, serious complications may result such as coronary-artery disease and cerebrovascular accident causing paralysis, blurr vision, retinopathy, blindness, nephritis, renal failure, hypertension, as well as loss of sex drive (Pannatam,S.1997:35). Apart from causing various complication may be a chance to risk in death from coronary artery disease and brain disease which occurs 4 % higher than in normal persons (Valmadrid T.C., et al.,1997: 26a). Diabetes have the chance of amputation of the legs or feet and diabetes mellitus can develop in the elderly (Sitonen, et al., 1993: 16). The majority of diabetic patients always died from complications. A survey of Siriraj Hospital showed that diabetic patients aged over 60 years age groups who were hospitalized with diabetes complication in 1994, 46.1 % and in 1995 raised up to 53.9 % (The Bureau of registered statistics, Siriraj hospital, 1997). Division of Public Health Statistics (1999: 157) reported that the death rate of diabetic patients was 1 per 100,000 population. It can be classified by gender as following, 1,798 men as 6.0 %, 2,754 women as 9.1 percent. Furthermore, diabetes mellitus is a chronic disease that causes the patients over a long period of time to suffer impaired health and the loss of competency in work activities. It will cause a lifestyle change from the normal to a condition where the disease can be controlled effectively. For example, the control of diet intake that is different from the normal person, continuity of drug taking and regular exercise are appropriate. Moreover the patient has to be separated from

associated person and leave home in order to gain hospitalized curing. This can cause psychosocial problems and financial problem to patients, families, and include country, for the expenditure of diabetes medication. In Thailand, diabetic patients who were hospitalized at diabetic clinic, siriraj hospital, the expenditure of diabetic medication was about 5,582.80 Baht per year for each person (Ratanapituk,A.1993: 80-81). Helping the diabetic patients is also a problem. The nurses play an important role in encouragement and support the elderly with diabetes mellitus to be enable to control the disease by themselves as much as possible. According to Eight National Economic and Social Developmental Plan, the purpose is to support the health of the elderly and to correctly care for their health. The health care of diabetic patients is emphasized about diet controlling, exercise, medication, and health care, including glucose laboratory findings in urine or blood glucose level (Bruke, 1971: 548). The expert physicians specialized with diabetes mellitus mention that exercise could control blood sugar.

Exercise is an important factor, to improve of diabetic control. The elderly with diabetes mellitus gain benefits from exercise; for examples, improve physical fitness, improve heart and vascular, reduce their risk of coronary heart disease, control body weight, reduce levels of triglyceride and cholesterol and decrease tissue sensitivity to insulin. In a study of Berglund, et al., (1982: 176-177), it was found that after exercise, there was improved insulin secretion. This is related to the studying of Wannasiri,T.(1989:D) which found that exercise with walking on a treadmill by diabetic patients could reduce levels of blood glucose. Besides, exercise can reduce a period of chronic illness, enables the functions all the body systems working better, such as improving strength of muscular and other joint of

body, improving movement of body and reducing the risk of osteoporosis (Mums, 1981; Robertson, 1991; Shephard, 1993: 120). It can reduce stress, improves the psychological outlook and the quality of life in the elderly who have diabetes mellitus. Exercise which is suitable to diabetic patients should be aerobic exercise, such as walking, jogging, arm exercise, or Taichi. Exercise time should be 30-minute in length and at least 3 times per week. If diabetic patients perform regular exercise, they can control their illness and prolong their life (Boonnak,S.1992: 290). Presently,there are a widespread information about diabetic disease to general public; however, it can not control the disease (Chomsamut, K.1992:2; Liangraksa, N.1993:65). The prevalent rate of diabetic does not decline, eventhough there has been progress in medical technology for the treatment. Problems that often found in the elderly with diabetes mellitus are unable to control their food, over weight, lack for appropriate exercise and irregular of drug taking (Chomsamut,K.1992:2; Rajatanawin,R.,et al.1987: 183-188). From the study of Phonploy,V.(1996:35), it was found that nonexerciser resulted in higher levels of blood glucose than those who exercised. According to the study of Limumnuaylarp,S. et al.(1993:30), it was found that most patients have low participation in controlling diabetics by exercise the same low level as shown in their control of food intake.

From a survey of population in Ratchaburi Province the number of people was found to be 813,293, of these approximately 91,056 people or 11.19 percent of the population was over 60 years, and the elderly with diabetes mellitus increased to be 8,764 people (Provincial Public Health Office, Ratchaburi Province,1998:20). Presently, there are elderly clubs in the community, that provide information about health which is beneficial to the elderly. These elderly can also participate in health

activities at the clubs. So encouraging the elderly to take part in group activity is essential and enable the aging to have good health. From a primary data study. in a elderly club in Ratchaburi Province, it was found that 80 % of the elderly have problem about exercise. Such problems are selecting appropriate type and duration of exercise that are appropriate to their age and their physical condition. They do inappropriate exercise and have poor understanding in their exercise activities.It isn' t good enough because there is no coordination between the elderly in the community and the elderly club. It is the new elderly club with no coordination from the elderly in community. The effect of non exercise led to health problem in the elderly with diabetes mellitus. A particular goal for preventing and solving the problem is to support the patients through correct exercise behavior, and to improve their health.

The researcher is interested in studying exercise behavior of the elderly with diabetes mellitus. If the elderly with diabetes mellitus have regular exercise, they can control blood glucose levels and reduce the risk factors in various complication. Exercise behavior is one of health behavior, which is important in promoting the health of the elderly with diabetes mellitus.

For demographic factors, the researcher select variables such as gender, income, educational level, and duration of illness to examine their influences on exercise behavior. From a review of literature, these variables were found to have effects on exercise behavior.

Gender. Gender is a factor to classify the physical differences of human beings. Sakulpan, N.(1992:90) found that there was no difference between male and female in self-care behavior. Siegler and colleagues (1997: 258, cited in Tumpenjit, S.1998:100) found that males prefer exercise while females prefer sedentary

lifestyles. Hiranwan, S.(1995:56) reported that the male diabetic patients would take care of themselves in exercise better than the females. But from a study by Hunkittikul, S (1996:143), it was found that females have exercise behavior better than males. In a study of Manogulanun, P. (1992: 73), it was seen that females controlled diabetic better than males.

Income. Income is important to indicate the economic and social conditions of the diabetic elderly. With high income, a person has a good chance in searching for something that is useful in caring for themselves (Pender,1982:161). Yamjunchai,V. (1993:43) found that income is a variable which can predict the exercise behavior in the elderly. According to Sakulpan, N. (1992:B) it was found that family income associated with self - care behavior in the diabetic patients. On the other hand, Siritrungsri, B. (1990:199) found that income was not related to self-care behavior of the diabetic patients.

Educational level. Education is an indicator of ability in thinking. Those who are able to well understand health information have a good level of activity for self-care (Orem, 1985: 120, 175), and they have a better chance of acquiring useful methods to encourage health activity than lower educational levels (Pender, 1987: 163). According to a study of Lusk, Kerr and Ronis (1995: 22, cited in Phonploy, V. 1996:20) it was found that high educated people had greater understanding exercise behavior than lower educated people. Besides, education level has a positive relationship to health-promoting behavior in the diabetic elderly (Kasekan, K. 1998:82). This is in contrast to a study of Sakulpan,N. (1992:90), when it was found that educational level had a negative relationship to the diabetic patients.

Duration of illness. Duration of illness is an important factor to health activity. Patients in the first period may lose confidence in any action related to health. A study of Sakulpan, N. (1992: B) found that the duration of illness related to self - care behavior in the diabetic patient, but from the studying by Sumpunyu(1996: B), it was found that the duration of illness is not related to health-promoting behavior. Expecting the results of this study, it will be a guidance for nurses who take the important role in supporting the diabetic elderly. The findings may serve as a guideline for developing exercise activities in the eldely club. The regular exercise may reduce the complication and enable elderly to have a better quality of life.

Research Question

What is the exercise behavior of the elderly with diabetes mellitus and what is the relative contribution of gender, income, educational level, duration of illness, perceived benefits, and situational influences to exercise behavior ?

Purpose of the Study

1. To study the exercise behavior in the elderly with diabetes mellitus.

2. To study the perceived benefits and situational influences in the elderly with diabetes mellitus.

3. To determine the predictive power of predictor variables: gender, income, educational level, duration of illness, perceived benefits and situational influences to exercise behavior of the elderly with diabetes mellitus.

Conceptual Framework of the study

The Health Promotion Model (HPM; Pender,1996) has been used to guide this study. Pender's Health Promotion Model identifies the importance of perceptions in changing behavior. Such as, a person might choose to engage in health - promoting behaviors depend on Behavior-Specific Cognition's and Affect which is composed of 6 factors -perceived benefits, perceived barriers, perceived self-efficacy, activity-related affect, interpersonal influences, and situational influence. Personal factor are also predictive of the given behavior. They are shaped by the nature of the target behavior being considered. Personal factors have been categorized as bilogical, psychological, and sociocultural. Personal factors are considered to have a direct influence on both behavioral-specific cognitions. These various factors have influences on health-promoting behaviors, such as exercise in the elderly with diabetes mellitus. Perceived benefits and situational influences were two important variables which could affect behavioral outcomes such as exercise. Perceived benefits is one of motivational factor that has been supported in the health-promoting behaviors (Pender, 1996: 68-69). Benefits from the performance of the behavior may be intrinsic or extrinsic. Intrinsic benefits include increasing alertness and decreasing feeling of fatigue. Extrinsic benefits can include monetary rewards, appreciatively wording or social interactions. Individuals may believe that exercise improves health. If they do not perceive their health to be threatened, they may not need to exercise. Consequently, perceived benefits of exercise behavior provide the key to motivate people to take exercise and to develop exercise habits, they will maintain throughout their lives.

One factor which may be related to exercise is situational influences. Pender (1996: 67-71) said that situational influences are personal perceptions and cognition's of any situation or context that can faciliate or impede health-promoting behavior. These include perceptions of options available, demand characteristics, and aesthetic features of the environment in which a given behavior is proposed to take place. Option available was the chance or situation that in context can faciliate or impede health-promoting behavior. Environment was anything which is a factor to faciliate or impede health-promoting behavior. In addition, environment that are fascinating and interesting are also desirable contexts for the performance of health behaviors. This promotes a person to have suitable health-promoting behavior. Consequently, situational influences of exercise behavior provide an important key to developing exercise and maintenance of health behavior.

The framework could describe personal factors related to exercise behavior of the elderly with diabetes mellitus.

Personal factors are: gender:it is a factors to classify the physical difference of human beings which might be difference of exercise behavior in each person. Income: income indicates them to have the opportunity to select the types of exercise that suitable for their economic status. Educational level :education is an essential factor in supporting and understanding health information. It gives the knowledge for them to change their exercise behavior. Duration of illness: duration of illness is an important factor to health activity, help to have a decision making about exercise.

In this study, it is expected that if perceived benefits and situational influences are high, the elderly with diabetes mellitus would tend to develop motivation to engage in positive exercise behavior. Gender, income, educational level, and duration

of illness can also determine the exercise behavior. The conceptual framework of this study is shown in figure 1.

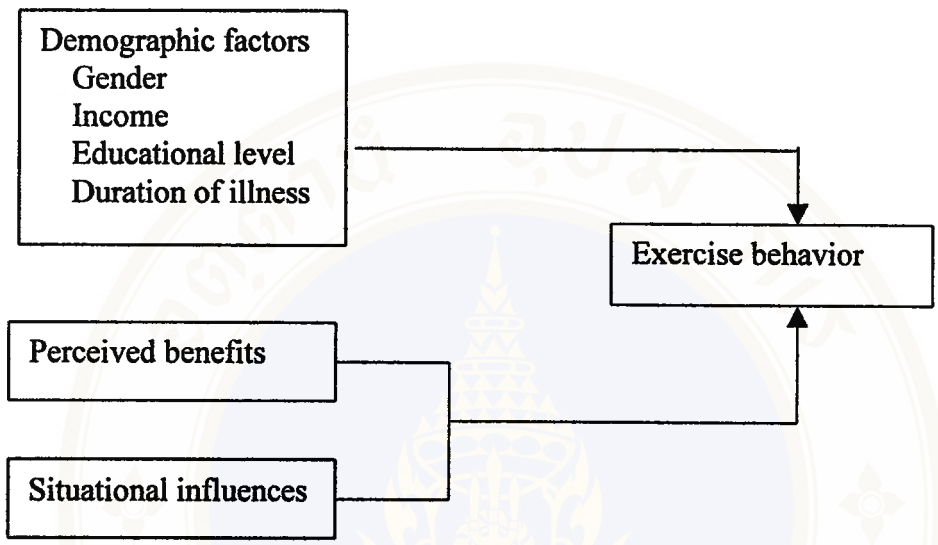

Figure 1. Conceptual Framework

Hypotheses

Gender, income, educational level, duration of illness, perceived benefits and situational influences can predict the exercise behavior in the elderly with diabetes mellitus.

