SURVEY OF FACTORS AFFECTING TRIGGER FINGER IN OUT-PATIENTS AT LEARD-SIN HOSPITAL

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Thesis
Entitled

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SURVEY OF FACTORS AFFECTING TRIGGER FINGER IN OUT-PATIENTS AT LEARD-SIN HOSPITAL

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ABSTRACT

Trigger finger, a condition in which the fingers tend to lock, is one of the most common causes of hand pain and disability. There has been no survey study in Thailand about the causes of trigger finger and their relation to individual characteristics and type of hand function pattern and there has been no epidemiologic study in Thailand. Therefore, the purpose of this study was to determine factors influencing trigger finger, including individual characteristics, work tasks, and psychosocial factors along with the association between affected fingers and hand function patterns and occupation or work tasks.

A cross-sectional retrospective survey was conducted in Leard-Sin hospital Bangkok, Thailand from May-June 2006. Two hundred and fifty trigger finger patients were included in this study using self-administered and interview questionnaire, and physical examination.

The results revealed that most of the patients with trigger finger were female (80.4%) with an average age of 55.39 years. Housewives (28.4%), academic staff (13.2%), retired government officials (10.8%), and chefs (7.2%) were the occupations most frequently found while clothes washing, wringing, cooking, bag carrying, and writing were the activities most frequently reported. Hand function patterns mostly reported were power grip (47.2% in right hand and 45.6% in left hand) and hook grip (28.4% in right hand and 42.4% in left hand). The patients tended to have trigger finger in the fingers always used, which depended on their work tasks or occupations. Hand function patterns and occupations were found to be significantly associated with affected fingers ($p<0.01$), but trigger finger was not more frequently found in the dominant hand.

In conclusion, the occupations and hand function patterns used in some work tasks or activities which were found to associated with trigger finger should be of concern and a prevention program should be designed in further study.

KEY WORDS: TRIGGER FINGER/ THAI/ HAND FUNCTION / OCCUPATION

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การสำรวจปัจจัยที่มีผลต่อการเกิดโรคนิ้วล็อกในผู้ป่วยนอก โรงพยาบาลเลิดสิน
(SURVEY OF FACTORS AFFECTING TRIGGER FINGER IN OUT-PATIENTS AT LEARD-SIN HOSPITAL)

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บทคัดย่อ

โรคนิ้วล็อกเป็นสาเหตุหนึ่งของอาการเจ็บปวดและลดประสิทธิภาพของการใช้มือที่พบได้บ่อย ยังไม่มีสำรวจปัจจัยที่มีผลต่อการเกิดโรคนิ้วล็อก ที่ศึกษาเกี่ยวกับลักษณะในแต่ละตัวบุคคลและรูปแบบการใช้มือ ส่วนในประเทศไทยยังไม่มีการสำรวจระบาดวิทยาและสาเหตุของโรคนิ้ว-ล็อกอย่างจริงจัง ดังนั้นวัตถุประสงค์ของการศึกษาครั้งนี้เพื่อสำรวจปัจจัยที่อาจส่งผลต่อการเกิดโรคนิ้วล็อก ซึ่งได้แก่ ปัจจัยในตัวบุคคล, ลักษณะงานหรือกิจกรรมที่ทำ และปัจจัยทางด้านจิตสังคม ตลอดจนหาความสัมพันธ์ระหว่างนิ้วที่เป็นโรคนิ้วล็อก กับรูปแบบของมือที่ใช้ทำกิจกรรมและงานที่ทำหรืออาชีพ

การศึกษาภาคตัดขวางแบบย้อนหลัง สำรวจในโรงพยาบาลเลิดสิน กรุงเทพมหานคร ประเทศไทย ระหว่างเดือนพฤษภาคม - มิถุนายน 2549 ทำการศึกษาในผู้ป่วยนิ้วล็อก 250 คน โดยวิธีการตอบแบบสอบถามชนิดเติมคำตอบเอง, ชนิดสัมภาษณ์และการตรวจร่างกาย

ผลการวิจัยพบว่าผู้ป่วยนิ้วล็อกพบมากในเพศหญิง (80.4%) อายุเฉลี่ย 55.39 ปี พบมากในอาชีพแม่บ้าน (28.4%), อาจารย์-นักวิชาการ (13.2%), ข้าราชการเกษียณ (10.8%) และพ่อครัว-แม่ครัว (7.2%) ซึ่งกิจกรรมที่ทำบ่อยที่สุดคือ การซักผ้า-บิดผ้า การทำอาหาร การหิ้วถุงหรือกระเป๋า และการเขียนหนังสือ รูปแบบการใช้มือที่พบบ่อยคือการกำ (มือขวา 47.2%, มือซ้าย 45.6%) และการหิ้ว (มือขวา28.4%, มือซ้าย 42.4%) ผู้ป่วยมีแนวโน้มเกิดนิ้วล็อกในนิ้วที่ใช้อยู่เป็นประจำขึ้นอยู่กับงานหรืออาชีพของผู้ป่วยเหล่านั้น โดยพบว่าลักษณะการใช้มือและอาชีพมีความสัมพันธ์กับนิ้วที่เป็นนิ้วล็อก แต่ไม่พบว่านิ้วล็อกจะเกิดกับมือข้างถนัดมากกว่า

โดยสรุป อาชีพและรูปแบบการใช้มือในการทำงานหรือกิจกรรมบางชนิดที่พบว่ามีความเสี่ยงต่อการเกิดโรคนิ้วล็อก ควรได้รับการเฝ้าระวังและศึกษาวิธีการป้องกันในการศึกษาครั้งต่อไป

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LIST OF ABBREVIATIONS

WMSDs	**work-related musculoskeletal disorders**
MSDs	**musculoskeletal disorders**
n	**number**
hr	**hour**
kg	**kilogram**
m	**meters**
BMI	**body mass index**
CTDs	**cumulative trauma disorders**
RTDs	**repetitive trauma disorders**
RSIs	**repetitive strain injuries**

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CHAPTER I
INTRODUCTION

Trigger finger is one of the most common causes of hand pain and disability. The condition begins as pain or discomfort in the palm (base of digit) during movement of the involved digit(s). In some cases, the flexor tendon causes painful triggering or snapping as the patient flexes and extends digit. On some occasion, the patients may present with a digit locked in a particular position, more often in flexion, which may require passive manipulation to the digit into full extension (1, 2).

This phenomenon is due to a disproportion in size between the flexor tendon and retinacular pulley at the level of metacarpal head from thickening of pulley or formation of a nodule in the flexor digitorum superficialis tendon, where it glides under the A1 pulley. That causes a difficulty to flex and extend the digit (3, 4).

Trigger finger can be “primary” which includes trigger finger occuring in normal person while “secondary” occurs in patient who has systemic disease affecting tendon or sheath (such as rheumatoid arthritis, diabetes mellitus) (2-4). The most common form of trigger finger is the primary type, found 2-6 times more frequently in middle-age women than men and seen most often in dominant hand (5-9). The thumb, middle and ring finger are affected much more frequently than the index and little finger (5, 7, 8).

There are many studies reporting incidence of trigger finger. Weiby in 1970 (5) surveyed from The Orthopedic Hospital in Denmark since 1953-1967, found that the number of patients increased year by year in 1953-1963 period, 6 times as common in females than male and peak incidence of trigger finger averaged in 50-59 years old. This result is similar to Bonnici and Spensor in 1988 (10), which surveyed patients who had received operative treatment for trigger digit at The Lewisham and Guy’s Hospital, London since 1984-1987. Both studies found that the ring, middle and thumb were affected much more often than the index or little finger.

When trigger finger had occurred, it is interesting to find out the causes of trigger finger and the factors affecting to them. Several studies pointed to a

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relationship between activities that require exertion of pressure in the palm while performing forceful grip or repetitive digital flexion (5, 7-12). They demonstrated that hand-tool use (13), aggressive activity of fingers (7), high repetitive and forceful job (14) increase the risk of trigger finger or other hand and wrist tendinitis in factories.

The result in each survey can explain that highly repetitive work may damage tendon through repeated stretch and elongation. Forceful hand exertion increases the risk to trigger finger including carrying heavy tools, employing knives or scissors to cut and wrenching bolts. Local mechanic stresses (due to direct pressure) occur when body parts contact with hard and sharp objects especially trigger finger which is seen to relate with tools that have hard, sharp or small diameter handle (15).

From previous studies as mention above, it indicates that hand and wrist disorders including trigger finger associated with occupation. However, these studies lacked the data about age and description or characterization of the work task. In addition, these studies were in contrast with Trezies et al in 1998 (16), which found that the distribution of occupation between population who had trigger finger and local population was not significantly different. Accordingly, they suggested that majority cause of trigger finger were unrelated to work.

Furthermore, other factors such as heredity (5, 6, 10, 17), trauma (10) and excessive heat (7) can be the causes of developing trigger finger.

Within pathological condition or disease, some digits may be reduced in ability to flex, extend and grip. Consequently, the patients would have hand function problem in performing activities and work task. In addition, their working capacity would be limited resulting in loss of income and time including expense for treatment.