Scope of the study

This research studied exercise behavior. The population of this study were the elderly with diabetes mellitus aged over 60 years old, including both males and females. The subjects were diagnosed by a physician as having diabetic, for at least 6 months. The subjects were performing exercise behavior and living in Ratchaburi Province.

Definition of Terms

1. Exercise behavior is defined as an action or activity performed which movement effects to change in body muscles and various other joints of the body more than the movement or activities of daily living such as walking, jogging, arm exercise,and Taichi. In this study, the measurement of exercise behavior is carried out by interviewing using a structured questionnaire. The questionnaire consists of warm up and cool down, preparation before exercise, indication in exercise.

2. Perceived Benefits is defined as the elderly with diabetes mellitus perceive action or exercise behavior as useful to health and which can prevent complications from the disease. This was evaluated from the questionnaires developed by Pender (1996: 68-69) in accordance with Health-Promotion categorized into 2 parts.

2. 1 Intrinsic benefits is defined as the elderly with diabetes mellitus perceived after having exercise behavior which will affect changes to improve health

2.2 Extrinsic benefits is defined as the elderly with diabetes mellitus obtain from monetary rewards, appreciatively words or social interaction after having exercise behavior.

3. Situational influences are defined as the elderly with diabetes mellitus perceptions and cognition of any situation or context that can faciliate or impede exercise behavior. These are categorized as follow:

3.1 Options available is defined as the chance or situation that in context can faciliate or impede exercise behavior in the diabetic elderly.

3.2 Environment is defined as anything which is a factor to faciliate or impede exercise behavior in the diabetic elderly.

4. Gender is defined as the diabetic elderly s ' sex identification either males or females.

5. Income is defined as the elderly with diabetes mellitus personal monthly incomes when single status, or the elderly with diabetes mellitus income include together with his or her spouse 's income in the case where they are married.

6. Educational level is defined as the highest educational level in schooling.

7. Duration of illness is defined as the period in years, starting from the date that the diabetic elderly have been diagnosed by the physician until the date of the study.

Expected Outcomes and Benefits

1. The study can be a guide to health care teams who are able to use the research results in the plan of exercise in the elderly club; for developing exercise behavior correct and suitable for the elderly with diabetes mellitus, by getting concepts of perceived benefits and situational influences of participation in the plan about exercise in the elderly club.

2. The study can be used as a primary data for health care teams to encourage and help the elderly with diabetes mellitus to do exercise continuously and so prevent complications.

3. It can be a guidance for further study.

CHAPTER II

LITERATURE REVIEW

The purpose of this descriptive study is to determine the contribution of perceived benefits and situational influences to exercise behavior in the elderly with diabetes mellitus. Therefore, the component of review literature consists of the following topics:

1. Health problems of the elderly with diabetes mellitus.
   - 1.1 Changing the pathophysiology of diabetes mellitus
   - 1.2 Complication of diabetes mellitus
   - 1.3 Controlling diabetes mellitus
2. Benefits of exercise to prevent complication in the elderly with diabetes mellitus.
   - 2.1 Definition, classification, and benefits of exercise
   - 2.2 Mechanisms of exercise to blood glucose level
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1. Health problems of the elderly with diabetes mellitus.

1.1 Changing the pathophysiology of diabetes mellitus.

Diabetes mellitus is a chronic disease caused by abnormalities in the function of insulin which effects metabolism of carbohydrates causing disorder and an increase in blood glucose level. It is always found in the elderly. The main types of diabetes mellitus which is usually seen in the elderly is noninsulin dependent diabetes mellitus. There are many factors which cause diabetes mellitus in the elderly such as genetic history and obesity. Moreover, the relationship between age and the impaired ß-cell will decrease insulin secretion and sensitivity (Funnell & Merrit,1993: 6). Mechanism of elevated glucose when aging derives from abnormal of post-receptor (Reaven GM, Reaven EP. 1985, cited in Somchock,J.1997:12) or the abnormally of target cell. It has been found that the amount of insulin receptor at the cell membrane is less than normal or the response of receptor to insulin is below the normal. It may be found that the insulin in veins is more than normal caused by the higher production and hypersecretion of insulin from the pancreas for effecting impaired insulin resistance. Also, when aging, exercise will be decreased and muscle mass decreases but adipose tissue increases. These are the reasons for insulin resistance because adipose tissue will affect the response of insulin. It will decrease (Funnell MM. & Merrit JH, 1993:

45), or insulin may combine with fat and change these fat to inactive insulin (Punyavanit,P.1978 cited in Somchock,J.1997:12).

1.2 Complication of diabetes mellitus

Diabetic complications in aging may happen quickly and severely and cause the mortality rate to be higher than at a younger age (Juntaraprasert,S.1993:95). Diabetes mellitus distribution in the body system is as follows:

1. Heart and Vascular. Vascular impairment may cause altherosclerosis problem which comes from elevated serum triglycerides levels and the gradual increase of sorbital. This change in vascular causes patients to have problems with hypertension, myocardial ischemia, and myocardial infarction.

2. Neurologic. The frequent cause of neuropathy affects the majority of the elderly who have ischemia. It is often found in diabetic patients who have sensory losses in the feet, starting from the extremities of the feet. This will easily cause foot ulcers and eventually may require amputation.

3. Eyes. Diabetic retinopathy is a cause of blindness due to the change of capillaries in the retina because tissue ischemia always occurs with nephropathy.

4. Renal and Urinary. Creatinine clearance decreases with increasing age. If they are diabetic, this may cause renal failure in the elderly or have hypertension. Diabetic nephropathy is the state where protein leaks into urine all the time. If this state becomes severe, there will be renal failure.

5. Blood . Red blood cells have a short life. Platlets will hold and combine together easily and cause the impairment in the veins which can be severe. Moreover, lymphocyte which destroy foreign bodies in the blood and other impaired

function cells causes patients to have a lower resistance than normal people. Therefore, complications are significantly a problem for diabetic patients, causing death or highly destroying the competency of patients. So the important aim in caring for diabetic patients is to control blood glucose at a normal level.

1.3 Controlling diabetes mellitus

Diabetes mellitus is a chronic disease which is unable to be treated. In order to help patients to have a longer life, self-care behavior should be addressed. The target of control of diabetes mellitus is the prevention of acute complications from high blood glucose. For the best results in controlling diabetes mellitus, these 3 following methods must be used;

1. Diet. Diabetic patients should control their diet such as calorie intake, the type and the amount of daily food consumption. They should get carbohydrates: proteins: fats in the ratio of 50-60: 15-20: 20. The type of suitable food is that it increases blood glucose levels slowly. For instance, starches, dietry fiber, and avoid diet with chemically processed sugar such as desserts, soft drink, and diets with animal fats.

2. Exercise. The advantage of exercise for diabetic patients is to reduce insulin resistance, improve insulin sensitivity, and to improve blood circulation and to decrease blood pressure. Exercise increases bone strength, bone density, decrease body fats, and maintains the movement of other joints and make the patient happy (Funnell & Merritt 1993: 48). The suitable exercise for diabetic patients is aerobic exercises which take 30 minutes at a time, and should practice at least 3 times per week.

3. Medications. The majority of diabetic patients with NIDDM can be treated with oral hypoglycemic drug at the first stage. Such drugs as sulfonylurea agents, biguanide or ∝-glucosidase inhibitor; but finally, some patients need insulin injections. Medication should be by prescription. Additionally, the patients should be observed for complications causing from the medication, for instance, lower blood glucose levels, abnormalities or insulin resistance, and blurring of eyesight and edema.

2. Benefits of exercise to prevent complications in the elderly with diabetes mellitus.

Exercise is an interesting treatment for diabetes mellitus. The majority of physicians specialized in diabetes mellitus realize the way to control blood glucose level and pay attention to exercise as a best method.

2.1 Definition, classification, and benefits of exercise

Exercise is defined as any bodily movement produced by skeletal muscles that result in calorie expenditure. There are many definitions of exercise. Nittiyanun,V. (1992:23) defines exercise as activities which are additional to the daily or routine activity. This can be any activity that causes movement for body and requires high body exertion over a period of time. Thoranin,J.(1991:8) defines exercise as powering and shearing in physical fitness for strengthen all structures in the body and affects muscular. The goal is that body has most metabolism which results to another tract in body improvement to work. In general, exercise means activity performing in leisure

time, but Pender (1996: 185) defined exercise as both leisure time and lifestyle exercise.

Exercise affects to changing anatomy and physiology of human which can be separated into 2 types as follows.

Dynamic (isotonic) exercise or aerobic exercise may be described as occurring when the skeletal muscle undergoes a contraction that principally results in a change in length of muscle with little or no change in tension within the muscle. This type of exercise increases cardiac output and heart rate, while arterial blood pressure may be stable or changed slightly. These types of exercise are walking, running, swimming, arm 's exercise and Taichi (Chinese exercise style).

Static (isometric) exercise occurs when the skeletal muscle contracts and principally results in a large change in tension within the muscle with little change in the length of muscle. The static exercise are best represent by activities such as pulling and weight lifting (Wenger & Hellerstein, 1992: 104).

For this study, exercise refers to regular dynamic or aerobic exercise which is done in leisure-time and perform at least 15-30 minutes.

Exercise is beneficial for all of the body systems. (Levy, 1988). The benefits are as follows :

1. Decreasing blood glucose level and improved insulin activity

2. Increasing lipid metabolism and reduced weight

3. Improving cardiovascular system, leads to increase performance, and decreases or prevents complications in the cardiovascular system.

4. Increasing physical fitness, improving of movement of the muscles and joints, and decreasing bodily damage.

5. Increasing effectiveness of the gastrointestinal tract- the aging can normally eat more than a person who does no exercise, and exercise makes for improvements of excretions.

6. Decreasing stress.

2.2 Mechanisms of exercise to blood glucose level

Exercise can reduce blood glucose level of diabetic patients with NIDDM. Muscular activity requires energy gradually increasing glycogen in the muscles and free-fatty acid in the blood. This uses energy in the following order - when starting exercise muscle gradually use glycogen. During exercise, glucose and FFA in the blood replaces energy in the body over a long period of exercise. FFA is the main source of energy. Moreover exercise will cause muscular activity factor-MAF secretion and increases insulin-like activity in active muscles. The insulin receptor will be sensitive for catching insulin in the conjunction with tissue hypoxia during muscular contraction and calcium levels in cytoplasm of cell increase. These factors will improve the process in which insulin uses glucose. Furthermore, blood supply at the active muscles and dilated capillaries, caused by exercise, makes an adequate supply of insulin go to the muscles (Vranic and Berger, 1979: 159; Karamanose, et al., 1982: 152; Vranic, et al., 1983: 568-569). Normally, the quantity of glucose used at muscles is the same as the increase of glucose production by the liver. The cause of insulin in circulation reduces and hormones that have an opposite action to insulin such as glucagon, cathecolamine and growth hormone increase.Thus, blood glucose levels are not changed. In the case of diabetic patients with NIDDM when starting exercise, glucose at the muscles is increasingly used as usual, but insulin in plasma is

not reduced and the liver does not produce more glucose than normal. This causes blood glucose levels to decrease (Minuk, et al.; 1981: E 463, Horton, 1988: 208). From the study of changing blood glucose level of diabetic patients after walking on treadmill, it was found that after physical activity blood glucose level was decreased (Wannasiri,T.1989:D). Moreover, from the study of Huttunen, et al. (1989: 737), it was found that diabetic patients with NIDDM, in an experimental group that had regular exercise, spending 1 hour per week within the duration of 3 months, controlled blood glucose level and their health better than the other controlling group. From a study of Phonploy,V.(1996:35), it was found that nonexerciser resulted in high levels of blood glucose than those who exercised. This study is in accordance with the study of Hiranwan,S.(1995:56) who found that control diet, taking drugs following the physicians directions and exercise are related to controlling blood glucose levels. The reasons that most aging people are not interested in exercise that they think it unhealthy, they feel uncomfortable, or they are afraid that it may cause illnesses if they do some exercise (Tearnwong,V. 1997:122). They lack the time, they are too busy to do exercise which are mostly seen in the working person (Yamjunchai,V.1993:43). They believe that their daily work, such as house work, or selling thing is exercise. They are not interested in exercise, do not exercise by themselves because they are afraid that there will not be any people to help them if problems occur (Tearnwong,V.1997:121). They do not know the real benefits of exercise and do not know what types of exercise are suitable for them (Chusuwan,S.1997:12). Besides, they have limited area to do exercise, or it is far from their house and their houses are not suitable for exercise, for example, the area that they can exercise is too small (Yamjunchai,V.1993:43).