In Thailand, trigger finger is also one of the most common problems and tend to occur in female more than male 4 times. In female, it mainly occurs in housewives, 50-60 years old where as the male occur in 40-70 years old and mainly in gardener, the man who frequently uses hammers, pliers or scissors (18). Sometimes it can be expected which fingers are affected from the person activities such as the housewives who carry the loading weight everyday tend to present trigger finger in index, middle and ring finger, the golfer mainly occur in little finger, or the writer mainly occur in thumb. However there are still no completed epidemiologic studies. Although, there are some study results from other countries, they may not be applied for Thai because

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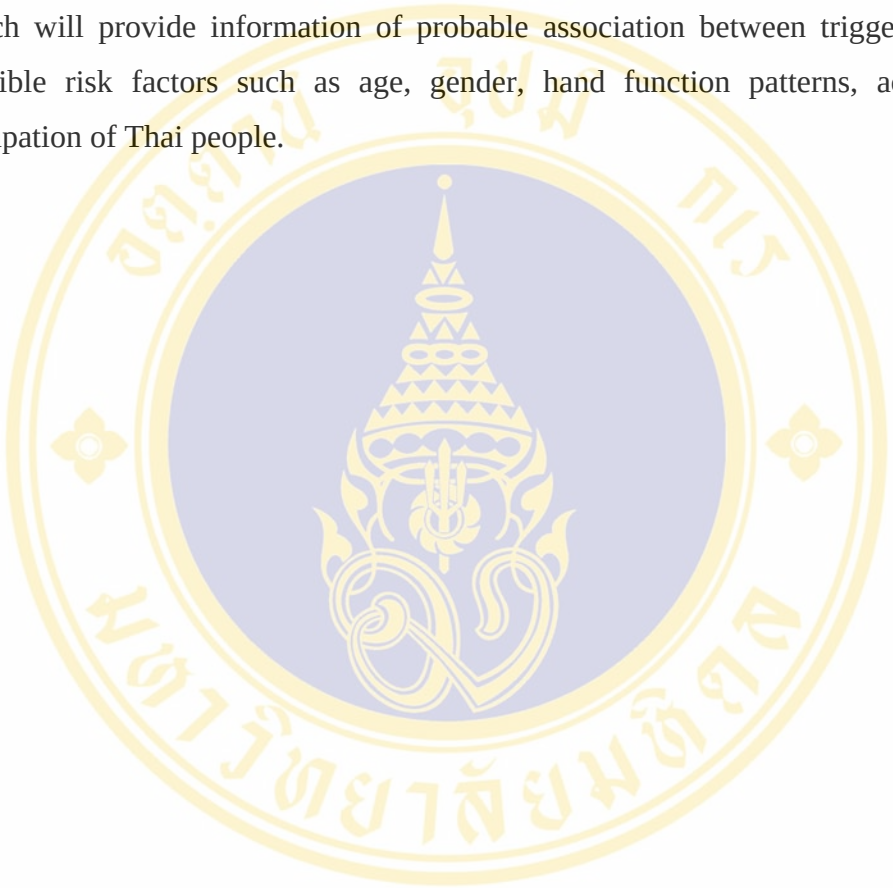
variation in culture and living style may interfere. Therefore, it is interesting to study the epidemiology of trigger finger in Thai. This database can be served to provide the information for designing preventive program for Thai people who has high risk to trigger finger. Prevention is certainly better than cure when the disease have occurred.

Therefore, this study aimed to survey factors affecting trigger finger in Thai, which will provide information of probable association between trigger finger and possible risk factors such as age, gender, hand function patterns, activities and occupation of Thai people.



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Purpose of the Study

General Objective

The purpose of this study was to survey possible factors influencing trigger finger, including the individual characteristics, work task or activity characteristics and psychosocial factors of individuals with trigger finger.

Specific Objective

This study determined the following;

1. The individual characteristics of patients with trigger finger.
2. The work task or activity characteristics of patients with trigger finger among different types of work task or activity.
3. The psychosocial factors of patients with trigger finger.
4. The association between fingers affected with trigger finger and hand function patterns.
5. The association between fingers affected with trigger finger and occupations
6. The association between fingers affected with trigger finger and gender
7. The association between hand affected with trigger finger and handedness
8. The association between number of fingers affected with trigger finger and BMI

Hypothesis of the Study

There would be an association between affected finger with hand use appearance and hand activity in various work tasks.

Scope of the Study

This study was conducted at Leard-sin Hospital, Bangkok Thailand. The patients who came to received treatment for the conditions of primary trigger finger were included in this survey.