2.3 Exercise behavior of the elderly with diabetes mellitus

Exercise is essential for aging and should be performed continuously until it can be treated as a routine of anyone ' s life for a better health. Exercise is one of the health-promoting behaviors (Pender, 1996: 186). Exercise is generally defined as leisure-time physical activity. Exercise for fitness should compose of three stages: warm-up, endurance exercise and cool-down. Exercise may be evaluated by intensity, frequeney, duration, and type (Pender, 1996: 85). It is recommended that the appropriate exercise for elderly is aerobie, 15-60 minutes in length each time and 3-5 times per week (Pender, 1996: 204).

For exercise in the elderly with diabetes mellitus, the best method of exercise is aerobic exercise (Tuntiparachewa,K.& Tuntiparachewa K,1995:55). It is a continuous exercise without using high forces and requires a short period of time. So it is not harmful for the heart. Aerobic exercise requires 30 minutes so the body can control the blood glucose at a normal level, and the exercise has to be performed until glycosylation occurrs. It varies in activity and must be continued for at least 120 days (Benjawongguchai,A.,&Boonnak,S.1992 cited in Wansang,S.et al.1993:184). Exercises which are appropriate for the elderly with diabetes mellitus are walking, jogging, arm exercise, Taichi. These have to be done at least 3 times per week. Speedy walking is the easiest way to do aerobic exercise because there is no limitation of time or place. Exercise in the morning may get the best results, because it is a time of highest insulin resistance condition, however, time of exercise depends on a treatment program of each person and the lifestyle pattern of that person (Funnell & Merritt 1993:48). Nevertheless, an appropriate exercise time should be 60-90 minutes

after the meal because it can prevent hypoglycemia also (Graham C. 1991 cited in Funnell & merritt 1993: 48).

It is necessary to understand some evaluation of the exercises for developing a suitable exercise plan for the elderly with diabetes mellitus. This will help control diabetes efficiency.

The criteria in an evaluation of exercise in the elderly with diabetes mellitus are in the following: (Nittiyanun,V.1992,Worraharn,V,1998:130).

1. Type. Choose the type of exercise most suited to the age, health and occupation of the people exercise should be selected as preferred and practicable. The type of exercise which is appropriate for the elderly with diabetes is aerobic exercise. It is a continuous movement exercise such as stretching, speedy walking, jogging, swimming, bicycling. Exercise that is not suitable is speedy running, boxing, U-do, weight lifting, scuba and sports which required high energy in short-time.

2. Duration. The elderly with diabetes mellitus should spend time for exercise about 20-45 minutes. If it is less than this length, there will not be any effects to change metabolism. However, exercise longer than 20-45 minutes may be harmful to muscular and joint also. Activity should be started at 5-10 minutes then increasing every 2- 4 weeks. When the body is ready for higher exercise, the elderly and cardiac patients have to start gradual and improve slowly.

3. Warm up and Cool down. It is a preparation of muscular, joint and blood circulation for hard work and slowly decrease before step working. Particularly, aging or particularly disease person must practice strictly. Warm up and cool down should be spent about 5-10 min. This can prevent post-exercise hypotension which leads to unconscious. Warm up and cool down should be done slowly (Clark, 1994:

62), especially for anyone who never do the exercise before to prevent accident from exercise such as muscle strains and joint sprains.

4. Frequency. Exercise should be regularly done at least 3-5 times per week because the response of body to insulin decreases after stopping exercise more than 3 days and benefits in reducing blood glucose level after exercise will be effected about 12-72 hours only. Exercise should be done everyday if possible for the most benefits to the body.

5. Intensity. The intensity of exercise can be measured from oxygen uptake rate, estimate as the percent of VO_2 max. This measuring method is inconvenient because it requires some instruments. In the practical, maximum heart rate is used to measure the intensity by doing exercise until the intensity level reaches 65-80 percent of maximum heart rate means. This maximum heart rate equals 220 (beats per minute) minus by the age (years).

Target heart rate formula (American College of Sport Medicine, 1991: 20)

Target heart rate = specific intensity x (220-age)

Assumed specific intensity = 70 %

Age of exerciser = 60 years old

Target heart rate = (70/ 100) x (220-60)

= 112 times per minute

How many percent to assign the intensity of exercise, depends on physical fitness and basic health of exerciser. Aging or health problem person should start at 50 % of maximum heart rate and increase gradually. Pulse rate should be suddenly recorded when stopping exercise by a staff or exerciser counting for 10 seconds.

After the pulse is count for 10 seconds, the obtain number will be multiplied by 6 then the results is a pulse rate per minute.

Principle of exercise for the elderly with diabetes mellitus

1. Before starting exercise, the exerciser should have a medical clearance from the physician who has looked for, any abnormally or complication such as cerebrovascular accident, coronary artery disease, hypertension, nephropathy, complication of eyesight or infection. Patients who have blood glucose level before meal higher than 300 mg % have higher opportunity of having ketoacidosis in which it is a severe symptom of diabetics. The physician may not allow this patient to exercise.

2. Describe about type and method of exercise to physician for changing the correct medication dosage.

3. Exercise should be performed regularly at the same time of each day for good controlling of blood glucose.

4. Avoid exercise in the times as following, while stomach is empty, after getting up, the time that insulin is highly in action, ask the physician or pharmacologist for the prohibit duration of exercise. These mentioned times that blood glucose level decreases so there may be danger. If it is necessary to do some exercise in these times, exerciser should have some snacks, for example, juice, biscuit 2-3 pieces before exercise.

5. Avoid insulin injection in surface of muscular that involves exercise because during exercise, drug is absorbed quickly and it can cause hypoglycemia also.

6. Exercise in the first stage should be started from low level of exercise, and will be increased until it reaches the appropriate level.

7. Exercise that appropriate for the elderly with diabetes mellitus is walking and Taichi.

8. Avoid exercise which requires power competition or strengthen forces particularly in patients that has pathology of vascular, because it increases blood pressure which can lead to cerebrovascular accident.

9. During physical activity, exercisers should be observed about their headaches, blurred vision, shakiness that are the symptoms of hypoglycemia. If these symptoms present, exerciser must drink sweeten water or candy immediately and stop exercise.

Exercise that appropriate for the elderly with diabetes mellitus is walking. These exercises tend to decrease blood glucose level. If patients have regular exercise, it will support the ability in controlling of diabetes and lead to long-lifes.

3. Factors related to exercise behavior of the elderly with diabetes mellitus.

3.1 The Health -Promotion Model (HPM)

The Health-Promotion Model (HPM) uses a wellness orientation and focuses on what motivates individuals to increase their levels of well-being and self-actualization (Pender, 1996: 51). HPM is based on expectancy-value theory and social cognitive theory. The model provides an approach for explaining and predicting health-promoting behavior such as exercise . In 1996, the revised HPM was developed and consists of three parts: individual characteristics and experiences, behavior-specific cognitions and effects, and behavioral outcome (see Figure 3.1). Individual

characteristics and experiences have both an indirect effect through behavior-specific cognitions and a direct effect on behavioral outcome.

Individual characteristics and experiences compose of two variables, prior-related behavior and personal factors. Prior-related behavior is behavior in the past that has direct and indirect effects on future health behavior. Personal factors, including demographic and biological characteristics, can be variables selected for a particular health behavior(Pender , 1996: 67). Although personal factors are proposed to have direct influence on cognition processes and health-promoting behavior, some personal factors cannot be changed; therefore, they are seldom considered.

The six variables within behavioral-specific cognitions and effects are perceived benefits of action, perceived barriers to action, perceived self-efficacy, activity-related effect, interpersonal influences, and situational influences. These variables can be changeable by nursing actions; therefore, they are crucial for intervention (Pender, 1996: 67). The last principal factor is behavioral outcome which is considered to be the action phase. There are three stages to this: commitment to a plan, immediate competing demands and preferences, and health-promoting behavior. Health-promoting behavior is the last variable in the model and it is composed of health responsibility, exercise, nutrition, interpersonal relations, spiritual growth and stress management. Ultimate action of the HPM will eventually be directed toward a positive health outcome for the client.

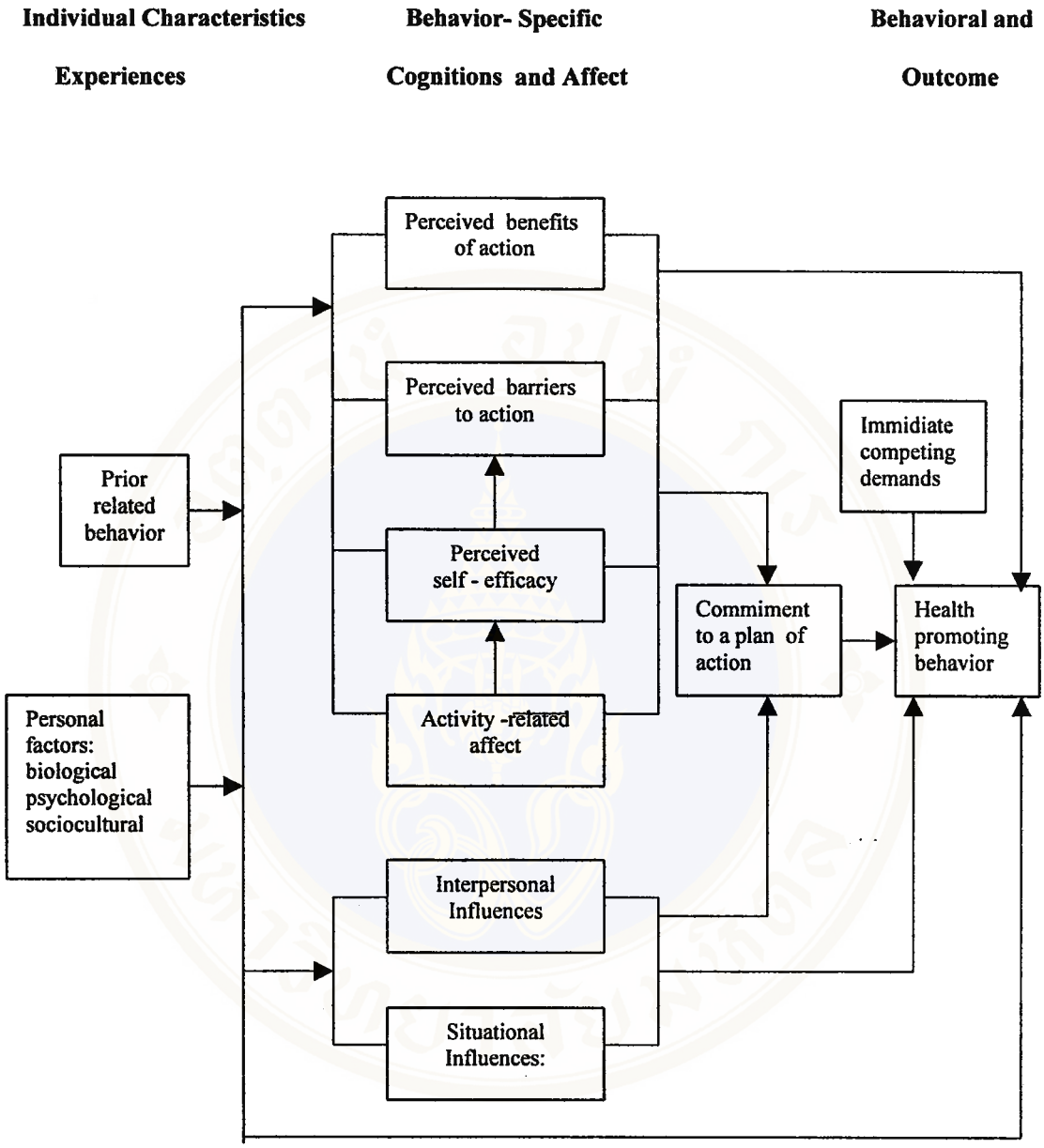

Figure 3.1 Revised Health Promotion Model

Source: Pender, N.J. 1996 Health Promotion in Nursing Practice (p.67)

Many researchers showed that individual characteristics of the sample including gender, income, educational level and duration of illness might influence the exercise activity of each person. Therefore, perceived benefits, situational influences, gender, income, education level and duration of illness are proposed to be the variables that can predict exercise behavior in this study.

3.2 Perceived benefits of exercise behavior in the elderly with diabetes mellitus

Perceived benefits is personal perceptions and cognition of performance of the behavior have beneficial to health (Pender, 1996: 68). Anticipated benefits of action are mental representations of the positive or reinforcing consequences of a behavior. Vicarious experience of outcomes from prior direct experience results or observations learning from other engaging in the behavior will be the main motivation to engage in the behavior. Perceived benefits of a person or outcome expectations in activities will have benefits to that person in changing his or her characters. Individuals tend to invest time and resources in activities with a high likelihood of increasing their experience of positive outcomes. Perceived benefits will support in the majority of the pattern of exercise behavior. Benefits from performance of the behavior can be divided into 2 parts as follows:

1. Intrinsic benefits is defined as the condition where the elderly with diabetes mellitus perceive that their health will improve after they do some exercise. They will do the exercise without hesitation and their exercise demands are intrinsic.These are internal motivations to reach targets, such as increasing alertness, decreasing the feeling of exhaustion, reducing the blood glucose level and preventing complications. Intrinsic benefits may be a motivation for continuously exercise.

2. Extrinsic benefits is defined as the condition where the elderly with diabetes mellitus realize the value of exercise behavior because they want extrinsic motivation such as monetary rewards, appreciative words or good social interaction. These are the motivations encouraging the elderly to exercise behavior. In the first

stage extrinsic benefits of health behavior may be a significant motivation in exercise behavior.

Pender (1996:68) classified perceived benefits as being in the first ordinal class from 6 classified classes of behavior-specific cognition. In the case of over 65 years old patients, they are forget-easily, a result from being a diabetic, (Wedchapat, S. 1995:182). The elderly diabetic will lose their memory but the aged will choose to remember something that they believe is valuable to themselves so they can memorize it and can carry it out correctly (Becker and Maiman, 1975: 20; Wedchapat, S. 1995:180). The way to promote healthy behavior in the diabetic elderly is to encourage them to perceived benefits of controlling their blood glucose level as much as possible (American diabetes association, 1997: s 61). In the study of Janz and Becker (1984: 28), it was found that the perceived benefits of treatment are related with participation in exercise the diabetic patients. According to the study of Hallal (1982: 137), it was found that diabetic patients perceived exercise to have benefits in controlling disease. Thus, they had good participation in treatment. Additionally, Ferguson, et al., (1989: 61) studied a group of 600 high school students and found that the perceived benefits of physical activity support the attention to health-promoting behavior about exercise and was given as a reason for continuing exercise. Tirrell & Hart (1980: 492), found that the perceived in effectiveness of exercise followed the treatment plan was related to the treatment.

3.3 Situational influences to exercise behavior in the elderly with diabetes mellitus

According to Pender (1996: 67-71), situational influences is personal perceptions and cognition of any situation or context that can faciliate or impede

health-promoting behavior. They include perceptions of options available, demand characteristics, and aesthetic features of the environment in which a given behavior is proposed to take place.

Kaplan ands Kaplan, individuals are drawn to and perform more competently in situations or environmental contexts in which they feel compatible rather than incompatible, related rather than alienated, safe and reassured rather than unsafe and threatened. Environments that are fascinating and interesting are also desirable contexts for the performance of health behaviors. Situations may directly affect behaviors by presenting an environment " loaded " with cues that trigger action. For example, a " no smoking " sign indicates that this place requires nonsmoking behavior (Pender, 1996: 71). If this situation is generally accepted, it can be a good persuation of nonsmoking.

The effects of environment to exercise behavior for the diabetic elderly are as follows: They are unable to get information useful to their healths, they take a deeper contact with their physician or nurse, which leads to their inability to receive the correct exercise instructions suitable for diabetes mellitus. This will cause some elderly to not exercise. In the study of Fisher, et al. cited in Ytterbery, et al., (1994: 168), it was found that the osteoarthritis patients that had an exercise program about 3 months, they will be able to do the exercise continuously during in program or situation as provided. But when the program was over, it led to a decrease in their exercise behavior. The study of Punyothee, D.(1996:56) found that the elderly in the elderly clubs had regular exercise because the elderly club planned an activity program, including getting new people to join in exercise. This will enable the elderly following the assigned program, to effect their exercise behavior.

3.4 Demographic factors that effect to exercise behavior of the elderly with diabetes mellitus.

Gender. Gender is a factor to clasify the physical differences of human beings. From the studying by Sakulpan, N.(1992:90) found that there was no difference in male and female self-care behavior. In a study of the exercise behavior of male and female, it was found that they had the same behavior as the nonexercise group apart from working, because they didn't know that exercise prevented complication to diabetics (Manogulanun,P. 1992:73). Siegler and colleagues (1997: 258, cited in Tumpenjit,S.1998:100) found that males prefer exercise while females prefer sedentary lifestyles. This is related to a study of Hiranwan, S.(1995:56) where it was seen that the male diabetic patients would take care of themselves in exercise better than the females. But from a study by Hunkittikul, S. (1996:143), it was found females have exercise behavior better than males. In a related study of Manogulanun, P. (1992:73) it was seen that females control diabetic better than males.

Income. Income is important and a useful statistic to indicate the economic and social conditions of the elderly diabetic. The high income person has a good chance in searching for something that is useful in caring for themselves (Pender,1982: 161). Raungrua, R. (1993:72), found that the elderly with high income had self-care activity better than the elderly with lower income. The same result was found in a study of Ford, et al. (1991), it revealed that the high income person spent lesiure-time for exercise more than the low income person. Yamjunchai, V.(1993:43), found that income was a variable which could predict the exercise behavior in the elderly. According to Sakulpan, N. (1992:B), it was found that family income associatd with self-care behavior in the diabetic patients. On the other hand, a

studying of Siritrungsri, B. (1990:199) found that income is not related to self-care behavior of the diabetic patients.

Educational level. Education is an indicator of ability in thinking. Those who are able to well understand health information, have a good level of activity for self-care (Orem, 1985: 120, 175), and they have a better chance of acquiring useful methods to encourage health activity than lower educational levels(Pender,1987:163). From the studying by Dumrongvanit, S. (1993:B), it was found that educational level has a positive relationship to exercise behavior. Lusk, Kerr and Ronis (1995: 22) found that high educated persons have exercise behavior higher them lower educated persons. Besides, education level has a positive relationship to health-promoting behavior in the diabetic elderly (Kasekan, K. 1998:81). This is in contrast to a study of Sakulpan, N. (1992:90) which found that educational level had a negative relationship to the diabetic patients.

Duration of illness. Duration of illness is an important factor to health activity. Patients in the first period may lose confidence in any action related to health because they lack knowledge and experience. The patient who has a short duration of illness may be uncertain and can not change they medical treatment and behavior. Duration of illness of elderly with diabetes mellitus is related to their learning and self-care. A long period of illness will cause improvement in their self-care. Sakulpan, N. (1992:B), found that the duration of illness was related to the self-care behavior in the diabetic patient. But from a study by Sumpunyu (1996:B), it found that the duration of illness is not related to health-promoting behavior.

In summary, exercise behavior has an effect on the health status of the elderly with diabetes mellitus. Health-care providers should be aware of helping, supporting

and promoting the elderly with diabetes mellitus to increase their concern regarding to exercise behavior in order important of the exercise and the to maintain and enhance their health.

CHAPTER III

METHODOLOGY

Research Design :

In this study, a descriptive design was used to determine the contribution of perceived benefits, situational influences, gender, income, educational level, and duration of illness to exercise behavior of the elderly with diabetes mellitus.

Population and Sample

Population: The target population of this study consisted of either male or female, 60 years of age or over, diagnosed by doctor as having diabetes mellitus for at least 6 months. They must perform exercise activities and live in the Ratchaburi Province.

Sample : The researcher randomly sampled from the above population by using two steps.

In the first step, Muang District, Damnoensaduak Districts and Photharam District were randomly sampled from out of nine Districts and one Sub-Commune in Ratchaburi Province.

In the second step, three elderly clubs from each of the three Districts, taken in the first step, were randomly sampled.

The subjects in this study were chosen by accidental sampling from qualified elderly who came to the elderly club. According to the criterion of Ackerman (1981),

the sample size for the stepwise multiple regression analysis is twenty times the number of all variables:

$$n = 20k$$

where n = number of sample groups

k = number of all variables

There were seven variables in this study: perceived benefits, situational influences, gender, income, educational level, duration of illness and exercise behavior. Based on the above criterion ,one hundred and forty subjects.

Nine elderly clubs and number of subjects from the three districts were selected in this study as follow:

1 . Muang district

elderly club at Central Ratchaburi Hospital 25 subjects

elderly club Boromarajonani College of Nursing, Ratchaburi 35 subjects

elderly club Hinkong Sub-District 8 subject

2 . Damnoensaduak District

elderly club at Damnoensaduak Hospital 30 subjects

elderly club Donpai Sub-District 10 subjects

elderly club Buangaram Sub-District 3 subjects

3 . Photharam district

elderly club at Bangtanode Sub-District 10 subjects

elderly club at Bansing Sub-District 9 subjects

elderly club at Donsai Sub-District 10 subjects

Setting

Ratchaburi province is located in the western part of Thailand. It is far from Bangkok about 100 kilometers. The number of population in this province is 813,293 peoples and 91,056 of are elderly. Ratchaburi consists of nine districts and one Sub-Commune District which are Muang, Jombueng, Damnoensaduak, Bangphae, Banpong, Photharam, Paktoe, Watprang, Soenpueng Districts and Banka Sub-Commune District. For this research, the sample of elderly clubs which is selected by the researcher are Muang Damnoensaduak and Photharam District. Elderly clubs are normally set up in each Sub-District and activities of these clubs are in the responsibility of health care provider and the elderly in that Sub-District.

Members of most elderly club are 60 years old and over. There are 50-1,000 members in each club. The activity set in the club is done within the period of 09.00-12.00, starting from daily praying and follows by exercise. Most clubs assign the exercise activity by doing stretching for 15-30 minutes. After that, it will be the briefing for health knowledge, the process of the clubs and other matters. There are some entertainment and having some food together. Moreover, there are another activities in some clubs such as travelling. The target of setting elderly club in order to enable the elderly having good healths and having the activity with others.

Instrumentation

Structured questionnaires were used for the interview to collect data. It composed of four parts.

Part 1: Characteristics data. This information included gender, duration of illness, age , income , educational level, marital status , history about exercise and health status.

Part 2: Exercise behavior. This measure was developed by the researcher based on the literature review and Wangkaoom, C.'s instruments (1997: 96). It assesses of the diabetic elderly's exercise behavior, it compose of warm up and cool down, indication in exercise, and preparation before exercise. It contained nine items. The answer were coded on a 1 to 4 scale as follow:

Regularly practice	=	4
Often practice	=	3
Sometimes practice	=	2
Never practice	=	1

Explanation of the score is in the following description.

Regularly practice means the elderly with diabetes mellitus performs the activity regularly every day or at least three times per week.

Often practice means the elderly with diabetes mellitus performs the activity often or two times per week.

Sometimes practice means the elderly with diabetes mellitus performs the activity sometimes or one time per week.