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Advantage of the Study

1. The study provides some part of database about epidemiology of trigger finger in Thailand
2. The result of this study provides the data about factor affecting trigger finger including individual and work task or activity factors. Therefore, this study is more important for people who have tendency or risk to present trigger finger to be aware and prevent themselves from disorder.

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CHAPTER II
LITERATURE REVIEW

2.1 Problems and Incidence of Trigger Finger

Trigger finger (the terms used synonymously are trigger digit, snapping digit, locking digit, stenosing tenosynovitis, peritendinitis stenosans, and digits sultans) is one of the most common causes of hand pain and disability. It is found much more in women than men with average age 50-60 years and frequently in workers who use hand or hand tools repetitively for a long time (2, 19).

In Thailand, trigger fingers tend to occur in female than male 4 times. In female, it is mainly occurs in housewives with age around 50-60 years old and having report of extreme and frequent hand use in carrying, grasping, catching, chopping repetitively. Whereas in male, it occurs in 40-70 years of age and mainly in gardeners, who frequently use heavy tools such as hammers, pliers, and scissors. Additionally, it can be found in golfers and musicians (18, 20).

Trigger finger is seen more often in dominant hand, most occur in thumb, next in ring, middle, little fingers and the least in index fingers (2, 8). However, the number of the affected finger can be varied, whereas in Thailand, the most affected finger is middle, thumb, ring, index and little finger respectively.

In 1970 Weiby (5) had surveyed incidence of trigger finger in children (age 1-10 years) and adult (older than 11 years). He served a population from a large city, small towns, and rural areas of a composition corresponding to that of Denish population in general and studied in Orthopedic Hospital since 1953-1967. There were 134 children (both congenital and acquire) of a total of 594 patients. He found that the number of patient had tendency to increase each years during 1963-1967 and shown that children were 17% of all patients with trigger finger.

Among adult patients, there were 6 times more females than males. The disease affected the finger listed from the thumb to little finger at the rate: 73, 3.4, 8.8, 8.3 and 5.5% respectively. Sixty percent of trigger fingers were on right hand.

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In children, there were also more common in girls and 93% affected the thumb, equally both sides.

In 1988, Bonnici and Spencer(10) surveyed trigger finger in adult by sending the questionnaires to all patients who had received operative treatment for trigger fingers in the period from January 1984 to March 1987 at Lewisham and Guy Hospital, London. The questionnaires asked about the patient's hand dominance, occupation, and previous or family history of trigger finger, associated condition (e.g. rheumatoid arthritis), and any history of trauma or previous hand surgery. In this study, only 36 of 47 patients respond to the questionnaire and the most commonly affected finger was found to be ring finger, next in thumb, middle, index, and little fingers respectively. But this study had too little subjects because of questionnaires were sent to 47 patients, but only 36 replies were obtained.

In 1994, Rodgers et al (21) had surveyed incidence of trigger digits in 1046 newborns. But this study could not find trigger digit in those newborns, which by the researcher said that the congenital trigger digit is very rare. There is incidence of 0-3 per 1000 live births. Later on, they had retrospective study in 73 children, trigger digit patient, from the hospital since 1989-1992 and found that trigger digit usually present during 1-2 years after birth, the youngest child in this study present with trigger thumb at 4 months and not found any congenital trigger finger.

Furthermore, they discussed that the thumb is the most commonly involved digit in children. The researchers gave a remark about some differences of trigger finger between adult and children like. After surgery, adults are more likely to show a thickened tendon sheath, while children show more nodular thickening of the tendon itself.

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2.2 Trigger Finger

2.2.1 Pathology and Causes of Trigger Finger

Cause of trigger finger is unknown or uncertain, suspect comes about by the formation of thickening nodule on flexor tendon or sheath or both of them, resulting in interference with normal smooth gliding of the tendon within fibrous digital sheath (A1 pulley) (1, 4, 7). Trigger finger can be classified accordingly the cause into 2 types as following (3, 6);

Primary trigger finger includes trigger finger in healthy person (do not have the disease). The phenomenon is due to direct, severe or multiple traumas especially power grasp or squeeze, repetitive forceful digital flexion. It causes high angular loads at the distal edge of the A1 pulley(1, 2), flexor tendon and its sheath will be cinched between head of metacarpal bone and an object, which is grasped or squeezed until the flexor tendon inflame and swelling. After that, it causes a formation of a nodule in flexor tendon and presents a disproportion between the size of flexor tendon and retinacular pulley. Consequently, the flexor tendon can glide within the pulley difficultly; if it can be passed, locking or triggering will occur. The patients may present with a digit locked in particular position, more often flexion, which may require gentle passive manipulation into full extension and always combines with pain (1, 2, 22).