Never practice means the elderly with diabetes mellitus never performs the activity.

Interpretation of the average score is as follow:

1.00-2.50 means the exercise behaviors in the elderly with diabetes mellitus is

poor.

2.51-3.50 means the exercise behaviors in the elderly with diabetes mellitus is fair.

3.51-4.00 means the exercise behaviors in the elderly with diabetes mellitus is good.

Part 3: Perceived benefits questionnaire was developed by the researcher according to Pender's Health Promotion Model (1996: 68). This is assessment of the diabetic elderly's perception of benefits to their exercise behavior. It consisted of eleven items, positive statement in total and was divided into two categories:

Intrinsic benefits (items 1 to 4)

Extrinsic benefits (items 5 to 11)

Score rating for the answers of perceived benefits is:

Strongly agree = 3

Agree = 2

Disagree = 1

Explanation of the score is in the following description.

Strongly agree means the elderly with diabetes mellitus has totally agree in that item.

Agree means the elderly with diabetes mellitus has partially agree in that item.

Disagree means the elderly with diabetes mellitus do not agree in that item.

Interpretation of the average score is as followed.

1.00-1.50 means The diabetic elderly perceived benefits to exercise behavior is low.

1.51-2.50 means The diabetic elderly perceived benefits to exercise behavior is moderate.

2.51-3.00 means The diabetic elderly perceived benefits to exercise behavior is good.

Part 4: Situational influences questionnaire was developed by the researcher according to Pender's Health Promotion Model (1996: 70). It measured the perception of situational influence to exercise behavior of the elderly with diabetes mellitus. The questionnaire consisted of eleven items and was divided into two categories:

Option available (items 1 to 6)

Environment (items 7 to 11)

The questionnaire consisted of four negative statements (items 5,6,8,and 11) and seven positive statements (items 1,2,3,4,7,9,and 10). Rating scores for the response choice of situational influences are:

		Positive	Negative
Strongly agree	=	3	1
Agree	=	2	2
Disagree	=	1	3

Explanation of the score is in the following description.

Strongly agree means the elderly with diabetes mellitus has totally agree in that item.

Agree means the elderly with diabetes mellitus has partially agree in that item.

Disagree means the elderly with diabetes mellitus do not agree in that item. Interpretation of the average score is as followed.

1.00-1.50 means The diabetic elderly perceived situational influences to exercise behavior is low.

1.51-2.50 means The diabetic elderly perceived situational influences to exercise behavior is moderate.

2.51-3.00 means The diabetic elderly perceived situational influences to exercise behavior is good.

Validity and reliability

The questionnaires were content validated by five experts. These experts consists of one medical doctor who is specialized in geriatric rehabilitation , one medical doctor who is specialized in endocrine, two nursing instructors who had experienced in using Pender's Health Promotion Model, one nursing instructor who is an expert in geriatric nursing (list in appendix A).

After content validation, these questionnaires were considered in terms of the adaptability and utility in the elderly with diabetes mellitus population. The reliability of the questionnaires were next tried out with 30 qualified elderly with diabetes mellitus in Pongsawai elderly club, Ratchaburi Province. Thereafter, the reliability of the in instruments was calculated by using Cronbach's Alpha Coefficient (luecha Y, 1997: 127) formula.

$$\alpha = \frac{n}{n-1}\left[\frac{1-\sum Si^2}{St^2}\right]$$

when α = coefficient of consistency

n = number of item in the instrument

$\sum Si^2$ = summation of scores in each item

St^2 = total variation of score in the instrument

The results obtained for reliability of the instruments are as follows;

Exercise behavior questionnaire = 0.78

Perceived benefits questionnaire = 0.85

Situational influences questionnaire = 0.76

Data collection

All data were collected by the researcher using the following steps:

1. A letter of permission obtained from Faculty of Graduate Studies Mahidol University, was sent to the director of Boromarajonani College of Nursing, Ratchaburi, Central Ratchaburi Hospital, the director of Damnoensaduak Hospital and the head of Provincial Public Health office, Ratchaburi Province.

2. After receiving permission, the researcher met the director of Boromarajonani College of Nursing, Ratchaburi, the director of Central Ratchaburi Hospital, the director of Damnoensaduak Hospital and head of Provincial Public Health office, Ratchaburi Province to explain the objective of this study, procedures and asked for cooperation to collect data.

3. The researcher then met the elderly with diabetes mellitus at elderly club in Ratchaburi province during 7.00 am. to 13.00 pm. in January and February 2000 according to the following schedule:

Boromarajonani College of Nursing, Ratchaburi	on 13 January and 10 February 2000;
Central Ratchaburi Hospital	on 14 January and 11 February 2000;
Buangaram Sub-District	on 20 January 2000;
Bansing Sub-District	on 24 January 2000;
Donpai Sub-District	on 25 January 2000;
Damnoensaduak Hospital	on 26 January and 16 February 2000;
Bangtanode Sub-District	on 4 February 2000.
Hinkong Sub-District	on 8 February 2000.
Donsai Sub-District	on 9 February 2000.

4. The researcher collaborated with nurses and other health care providers attending the elderly clubs to find the best times for the interviews. These time were determined to be before activity, during break and at the end of activities. In case that the interview could not be finished within that day, the researcher need to follow them at home.

5. Then, the researcher checked the appropriate medical records to find the qualified subjects. The eligible subjects were approached and assessed in order to gain their agreement to participate in this study.

6. The researcher introduced herself in front of the meeting room, informed them of the objective of this study and their consent was need for participation.

7. After receiving the cooperation of the samples, the assistant researcher scheduled the interviews at a mutually agreeable time. Then the researcher began to interview the subject in a private room to collect characteristics data, followed by exercise behavior, perceived benefits, and situational influences, respectively. The interview took about 30-35 minutes for each subject.

8. The researcher checked the data for completeness after finishing the interview and suggest subjects who had inappropriate exercise behavior. Then prepared all completed questionnaires for data analysis.

Protection of the human subjects

Before collecting the data, the researcher provided the consent form (see Appendix B) to the subjects for protection of the human subjects. Some subjects might experience temporary discomfort when discussing about their felling and their own situation. The participants were free to refuse to answer any question they did not want to discuss. However, there was no cost to them nor would they receive any payment. During the interview, participants could ask question or stop the interview at any time. Due to the fact that some subjects with diabetes mellitus might not be able to read the consent form, the researcher read the consent form to them.

Data Analysis

The data analysis was carried out by using SPSS for windows program, a statistics package, with a significant level of 0.05 in the following steps:

1. Compute the frequency distribution and percentage of the characteristics

data.

2. Compute percentage, arithmetic mean and standard deviation of exercise behavior, perceived benefits and situational influences scores.

3. Perform the Pearson Product Moment Correlation Coefficient to determine the relationship of perceived benefits, situational influences, gender, income, educational level, and duration of illness.

4. Calculate the multiple correlation coefficient among perceived benefits, Situational influences gender, income, educational level, and duration of illness.

5. Analyze the predictors power of exercise behavior by using the stepwise multiple regression technique. Since gender is a nominal scale, it had to be changed to be a dummy variable using the following code: male is 1 and female is 0.

CHAPTER IV

RESULTS

The objective of this descriptive research was to study the exercise behavior and the factors that influenced exercise behavior. The proposed factors were perceived benefits, situational influences, gender, income, educational level, and duration of illness. The subjects were 140 elderly with diabetes mellitus recruiting from the elderly clubs at Central Ratchaburi Hospital, Boromarajonani College of Nursing, Ratchaburi, Hinkong Sub-District, Damnoensaduak Hospital, Donpai Sub-District, Buangaram Sub-District, Bangtanode Sub-District, Bansing Sub-District, and Donsai Sub-District.

The results are presented in five parts:

1. Characteristics data of the elderly with diabetes mellitus.
2. Exercise behavior of the elderly with diabetes mellitus.
3. Perceived benefits of the elderly with diabetes mellitus.
4. Situational influences of the elderly with diabetes mellitus.
5. Power of prediction of the study variables to determine the exercise behavior of the elderly with diabetes mellitus.

Part 1 Characteristics data of the elderly with diabetes mellitus.

Table 1 Number and percentage of subjects categorized by demographic characteristics (n = 140).

Demographic characteristics	number	percentage
Gender		
Female	99	70.7
Male	41	29.3
Age (Year)		
60 - 75	132	94.3
>75	8	5.7
Marital Status		
Single	10	7.1
Married	79	56.4
Widowed	47	33.6
Separated	3	2.1
Divorced	1	0.7
Educational level		
No education	12	8.6
Primary school	74	52.9
Secondary school	20	14.3
Certificate / Diploma	26	18.5
Bachelor degree or above	8	5.7
Income (Baht)		
< - 5000	104	74.3
5001 - 10000	21	15
10001 - 15000	5	3.6
15001 - 20000	7	5
> 20000	3	2.1

Table 1 Number and percentage of subjects categorized by demographic characteristics (n = 140). (continued)

Demographic characteristics	number	percentage
Income sufficiency		
Adequate	103	73.6
Inadequate	37	26.4
Their reponsibility		
Occupation (Gardening, Farmer , Trade)	43	30.7
house work	40	28.6
staying home without work	32	22.9
taking care of grandchildren	25	17.9

Table 1 showed that there were more female (70.7 %) subjects than male (29.3 %). Most subjects (94.3 %) were between 60-75 years of age. The majority of the subjects were married (56.4 %). More than half of the subjects (52.9%) had primary school education. Most of subjects had monthly income less than 5000 Bahts (74.3 %) but they reported having adequate income (73.6 %). Most subjects had responsibility to do occupation (30.7 %) and house work (28.6 %).

Table 2 Number and percentage of subjects categorized by exercise characteristics (n = 140).

Exercise characteristics	number	percentage
Exercise experience		
Yes	70	67.1
No	46	32.9
Type of exercise before having DM (n = 94)		
Walking	70	49.96
Arm exercise	9	6.42
Running	9	6.42
Taichi	4	2.84
Stretching	2	1.42
Type of exercise in present		
Walking	95	67.9
Arm exercise	27	19.3
Running	12	8.6
Taichi	5	3.5
Bicycling	1	0.7
Frequency of exercise (time / week)		
1	9	6.4
2	6	4.3
3	18	12.9
> 3	107	76.4
Duration (minutes)		
<15	56	40
15 - 20	34	24.3
21 - 40	35	25
>40	15	10.7

Table 2 showed that 67.1 % of subjects had prior exercise experience. Walking (49.96 %) was a major type of exercise that most subjects performed in the past. When asking type of exercise at present, 67.9 % of the subjects reported walking. The majority of subjects exercised more than three times a week (76.4 %). But the duration of practice was less than fifteen minutes (40 %).

Table 3 Number and percentage of subjects categorized by health conditions (n = 140).

Health conditions	number	percentage
Duration of illness with DM (Year)		
1-5	70	50
6-10	42	30
11-15	14	10
16-20	9	6.4
>20	5	3.6
Physical problem		
No	29	20.7
Yes	111	79.3
- joint pain	60	42.86
- heart disease	22	15.70
- hypertension	20	14.28
- foot ulcer	6	4.28
- pulmonary	3	2.14
Blood glucose level (mg%)		
Low (80 - 120)	41	29.3
Normal (121 - 180)	70	50
High (> 180)	29	20.7

Table 3 Number and percentage of subjects categorized by health conditions (n = 140). (continued)

Health conditions	number	percentage
Methods of treatment		
- Medication with diet control and exercise	80	57.18
- Medication only	37	26.4
- Medication and diet control	13	9.29
- Medication and exercise	9	6.43
- Diet control only	1	0.7

Table 3 showed that half of subjects have had diabetes mellitus for of 1 to 5 year. Seventy-nine percent of them had other physical problems. Of these, 42.86 % of subjects' physical problems were joint pain. Most of them had blood glucose level in the range 121-180 mg % (50 %), which was an indication of a fair degree of diabetes mellitus control. Medication with diet control and exercise was the most methods of treatment (57.18%).

Part 2 Exercise behavior of the elderly with diabetes mellitus .

Table 4 Mean, standard deviation and mean interpretation of exercise behavior score categorized by each item (n = 140).