Trigger finger mainly occurs in female more than male. It may due to the female often does housework, grasping or catching bags, broom, cooking as well as clothes launder. These require repetitiveness and long time of hand using. In male, it is found in gardeners, and golfers. It may associate with repetitive grasping or squeezing for a long time, causing swelling of tendon and sheath and present the sticky gliding finally (18).

Furthermore, trigger finger can be congenital which is most common in thumb. And it is caused by imbalance growth between tendon and pulley (22).

Secondary trigger finger occurs in patients who have systemic disease affecting tendon or sheath such as rheumatoid arthritis, diabetes mellitus, psoriatic arthritis, amyloidosis, hypothyroidism, sarcoidosis, and pigment villonodular synovitis (2, 3, 6). Sometimes carpal tunnel syndrome and de Quervain’s disease seem to be associated (23).

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Moreover, trigger finger can be divided into nodular and diffuse swelling of the tendon sheath on the basis of clinical palpation as following (8)

Nodular: Those digit contained a circumscription, well-defined swelling.

Diffuse: Those swelling were more extensive and less defined.

Although many studies presented that trigger finger always occur in tendon sheath and A1 pulley, there are three case reports presenting that two patients received the treatment both steroid injection and operation to release A1 pulley but they were failure. Part from that, it was found that the exact cause is palmar aponeurosis pulley. When they received operation to release palmar aponeurosis, then the symptom of trigger finger was disappeared (24). There are some authors described the fascia of the palmar aponeurosis, with its fibers surrounding each flexor tendon at the proximal flexor sheath, as a functional pulley in the digital flexor tendon system (25). In anatomical review of the palmar aponeurosis, Doyle (26) found that the aponeurosis pulley to be a constant structure and palmar aponeurosis is a part of the digital pulley system.

2.2.2 Signs and Symptoms of Trigger Finger

The patients always come to see doctors with digital locking and pain during active flexion or extension activity. They may need passive manipulation to extend the digit in later stage.

In early stage, the patients will have pain over the digital palm or pain radiation along the digit, and they can not grip extremely especially in the morning. However the symptoms can be relieved when they continue using hands for a period of time (2, 22).

The signs of trigger finger can be listed as the following (2, 19);

1) Triggering on active or passive extension by the patient
2) Palpable snapping sensation or crepitus over the A1 pulley
3) Tenderness over the A1 pulley
4) Palpable nodule in the line of the flexor digitorum superficialis tendon, just distal to the metacarpophalangeal joint in the palm
5) Fixed-flexion deformity in the presentation especially proximal inter phalangeal joint

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6) Evidence of associated condition (i.e. rheumatoid arthritis, gout)
7) Early signs of triggering in other digits (may be bilateral)

2.2.3 Trigger Finger Classification

Trigger finger has been classified into many systems in order to diagnose severity of symptom and provide the clinician a way to record notes in the patient's chart for retrospective review. Those classifications were mostly graded by severity of symptom, including pain and triggering, and increasing of mechanical problems.

Green in 1977 has been suggested to classified trigger finger into 4 grades, as following; (2)

Grade I (pretriggering)	pain; history of catching, but not demonstrable on physical examination; tenderness over the A1 pulley
Grade II (active)	demonstrable catching, but the patient can actively extend the digit
Grade III (passive)	demonstrable catching requiring passive extension (grade IIIA) or inability to actively flex (grade IIIB)
Grade IV (contracture)	demonstrable catching, with a fixed flexion contracture of PIP joint

Quinell in 1980 has been classified trigger finger regarding ability of finger movement into 5 grades as followings; (27)

Grade 0	(None)	Even movement during flexion/extension
Grade I	(Mild)	Uneven movement during flexion/extension
Grade II	(Moderate)	Actively correctable; interferes with normal hand function
Grade III	(Severe)	Passively correctable
Grade IV	(Locked)	Fixed in flexion

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Newport et al in 1990 have been classified all trigger fingers according to severity of symptom (23).

Grade I: simple tenosynovitis with tenderness and pain, but with no palpable nodule and with no triggering

Grade II: fingers demonstrated tenderness, swelling or nodularity of tendon and occasional catching or triggering

Grade III: most severe symptoms included all manifestation of grade II: as well as frequent catching, triggering, or locking

Patel et al in 1992 have been divided trigger finger into 6 stages, each with increasing grades of mechanical problems (12).