Description of exercise behavior	$\bar{x}$	SD	Interpretation
Overall of exercise behavior	**3.62**	**0.70**	**Good**
- stop suddenly when had abnormal.	3.94	0.27	Good
- wear comfortable shoe.	3.86	0.53	Good
- take a rest after exercise.	3.83	0.52	Good
- exercise following your schedule.	3.79	0.52	Good
- exercise before taking drug.	3.48	0.96	Fair
- wear suitable cloth.	3.47	0.96	Fair
- warm-up before exercise.	3.44	1.01	Fair
- prepare yourself to be ready to exercise.	3.41	0.97	Fair
- cool-down after exercise.	3.34	1.00	Fair

Table 4 showed that the overall mean of exercise behavior score was at the good level ($\bar{x}$ = 3.62, SD = 0.70). Means of the exercise behavior in each item were mostly at fair level. Only four items were at good level, "stop suddenly when had abnormal ", " wear comfortable shoe ", " take a rest after exercise ", " exercise following your schedule " ($\bar{X}$ = 3.94 ,SD = 0.27; $\bar{X}$ = 3.86 SD = 0.53 ; $\bar{X}$ = 3.83 SD = 0.52; and $\bar{X}$ = 3.79 ,SD = 0.52), respectively.

Part 3 Perceived benefits of the elderly with diabetes mellitus.

Table 5 Mean, standard deviation and mean interpretation of perceived benefits score categorized by each item (n = 140).

Description of perceived benefits	$\bar{x}$	SD	Interpretation
Overall perceived benefits	**2.81**	**0.36**	**Good**
Overall extrinsic benefits.	**2.86**	**0.31**	**Good**
- proud to be the role model in exercise.	2.91	0.28	Good
- proud to advice the others.	2.90	0.30	Good
- don 't be the burden to family.	2.89	0.32	Good
- to be praised to exercise.	2.86	0.34	Good
- meet new friends.	2.84	0.38	Good
- join activities with other.	2.83	0.38	Good
- decrease medication expenses.	2.80	0.40	Good
Overall intrinsic benefits.	**2.72**	**0.48**	**Good**
- makes me feel relaxed.	2.82	0.40	Good
- makes me pleasurable feelings.	2.78	0.52	Good
- improving strength of muscles and joints.	2.75	0.51	Good
- decrease taking drugs.	2.54	0.63	Good

Table 5 showed that each item of the perceived benefits had a mean score at good levels both extrinsic benefits and intrinsic benefits. The overall mean was 2.81 (SD = 0.36).

Part 4 Situational influences of the elderly with diabetes mellitus.

Table 6 Mean, standard deviation and mean interpretation of situational influences score categorized by each item (n = 140).

Description of Situational influences	$\bar{x}$	SD	Interpretation
Overall Situational influences	**2.69**	**0.45**	**Good**
Overall Option available	**2.71**	**0.42**	**Good**
- practice following useful advice.	2.92	0.30	Good
- expect as having an appropriate place that will exercise regularly.	2.91	0.29	Good
- do exercise even having hard work.	2.89	0.31	Good
- improve exercise when you observe health problem in other people.	2.59	0.66	Good
- decrease blood glucose when doing appropriate exercise	2.49	0.56	Moderate
- change the methods of exercise following blood glucose.	2.44	0.81	Moderate
Overall environment	**2.67**	**0.49**	**Good**
- expect beautiful environment will improve exercise.	2.93	0.28	Good
- expect support from organization will improve exercise.	2.84	0.39	Good
- do exercise even having responsibility.	2.72	0.54	Good
- do exercise when having music.	2.45	0.80	Moderate
- do exercise even there far from home.	2.44	0.70	Moderate

Table 6 showed that the overall mean of situational influences was at the good level ($\bar{X}$ = 2.69, SD = 0.45). The mean of option available and environment were at good level ($\bar{X}$ = 2.71, SD = 0.42 and $\bar{X}$ = 2.67, SD = 0.49). Means of the situational influences in each item had the good level: only four item was as the moderate level: " decrease blood glucose when doing appropriate exercise ", " do exercise when having music", "do exercise even there far from home ", "change the methods of exercise following blood glucose". ($\bar{X}$ = 2.49, SD = 0.56; $\bar{X}$ = 2.45, SD = 0.80; $\bar{X}$= 2.44, SD = 0.70, and $\bar{X}$ = 2.44, SD = 0.81), respectively.

Part 5 Power of prediction of the study variables to determine the exercise behavior of the elderly with diabetes mellitus.

Table 7 Correlation coefficient among predictors and between predictor and criteria showed in correlation matrix (n = 140).

Variables	1	2	3	4	5	6	7
1 gender	-	-	-	-	-	-	-
2 income	.338**	-	-	-	-	-	-
3 educational level	.150	.266**	-	-	-	-	-
4 duration of illness	.161	.032	.150	-	-	-	-
5 perceived benefits	-.112	-.294**	.181*	.003	-	-	-
6 situational influences	-.134	-.369**	.047	-.042	.949**	-	-
7 exercise behavior	-.133	-.309**	.165	-.014	.977**	.974**	-

*p< .05 **p< .01

Table 7 showed that perceived benefits, situational influences had positive relationship with exercise behavior at a statistically significant level of 0.10 (r = 0.977, and r = 0.974 respectively). Income had negative relationship with exercise behavior at a statistically significant level of 0.01 (r = -309). In addition, each predictor showed a relationship with other predictor as follows:

Gender showed a positive relationship with income at a statistically significant level of 0.01 (r = 0.338).

Income showed a positive relationship with educational level at a statistically significant level of 0.01 (r = 0.266). In contrast, a negative relationship of

perceived benefits and situational influences was found at a statistically significant level of 0.01 (r = -. 294 and r = -. 369 respectively).

Educational level showed a positive relationship with perceived benefits at a statistically significant level of 0.05 (r = 0.181).

Perceived benefits showed a positive relationship with situational influences at a statistically significant level of 0.01 (r = 0.949).

Table 8 Multiple correlation coefficients between predictors and exercise behavior of the elderly with diabetes mellitus by stepwise multiple regression analysis.

Steps Variables	Multiple R	R^2	F change	b	Beta	t
1 perceived benefits	.977	.956	2963.239***	1.890	.977	54.436***
2 perceived benefits				1.036	.536	13.007***
situational influences	.988	.977	2907.121***	.726	.466	11.306***
3 perceived benefits				.883	.456	10.568***
situational influences				.839	.538	12.656***
educational level	.990	.980	2180.768***	.03062	.057	4.212***
Constant (a) = -1.206			Overall F = 2180.768			

***p < .001

Table 8 showed that in step 1 of the stepwise multiple regression analysis, perceived benefits was the first selected predictor to the equation. It accounted for 95.6 % of the variability in exercise behavior at a statistically significant level of 0.001.

In step 2, the predictor selected for the equation was situational influences. It explained an additional 97.7 % of the variability in exercise behavior at a statistically significant level of 0.001.

In step 3, the last predictor selected for the equation was educational level. It was able to predict the exercise behavior up to 98 % of the variability in exercise behavior at a statistically significant level of 0.001. However, when adding the other predictors in further steps of the analysis, it was found that the prediction was not significantly different. The analysis was then terminated in step 3.

CHAPTER V

DISCUSSION

This study examined perceived benefits, situational influences, gender, income, educational level and duration of illness as the predictors of exercise behavior of the elderly with diabetes mellitus. The researcher provides discussion according to the objectives of the study as follows:

1. Investigation of exercise behavior in the elderly with diabetes mellitus.

This study showed that the overall mean of exercise behavior was at the good level ($\bar{X}$ = 3.62, SD = 0.70). All subjects in this study were the member of the elderly clubs in which they had a strong support to encourage them for practicing in exercise. In addition, most of the subjects (67.1%) had experienced in exercise before having diabetes mellitus. This could encourage the elderly to improve their exercise behavior. When considering to the characteristics of subjects, most subjects(75.7%) were in the age group between 60 to 75 years old. People at these ages are usually healthy enough to work or exercise. Furthermore, they have to handle some routine work at home such as, gardening, farming that made them earn enough money for their living. This could effect to a well planning and time management for practicing exercise. Fifty percent and 29.3% of the subjects had normal to low level of blood glucose. This result showed that most of them did not have any problem that could inhibit their exercise. According to the study by Hunkittikul,S. (1996: 106), it found

that elderly clubs and their membership had positive relationship with exercise activity at a significant level of 0.05. Elderly people who were members of elderly clubs had better exercise behavior than some elderly who were not. Furthermore, elderly clubs had coordination with the health leader from a health care center. The health leader provide health education and basics exercise. As a result the elderly could following their leaders in practicing exercise. Elderly clubs in Ratchaburi province provided different exercise activities depending on the leaders and their member's interest. Even though the elderly clubs in Ratchaburi province provided activity only one time per month or less. They still have exercise activity to be practiced at home. The elderly found that they had good results from exercise. During the interviews, the subjects said that they gained improves health and felt relax after exercise. In addition, some elderly people found that exercise reduced their blood glucose level also, which produced a good level mean score of exercise for the elderly with diabetes mellitus. Furthermore, walking and arm exercises were the most common practices. These exercises were of the isotonic or aerobic type, which were suitable for the elderly with diabetes mellitus because this type of exercise helps to decrease blood glucose level (Wansang,S. et al.1993:184). From a study by Kasekan,K.(1998:77), it was found that most of the elderly with diabetes mellitus had exercise activity, because they perceived that exercise enabled a decrease in blood glucose level.

When considering each item of exercise behavior, most subjects had exercise at a fair to good level. The study found that the subjects had exercise behavior in good level about " stop suddenly when had abnormal ", " wear comfortable shoe ", " take a rest after exercise ", and " exercised by following your schedule " ($\overline{X}$ = 3.94, SD = 0.27; $\overline{X}$ = 3.86, SD = 0.53; $\overline{X}$ = 3.83, SD = 0.52; and $\overline{X}$ = 3.79, SD = 0.52),

respectively. From the interviews, most subjects said that they had to rest because of sudden tiredness or stop exercise if they had abnormal symptoms, and they were afraid of serious problems to their physical health from hypoglycemia. Most subjects had known that during exercise they have to wear shoes because they were afraid that they might get foot ulcers. Most of them wore sandals when they exercised because they wore them for activities in the house during the day. They liked to exercise early in the morning before breakfast. Thus, the subjects need to rest and have some drinks after exercise. They decided to do exercise at this period of time because they are free.

Besides , it was found that the subjects had a fair level of exercise behavior in relation to " Exercise before taking drugs ", wear suitable clothing ", " warm-up before doing exercise ", " prepare yourself to be ready to exercise ", " cool-down after exercise " ($\bar{X}$ = 3.48, SD = 0.96; $\bar{X}$ = 3.47, SD = 0.96; $\bar{X}$ = 3.44, SD = 1.01; $\bar{X}$ = 3.41, SD = 0.97,and $\bar{X}$ = 3.34 , SD = 1.00), respectively. From the interviews, most subjects gave the reason that they have not been told by the doctors to avoid taking drugs after immediately finished the exercise. Therefore, they never paid attention to the appropriate time for taking drugs. Most of them wear waist cloth and sarong which was uncomfortable for exercise. In this study was found that most of them did not exercise effectively in term of duration, warm-up, cool-down. The reason might be that the subjects received information about exercise from doctors and health care providers but they were not explained the principles and steps of exercise. Moreover, most subjects said that they will do exercise based on their health status. If they have abnormal symptoms or weaknesses, they will not perform exercise activity. For this reason, they were afraid of serious problems to these health. The types of exercise in

most of the elderly clubs were stretching. Sometime, the clubs might have health care professionals at near by hospital, who became their leaders in exercise activity including giving recommendations. Besides, exercise was the main activity, which was important to the elderly club. This study showed that the overall mean exercise behavior was at the good level. Pinyocum, N. et al. (1993: 18) found that the elderly who had good self-care they had regular physical exercise (61.40 %) and walking was the main practice. Moreover, Kasekan, K.(1998: 77) found that the most diabetic elderly had exercise behavior in the good level.

2 . Investigation of perceived benefits and situational influences of the elderly with diabetes mellitus.

Perceived benefits: The mean overall perceived benefits was at the good level ($\bar{X}$ = 2.81, SD = 0.36). This result indicated that most subjects had perceived the benefit of exercise to health condition of the elderly. In addition, 67.1% of subjects had experienced in exercise before having diabetes mellitus. It probably effect to the elderly perception toward benefits of exercise. Furthermore, being a members of the elderly club, they could gained knowledge about benefits of exercise from their leaders in exercise activity.

Rosenstock said that any person who perceived the benefits of health behavior would have less chance of getting sick. According to the study by Kasekan, K. (1998:78) perceived benefits of health-promoting behavior in the diabetic elderly influenced health-promoting behavior. Sidney & Shephard cited in Pender (1987) that a person who came to join activities, would pay a good attention to themselves, including they could recognize the benefits of exercise.

Extrinsic benefits: The subjects had extrinsic benefits at a good level ($\bar{X}$ = 2.86, SD = 0.31). When considering each item, most subjects had extrinsic benefits at a good level in all of them; these were " proud to be the role model in exercise ", " proud to advice the others ", " don't be the burden to family ", " to be praise to exercise ", " meet new friends ", " to join activities with other ", "to be decrease cost " ($\bar{X}$ = 2.91, SD = 0.28; $\bar{X}$ = 2.90, SD = 0.30; $\bar{X}$ = 2.89, SD = 0.32; $\bar{X}$ = 2.86, SD= 0.34; $\bar{X}$ = 2.84, SD = 0.38; $\bar{X}$ = 2.83, SD = 0.38; and $\bar{X}$ = 2.80, SD= 0.40), respectively. The elderly clubs that will motivate the elderly by admiring their exercise behavior when they can do it well. Some elderly who have good exercise will be selected to be an exercise leader. This will make the elderly pleased. Moreover, they had participated in activities of the elderly clubs. When they meet, they will exchange experiences with others. They can exercise actively together also. This social interaction is considered as a benefits derived from doing exercise. In Gillette's study indicated the benefits of social support that could contribute to the presence of continuously practice exercise. Furthermore, when the economy was expanding it made the highly cost of medical treatment. So the diabetic elderly began to seek useful knowledge, such as perceived benefits of exercise, which could help them to have good life and to reduce their medical expenditure.

Intrinsic benefits: The subjects had intrinsic benefits at a good level (X = 2.72, SD = 0.48). When considering each item, intrinsic benefits had at a good level in all of them; these were " make me feel relaxed ", " makes me pleasurable feelings ", " improving strength of muscles and joints ", " decrease taking drugs " ($\bar{X}$ = 2.82, SD = 0.40; $\bar{X}$ = 2.78, SD = 0.52; $\bar{X}$ = 2.75, SD = 0.51; and $\bar{X}$ = 2.54, SD= 0.63), respectively. They are associated with club activities and take medical treatment

regularly. When they are in doubt, they can ask for consultation from the doctor and the nurse, most subjects can obtain knowledge about their disease and exercise. Intrinsic benefits of exercise certainly related pleasurable feelings (Gillette,1988),decreased joint stiffness (Toliver & Scott,1990), and a sense of well being which are the most important benefit to the persons who participated in regular exercise over a long period of time (Muhlenkamp & Sayles,1986). Ferguson and Colleagues (1989) indicated that people will live longer if they exercise.

Situational influences: The overall mean situational influences were at the good level ($\bar{X}$ = 2.69, SD = 0.45). The subjects were members of an elderly club. The club environment effects many activities of the elderly. When the elderly join in the elderly club, most of them will concentrate on their health and they have some motivation to perform many activities with other members. According to the study by Punyothee, D. (1996: 56), it was found that the elderly who joined in the elderly club where regular exercise was practiced. In addition, the club had a planned activity program in the exercise. This will enable the elderly to follow an assigned program. Green & Kreuter (1991: 161) cited that environment was a leading factor which lead to improvement in health-promoting behavior. Inkoom,G.(1998:71) it was found that the elderly with coronary artery disease had a good level in the overall score of situational influence. Situational influence of exercise behavior consists of the following 2 parts:

Option available : The subjects had the mean score of option available at the good level ($\bar{X}$ = 2.71, SD = 0.42). When considering each item; these were " practice following useful advice ", " expect as having an appropriate place you will exercise regularly ", " do exercise even having hard work " , " improve exercise

when you observe health preblem in other people" ($\bar{X}$ = 2.92, SD = 0.30; $\bar{X}$ = 2.91, SD = 0.29; $\bar{X}$ = 2.89, SD = 0.31; and $\bar{X}$ = 2.59, SD = 0.66), respectively. Most subjects were members of the elderly club and they pay attention to their health. In the interview, it was apparent that before having diabetes mellitus 67.1% of the subjects had exercise experience. Most of them found that their exercise was beneficial to their health. After having diabetes mellitus, they performed exercise activity following the recommendations of the doctor, because they knew that exercise was the one option available, which can control disease and prevent complications in diabetes mellitus. Most subjects selected to exercise at home in preference to other places because the home of the subjects had wide areas, where there was a suitable place to exercise. Although they still worked and did housework, this did not interfere with the exercise. From the interviews, most of the subjects must continue the exercises, control their diet intake and taking drugs, because it effect to health status and they realize in seeing other people who had amputations. They were afraid to loss their abilities to work.

The mean score of each item was at the moderate level; these were " expect appropriate exercise would decrease blood glucose ", " change the methods of exercise following blood glucose " ($\bar{X}$ = 2.49, SD = 0.56, and $\bar{X}$ = 2.44, SD = 0.81). The subjects knew the benefits of exercise would reduce blood glucose level, they believed that high intensity of exercise was not suitable for them. Furthermore, they knew many types of exercise, but did not know which types of exercise best suited to reduce blood glucose level. They choose to do the same method of exercise as in the past.

Environment: The subjects had the mean score of environment at the good level ($\bar{X}$ = 2.67, SD = 0.49). When considering each item, the subjects had environment factor at scores at a good level; these were " expect beautiful environment will improve exercise ", " expect support from organizations will improve exercise ", "do exercise even having responsibility " ($\bar{X}$ = 2.93, SD = 0.28; $\bar{X}$ = 2.84, SD = 0.39; and $\bar{X}$ = 2.72, SD = 0.54), respectively.

From information gathered at the interview, most subjects like to exercise in wide places and good ventilation. They like to friends at the elderly club and also health leader motivate them to do exercise. Although they have responsibility to do other things at home, they still pay attention to perform exercise because they know it leads to good health.

The mean score of each item was at the moderate level; these were " do exercise when having music " , " do exercise even there far from home " ($\bar{X}$ = 2.45,SD=0.80; and $\bar{X}$=2.44,SD= 0.70), respectively. From the interviews, most subjects were the elderly who gave the reason that they were rather shy of exercising with music. Others said that they didn't like music. Moreover, the elderly choose to perform exercise activity at home because it was convenient and they didn't have to travel. The appropriate environment will support exercise behavior and by joining together to do that activity in the elderly club, leads to better exercise behavior. According to Kaplan & Kaplan cited by Pender (1996: 67-71), these are perform more competently in situations or in the environmental context in which they feel compatible rather than in environment which they felt to be unsafe and threatening. Environments that were fascinating and interesting were also desirable for the performance of health behaviors.

3. The predictive power relating to perceived benefits, situation influence, gender, income, educational level and duration of illness to exercise behavior in the elderly with diabetes mellitus.

The factors which could predict exercise behavior in the elderly with diabetes mellitus were perceived benefits, situational influences, educational level but not gender, income and duration of illness. These three variables had a predictive power of 98 % at a statistically significant level of 0.001. The results were partly in accordance with the research hypothesis.

Perceived benefits: Perceived benefits was the first factor that could predict exercise behavior. It accounted for 95.6 % of the variability in exercise behavior at a statistically significant level of 0.001. Moreover, perceived benefits had the highest positively significant relationship with exercise behavior ($r = 0.978$, $p < 0.01$). The correlation of perceived benefits was higher than other variables and thus it was the most influential factor predicting exercise behavior. The explanation was that the elderly with diabetes mellitus with good perceived benefits, they would have good exercise behavior. This results of this study because the subjects are in the elderly clubs, they got the information receive and perform exercises together. Thus, they have exercise behavior that is correct and appropriate. According to the study of Kasekan,K.(1998:81), perceived benefits of health-promoting behavior had a positive relationship with health-promoting behavior of the elderly with diabetes mellitus. The study of Hallal. (1982:137), Janz and Becker. (1984:28) also found that perceived benefits of treatment had relationship to participation in exercise of the diabetic patients. Maridee Jones & Mary A. Nies. (1994:156) found that older African American women with high perceived benefits in exercise would exercise at the high

level. This results found that perceived benefits were the most influential factor in exercise behavior. So perceived benefits important lead to appropriate exercise.

Situational influences : Situational influences was the second factor that could be used, in addition to perceived benefits, to predict exercise behavior in the elderly with diabetes mellitus. These two variables could explain 97.7% of exercise behavior at the statistically significant level of 0.001. Moreover, situational influences had positive relationship with exercise behavior ($r = .974, p < .01$). The explanation was that the elderly with diabetes mellitus with good situational influences would have good exercise behaviors. In addition, they are belong to elderly clubs, which had the suitable place to exercise including environment and situation in the club that influences to exercise behavior such as the others member, activity in the club, taking knowledge.

The environment and situation influences in the elderly clubs members with diabetes mellitus are motivated to exercise. In this study, most subjects (90.7 %) subjects exercise regularly if they have a suitable place. Ninety three percent of subjects expected an appropriate environment and wide places will improve their ability to exercise. Eighty four percent expected that support from the organization will improve their exercise. Furthermore, Green, L.W.d Lovato, C.Y.1990, cited in Wonglamthong, S.(199:98) stated that economic status and the power of the organization encouraged change of behavior. This was the lead factors that encourage of health-promoting behavior. According to, Inkoom, G.(1998:71), it was found that the elderly with benign prostatic hyperplasia with high situational influences could exercise at a good level.

Furthermore, this study found that situational influences and perceived benefits had high relationship (n = .949). This can be explained that because of the similarity of statements measuring situational influences and perceived benefits of exercise. Besides, social interaction which included in both situational influences and perceived benefits could bring about their high relationship.

Educational level: Educational level was the last factor that predicted exercise behavior in the elderly with diabetes mellitus. With all three variables, the exercise behavior may be explained 98 % at the statistically level of 0.001. Educational level had internal relationships with perceived benefits at a statistically significant level of 0.05 (r = .181). This explained educational level was a factor in thinking and judgement. This factor effects people' s awareness to the important of the usefulness of exercise in health promotion. They gained knowledge and exchanged ideas that were benefits to the health care of the elderly with diabetes mellitus in the club. The higher educational level of those diabetic elderly could have the better the perceived benefits of exercise. This will effect to having good exercise behavior. Thus, educational level was the third factor that predicting exercise behavior. Education was an indicator of ability to think clearly, so they were able to well understand health information, they have good understanding of self-care (Orem, 1985: 120, 175). According to study of Kinin,K.1993:69; Siritarungsri,B.1990:198; Borisut,G.1997: 68 found that education level had positive relationship with self-care behavior of diabetic patients. Furthermore, the study of Kasekan,K.(1998:81) found that educational level could predict health-promoting behavior of the elderly with diabetes mellitus. Dumrongvanit,S.(1993:80) found that educational level had positive relationship with exercise behavior.

Income, duration of illness and gender could not predict exercise behavior. In addition, the variables that could not predict exercise behavior.

Income: income was the factor that could not predict exercise behavior of the elderly with diabetes mellitus. It had a negative relationship with exercise behavior at a statistically significant level of 0.01 (r = -.309). For this explanation income does not effect an exercise behavior. According to study of Kasekan,K.(1998: 82), it found that income could not predict health-promoting behavior of the elderly with diabetes mellitus. Siritarungsri,B.(1990:198) found that income had no relationship with self-care behavior of the elderly with diabetes mellitus. This study found that income could not predict exercise behavior because income was correlated with educational level, perceived benefits and situational influences at a statistically significant level of 0.01 (r =.266, r = -.294 and r = -.369), respectively. In contrast it had low relationship with exercise behavior (r = -.309). Thus, income may not predict exercise behavior of the elderly with diabetes mellitus because of the shared variance with other predictor variables.