Stage	Finger movement
2	Normal
3	Uneven
4	Triggering or clicking or catching
5	Locking of finger in flexion or extension, unlock by active finger movement
6	Locking of finger in flexion or extension, unlock by passive finger movement

2.2.4 Treatment of Trigger Finger

The goal of treatment in patients with trigger finger is to provide a painless, smooth and full range of motion to the finger. Treatment methods include splinting ROM and tendon gliding exercise, steroid injection, and surgery (3).

In early stage, the sensitivity is mild and can be treated by rest or decrease hand using, anti-inflammatory drug, physical therapy by deep heat and ultrasound (18). However, there are only a few studies about physical therapy management of trigger finger. Medical treatment method can be listed as follow;

1) Immobilization (splinting) Evan et al in 1988 (28) reported that splinting of the metacarpophalangeal joint in 0 degrees extension relieved the symptoms in 73% of 55 digits in 44 nonrheumatoid patients. This method is most

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successful in trigger fingers involving index, middle, ring and little fingers in all stages, with the exception of locked fingers that cannot be passively unlocked (12).

2) Injection by corticosteroid at flexor tendon sheath to decrease inflammation and tendon sheath swelling. There are many studies reported that steroid injection is one of the treatment which is effective and no complications (3, 8, 9, 23).

The indications for surgical treatment included persistence of symptoms for more than 3 months, involvement of several digits, recurrence after local injection or splinting, and/or willingness to accept the procedure as primary treatment (29).

Freiberg et al (8) compared triamcinolone acetonide injection for treat two types of trigger finger include nodular and diffuse type. They found that 93% success was obtained in the nodular type compared with 48% in the diffuse type. Accordingly, they concluded that the patients with the nodular type should be offered a simple cortisone injection.

Murphy et al (3) studied effect of steroid injection compared with placebo injection. The result was that the difference in effectiveness in the steroid group (64%) and the placebo control group (20%) was statistically significant.

Griggs et al (30) studied treatment of trigger finger in Diabetes Mellitus (DM) patient by steroid injection. They found that diabetic patients responded less favorably to treatment by steroid injection.

3) Surgery This method usually uses when conservative treatments are failure or use in late stage of patient, but not is used in RA patient (12, 19, 27, 29). They are incised to release A1 pulley for tendon glide smoothly. The original methods have many risks include digital nerve injury (31, 32), infection (32), stiffness (31), weakness (32), scar tenderness (32) and bowstring effect (20, 33, 34). Later, the new methods are explored to reduce those risks.

Eastwood et al (27) used a 21- gauge hypodermic needle to percutanous release the A1 pulley. This technique is effective, convenient, safe and well tolerated by patients. Moreover there were no complication and after follow up of 13 months, there has been no recurrence.

Lyu (29) modified aneurysm needled and the curved blade used for closed the tenotomy of the A1 pulley. This method was also success and no risk to cut digital nerve.

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At present in Thailand, Doctor Wichai Vijitpornkul had found another one technique for percutaneous release of trigger finger by using the blade probe since 1999. This technique is simplicity, safety, effectiveness and also economically. The patient can return to work earlier than surgery (18).

2.3 Epidemiology and Etiology of Trigger Finger

When trigger finger has occurred, it leads to the interest what causes of trigger finger and what are factors affecting them.

In general, trigger finger results from repeated movement and clenching of the finger. Potential causes include playing card, doing handicrafts, working on keyboard, counting or sorting pages rapidly and playing videogames. Direct trauma is a rare cause. The number of finger movement per unit of time and the degree of clenching during activity are important factors in causality (35).

There are several studies consider of work task, which found the factors association with trigger finger.

Fahey et al in 1954 (7) found that trigger finger is frequently encountered in female manual workers in unaccustomed occupations or activities or in work, which requires unusual or excessive activity of the fingers. In three of their patients who worked on the same assembly, this condition developed following excessive pressure exerted by the left thumb on a round cap in the process of inserting plastic tubes into the cap.

Armstrong et al in 1987 (14) surveyed hand and wrist tendinitis that is De Quervain's disease, tendinitis, and tenosynovitis in 652 workers of different work sites by interview and physical examination, in order to detected relationship between the repetitiveness and forcefulness of manual work and prevalence of tendinitis. This study surveyed 652 workers who were selected from each of 4 combinations of force and repetitiveness at 7 worksites. Four combinations of force and repetitiveness included

1. low-force-low-repetitive jobs
2. low-force-high-repetitive jobs
3. high-force-high-repetitive jobs
4. high-force-low-repetitive jobs

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High-repetitive jobs were defined as those with a cycle time of less than 30 seconds or with more than 50% of the cycle time involved in performing the same motion pattern, whereas low-repetitive jobs were defined as those with a cycle time of more than 30 seconds or with more than 50% of the cycle time involved in performing the same motion pattern.