Duration of illness: Duration of illness could not predict exercise behavior of the elderly with diabetes mellitus and had negative relationship with exercise behavior at non statistically significant level (r = -.014). This explanation was that they tried to adapt by changing their lifestyle in order to prevent possible medical complication. The club viewed exercise as an important activity for everyone and not only the people who had illnesses. This might be the reason that duration of illness did not affect exercise behavior.

The above result according to study of Kasekan,K.(1998: 82) found that duration of illness could not predict health-promoting behavior of the diabetic elderly.

Sumpunyu, O. (1996: B) found that duration of illness had no relationship to health-promoting behavior. This study found that duration of illness could not predict exercise behavior. In addition, most subjects had a duration of illness in period of 1 to 5 years (50 %). This was that homogenous effects to non distribution of exercise behavior.

Gender: Gender could not predict exercise behavior of the elderly with diabetes mellitus and had negative relationship with exercise behavior at non statistically significant (r = -.133). It can be explained that, Most females had more leisure-time in gaining health information from television, radio and other media including meeting and performing exercise activity with other peoples not differences with males.

According to study of Kasekan,K. (1998: 82) found that gender could not predict health-promoting behavior of the elderly with diabetes mellitus. Sumpunyu (1996: B) found that gender had no relationship with self-care behavior of the elderly with diabetes mellitus. This study found that the most subjects were female (70.7 %). It was that homogenous effects to non distribution of exercise behavior.

In summary, perceived benefits, situational influences and educational level could predict exercise behavior in the elderly with diabetes mellitus. This result agreed with Pender's HPM (Pender, 1996: 67). Pender indicated that perceived benefits and situation influences were the factor in behavior-specific cognitions and effects which had direct influence to behavioral outcome including exercise behavior. Educational level could also influence the exercise behavior and was a personal factor used in the HPM.

CHAPTER VI

CONCLUSION AND RECOMMENDATIONS

Summary of the Study

In this study, a descriptive design was used to determine perceived benefits, situational influences, gender, income, educational level, and duration of illness as the predictors of exercise behavior of the elderly with diabetes mellitus. The Health Promotion Model (HPM; Pender, 1996) was used as a guideline in this study. The samples were the elderly with diabetes mellitus who participate in the elderly clubs at Central Ratchaburi Hospital, Boromarajonani College of Nursing, Ratchaburi, Hinkong Sub-District, Damnoensaduak Hospital, Donpai Sub-District, Buangaram Sub-District, Bangtanode Sub-District, Bansing Sub-District, Donsai Sub-District were conducted from January to February 2000, the sample consisted of 140 people.

The instruments were administered by face-to-face interviews. The structure questionnaires consisted of four parts. as follows: characteristics data, exercise behavior, perceived benefits, and situational influences. The validities of three instruments were verified by five experts and tried out with 30 subjects. Cronbach's alpha for the instrument was given as 0.78, 0.85, and 0.76 respectively. The data analyses were performed using frequency distribution, percentage, arithmetic mean, standard deviation and stepwise multiple regression technique.

The results of the study indicated that:

1. The majority of subjects were female (70.7 %). Age distribution was 60 to 75 years (94.3 %). Most subjects (56.4 %) were married. Fifty-three percent finished primary school. Most subjects (74.3 %) had annual income less than 5000 baht per month. Most subjects had income sufficiency (73.6 %) and their responsibility were occupation (30.7 %). The preference of exercise among them was walking (67.9%) and arm exercise (19.3%). Many subjects exercised more than three times a week (76.4 %) but their practice was less than 15 minutes (40 %). Fifty percent of the subjects had a duration of diabetes mellitus was 1 to 5 years. They had physical problems (79.3 %). Most subject had medication with diet control and exercise (57.18 %).

2. The exercise behavior of the subjects was at the good level ($\bar{X}$ = 3.62, SD = 0.70); perceived benefits was as the high level ($\bar{X}$ = 2.81, SD = 0.36); situational influences was as the high level ($\bar{X}$ = 2.69, SD = 0.45)

3. the result found that perceived benefits , situational influences and educational level explained 98% of the variance in exercise behavior.

Implication and recommendations

Implications for nursing practice

1. Health care providers, especially nurse working in the community, should emphasize the important of exercise that is appropriate to the diabetic elderly. Furthermore, nurses can provide information about the type of exercise which is best suitable to the elderly with diabetes such as walking. There should be a

special emphasize about warm-up, cool-down, and preparing before exercise Nurses also need to concern on the appropriate cloths that the elderly wear during exercise.

2. The results showed that perceived benefits effects to exercise behavior. Thus, nurse be emphasize due to benefits of exercise and promotion of exercise behavior to the elderly with diabetes mellitus which nonexercise.

3. The results showed that situational influences effects to exercise behavior. Therefore, nurse should be coordinate with the elderly in community for the group support for exercise. This program can help the elderly contacts and exchange information about exercise especially, they can exercise together more than in the elderly clubs. Therefore, nurses must be choose the places which not far from house of the elderly. It should be in the central village such as temples. Nurses should advise and activate a care giver that support exercise behavior of the elderly with diabetes mellitus.

Implication for Further Studies

1. This study was specific to the elderly with diabetes mellitus who had exercise activities. Further study may investigate exercise activities in the other population.

2. Quasi study to compare exercise behavior in the group of diabetic elderly who was the membership of the elderly clubs and the other people who was not the membership in the elderly clubs.

3. The instrument used for measuring the study variables need to be checked for their construct validity.

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Appendix

- Appendix A
- Appendix B
- Appendix C

Appendix A

List of experts

1. Associate professor Vilai Kuptniratsaikul

   Department of Rehabilitation Medicine, Faculty of Medicine

   Siriral Hospital, Mahidol University

2. Assistant professor Thavatchai Peerapatdit

   Division of endocrinology and metabolism, Faculty of Medicine

   Siriraj hospital, Mahidol University

3. Associate professor Wannee Satayawiwat

   Department of surgical nursing

   Faculty of nursing, Mahidol University

4. Assistant professor Penchun Sareewiwatthana

   Department of medical nursing

   Faculty of nursing. Mahidol University

5. Assistant professor Somjin Peachpansi

   Department of Fundamental nursing

   Faculty of nursing. Mahidol University

Appendix B

Consent Form

My name is Varaporn Totermsuck. I am a master student at the Faculty of Nursing (Siriraj), Mahidol University. I am conducting the study of perceived benefits and situational influences to exercise behavior in the elderly with diabetes mellitus. You are one of 140 diabetic elderlys invited to participation in this the study.

I would like you to answer the questionnaires. The interview will last for approximately 35 - 40 minutes. The information from this study will help nurses and other health professionals in planning exercise programs for the elderly with diabetes. You are free to withdraw at any time. All the information will keep confidential. Your name will not disclose to anyone. In case of you have any suspicion for taking part in the study. I'm willing to give you the answer at all time. I would like to express my gratitude to you too.

Varaporn Totermsuck

The Questionnaires

Research Title the study of perceived benefits and situational influences to exercise behavior in the elderly with diabetes mellitus.

Part 1 Characteristics data of the elderly with diabetes mellitus

Direction The interviewers checks / in ( ) or fills in the blanks realistically.

1. Age.....years

2. Gender

( ) Male ( ) Female

3. Educational level

( ) No education

( ) Primary school

( ) Secondary school

( ) Certificate / Diploma

( ) Bachelor degree or above

:

:

15. Methods of treatment

( ) Food control only

( ) Medication only

( ) Medication and food control

( ) Medication and exercise

( ) Medication with food control and exercise

Part 2 Exercise behavior of the elderly with diabetes mellitus

Regularly practice means the elderly with diabetes Mellitus performs the activity regularly Every day or at least three times per week

Often practice means the elderly with diabetes mellitus performs The activity often or two times per week.

Sometimes practice means the elderly with diabetes mellitus Performs the activity sometimes or one time per week.

Never practice mean the elderly with diabetes mellitus never Performs the activity.

Description of exercise behavior	Regularly practice	Often practice	Sometimes practice	Never practice
1. Do you exercised following your schedule?.				
2. Do you prepare yourself to be ready to exercise ?.				
:				
:				
9. Do you rest that it had abnormal while exercise ?.				

Part 3 Perceived benefits of the elderly with diabetes mellitus.

Strongly agree means the elderly with diabetes mellitus has totally agree in that item.

Agree means the elderly with diabetes mellitus has partially agree in that item.

Disagree means the elderly with diabetes mellitus has do not agree in that item.

Description of perceived benefits	Strongly agree	Agree	Disagree
Intrinsic benefits			
1. Exercise makes me pleasurable Feelings			
:			
3. Exercise to be continued will Decrease taking drugs			
Extrinsic benefits			
4. Proud to family praise you to exercise			
:			
:			
11. Exercise makes me meet new friends			

Part 4 Situational influences of the elderly with diabetes mellitus.

Strongly agree means the elderly with diabetes mellitus has totally agree in that item.

Agree means the elderly with diabetes mellitus has partially agree in that item.

Disagree means the elderly with diabetes mellitus has do not agree in that item.

Description of situational influences	Strongly agree	Agree	Disagree
Option available			
1. You will exercise regularly as have in the appropriate place			
:			
5. You expect high intensity of exercise will decrease blood glucose			
Environment			
7.You expect beautiful environment will improve exercise.			
:			
:			
11. Far distant from home makes me do not exercise.			

Appendix C

Result

Table 9 Percentage of exercise behavior of the samples (N = 140).

Description of exercise behavior	Regularly practice	Often practice	Sometimes practice	Never practice
- stop suddenly when had abnormal	94.3	5.0	0.7	-
- wear comfortable shoe	92.9	2.1	3.6	1.4
- take a rest after exercise	87.9	8.6	2.1	1.4
- exercise following your schedule	82.9	13.6	2.9	0.7
- exercise before taking drug	73.6	7.9	11.4	7.1
- wear suitable cloth	73.6	7.1	12.1	7.1
- warm-up before exercise	72.9	7.1	10.7	9.3
- prepare yourself to be ready to exercise	67.1	16.4	7.1	9.3
- cool-down after exercise	65.0	12.1	15.0	7.9

Table 10 Percentage of perceived benefits of the samples (N = 140).

Description of perceived benefits	Strongly agree	Agree	Disagree
Extrinsic benefits			
- proud to be the role model in exercise	91.4	8.6	-
- proud to advice the others	90	10	-
- don't be the burden to family	88.6	11.4	-
- to be praised to exercise	86.4	13.6	-
- meet new friends	85.0	14.3	0.7
- join activities with other	82.9	17.1	-
- decrease medication expenses	80	20	-
Intrinsic benefits			
- make me feel relaxed	82.9	16.4	0.7
- make me pleasurable feelings	82.9	12.1	5.0
- improving strength of muscles and joints	78.6	17.9	3.6
- decrease taking drugs	61.4	31.4	7.1

Table 11 Percentage of situational influences of the samples (N = 140).

Description of situational influences	Strongly agree	Agree	Disagree
Option available			
-practice following useful advice	92.9	6.4	0.7
-exercise as having an appropriate place that will exercise regularly	90.7	9.3	-
- do exercise even having hard work	89.3	10.7	-
-improve exercise when you observe health problem in other people	67.9	22.9	9.3
- decrease blood glucose when doing appropriate exercise	51.4	45.7	2.9
-change the methods of exercise following blood glucose	64.3	15.7	20.0
Environment			
-expect beautiful environment will improve exercise	93.6	5.7	0.7
-expect support from organization will improve exercise	84.3	15.0	0.7
- do exercise even having responsibility	76.4	19.3	4.3
-do exercise when having music	64.3	16.4	19.3
- do exercise even there far from home	55.7	32.1	12.1

BIOGRAPHY

NAME	Miss Varaporn Totermsuck
DATE OF BIRTH	11 October, 1972
PLACE OF BIRTH	Ratchaburi, Thailand.
TNSTITUTIONS ATTENDED	Boromarajonani College of Nursing, Ratchaburi 1991-1995 Bachelor of Nursing Science. Mahidol University, 1998-2000 Master of Nursing Science. (Adult Nursing).
POSITION & OFFICE	1995-Present, Nursing Educator, Boromarajonani College of Nursing, Ratchaburi.