High-force jobs were those with estimated average hand force requirement of more than 40 N, whereas low-force jobs were those with estimated average hand force requirement of below than 40 N.

They assessed the workers by interview and noninvasive physical examination. The result demonstrated that the risk of hand and wrist tendinitis in persons who perform highly repetitive and forceful jobs was 29 times greater than in persons who perform job that were low in repetitiveness and force. Therefore this database suggested that repetitiveness and force could be the important factors to present hand and wrist tendinitis, but this hypothesis has not yet been fully tested. Moreover, posture and mechanical stress also should be considered.

From statistic data of this survey shown that the risk of a repetitive trauma disorder developed in females was 4.6 times than male. Thus, the risk to females is slightly greater than to males but substantially less than the risk associated with certain type of work.

Moore and Garg in 1994 (36), surveyed upper extremity disorder in Pork-processing plant in order to determined relationships between job risk factor mobility in workers. Thirty-two were analyzed in term of force, wrist posture, type of grasp, speed of work; localize mechanical compression, vibration, time measurement, cold temperature, effort/min, cycle time, and percent of exertion/cycle. They classified as “hazardous” and “safe” in term of potential risk for elbow or hand and wrist disorder by videotape and observation. The weight of tools and products were obtained from the company. Then, they assessed morbidity category included medial and lateral epicondylitis, de Quervain’s tenosynovitis, trigger finger, trigger thumb, and carpal tunnel syndrome associated with each job categories during 20 month observation period.

The result demonstrated that the from 32 job categories, 14 were hazardous job (this classification was clearly a subjective process), and nearly all of disorders (96%)

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occurred among hazardous job categories. They found that 13 (87%) of 15 job categories associated with morbidity were classified in hazard job.

Morbidity which was the most important variable was found in more high exertional demand jobs, significantly greater than low exertional demand of the job, expressed as an estimate of %maximum strength. Other factors, such as hand-arm vibration and localized mechanical compression were present only in 1-2 tasks.

Interestingly, distal upper extremity morbidity data, hand and wrist morbidity was seen mostly in carpal tunnel syndrome, next in trigger finger, trigger thumb, and de Quervain's disease (36).

Moreover, the distribution of reported conditions according to gender was present that epicondylitis, carpal tunnel syndrome, and trigger thumb occur in females more than males whereas, de Quervain's disease and trigger finger much more occur in males. All case of trigger finger among males occurred in Wizard Knife Operators and affected only the fourth and fifth digits on the right hand. Trigger finger and trigger thumb can be developed in 2 job categories as well as Wizard Knife Operators and Scaler/Grader, which are hazardous job.

Gorsche et al in 1998 (13) determineD the prevalence and incidence of trigger finger in a meat-packing plant and explored the relationship between hand-tool use and development of trigger finger. They surveyed in 665 workers by interview and examination and found that the point prevalence of trigger finger was 14%, 75% of them used a hand tools. That is the hand-tool use increases the risk of developing trigger finger in a meatpacking plant.

Bonnici and Spencer in 1988 (10) obtained some data from questionnaire sent to 36 trigger finger patients. The patients in this study mostly had the job that involved repetitive identical manipulation of the fingers and this might have resulted in cumulative damage to the tendon sheath. Moreover, trigger finger occasionally associated with systemic disease because there were 4 patients with diabetes mellitus had trigger finger, and 2 other patients suffered from rheumatoid arthritis.

Sperecher in 1943 (17) experimentally produced a snapping finger and thumb in his own hand by excessive flexion and extension against resistance.

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Engel in 1949 (37) found that the cause in three cases which he observed were an overheated arc-welding fun in two cases and over-exposure to an infrared radiation lamp in another case.

However, many studies mention above contrast with the study of Trezies et al in 1998 (16) which investigated that occupation is an etiological factor in development of trigger finger or not. The subjects were 208 adult patients who were treated for trigger finger at Queen's Medical Center, Nottingham, during 1994-1997. They were sent a postal questionnaire, which asked about their employment during the last 10 years. After respondences, all of occupations were classified into 4 types that are unemployed/ housewife/ retied, office work, light manual, and heavy manual.

Then the occupational distribution of these patients was compared, using 95%CI, with the occupational data of the county of Nottinghamshire collected in the 1991 census. The result indicated that the distribution of occupations in the two groups of population was not significantly different. Accordingly, they suggested that the majority cause of trigger finger unrelated to work.

Another one factor, which can be associated with trigger finger, is hereditary factor. It was recorded in several studies.

Bollinger and Fahey in 1952 (38) demonstrated the familial incidence in the children that trigger finger occurred in twins; there was simultaneous occurrence in monozygotic twins.

Fahey et al in 1954 (7) demonstrated that there was a report; nineteen-month- old boy with a locked thumb had a brother with bilateral involvement. And they found trigger finger occurred in uni-ovular twins when they were about 53 years ode, which had an almost identical date of onset and symptoms.

Bonnici and Spencer in 1988 (10) found that heredity factor is one cause of trigger finger. Five patients had close relations with who had trigger finger, which are father, brother, and sister. There was one patient had all 5 digits of her hand affected. Her sister suffered from exactly the same condition, again involving all the digits of her right hand. This must be an extremely rare phenomenon.

Previous studies of factors affecting hand and wrist tendonitis including trigger finger are concluded in table 2.1.

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Table 2.1 Previous studies of factor affecting hand and wrist tendinitis including trigger finger

Researchers	Study design	Populations	Method	Factor affecting findings
Fahey et al in 1994	Case report (Trigger finger)	-	Literature review	Congenital Hereditary Heat Excessive hand use
Armstrong et al in 1987	Cross-sectional survey study (Hand & wrist tendinitis)	652 plants workers (from each 4 combinations of force and repetitiveness at 7 work sites)	Interview, Non-invasive physical exam	High repetitive and forceful job
Moore & Garg in 1994	Cross-sectional survey study (Upper limb disorder)	116 workers in a pork processing plant (32 jobs total)	Videotape & observation, Record tools weight	Disorders mostly occurred among hazardous job categories and Morbidity was found in more high exertional demand jobs
Gorsche et al in 1998	Cross-sectional survey study (Trigger finger)	665 meat-packing plant workers	Interview, Non-invasive physical exam	Hand-tool used

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Table 2.1 Previous studies of factor affecting hand and wrist tendinitis including trigger finger (Cont.)

Researchers	Study design	Populations	Method	Factor affecting findings
Bonnici & Spencer in 1988	Retrospective survey study (Trigger finger)	36 patients who had receive operative treatment	Questionnaire (asked to occupation, family history of trigger finger, associated condition, history of previous trauma or hand surgery)	Hereditary Systemic disease Occupation that involve repetitive hand movement
Trezies et al in 1998	Retrospective survey study (Trigger finger)	177 patients who were treated for trigger finger at Queen's Medical Center, Nottingham	Questionnaire (asked to employment during last 10 years)	The vast majority of trigger fingers develop cause unrelated to occupation.

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2.4 Work Related Musculoskeletal Disorders (WMSDs) with Trigger Finger

Work Related Musculoskeletal Disorders (WMSDs) are musculoskeletal disorders caused by performance of work or work environment (39, 40). WMSDs are not included in musculoskeletal injuries that are clearly caused by accidents (41). The term musculoskeletal disorders (MSDs) represent a set of pathological conditions that impair the normal function of soft tissue of musculoskeletal systems such as tendons, muscles, cartilages, ligaments and nerves(41).

The other terms, which often used synonymously with WMSDs are, included “Cumulative Trauma Disorders (CTDs)”, “Overuse Syndrome”, “Repetitive Strain Injuries (RSIs)”, and “Repeated Trauma Disorder (RTDs)” (15, 42, 43).

WMSDs are a common problem found in many different occupations and work groups. This may occur when one exposes to work task associated with the risk factors that can cause or contribute to musculoskeletal system pathology (40).

From the Verdon’s study in 1996 (15) found that since 1989, these syndromes have accounted for more than half of all occupational illnesses reported in the USA and overuse syndromes typically affect the upper body part especially wrist (the most common is CTDs, next in tendinitis). The prevalence of work-related musculoskeletal disorder is drawing an increase in amount of attention on the part of physicians in occupational medicine, management in industry. Upper limb problems, especially in the hand and forearm, are most problematic in the workers (44). It is due to the effect of products and loss of a lot of expense in industry.

Trigger finger is one of WMSDs. From many previous studies found the association between work task characteristics and occurrence of hand and wrist tendinitis, also included trigger finger (7, 14, 36, 37).

2.4.1 Factors Affecting WMSDs

Factors affecting WMSDs are defined as job characteristics or exposures that increase probability of occurrence of WMSDs.

1) Individual Factors

A number of individual factors that can influence a person’s response to risk factors for MSDs in the workplace include: age (40, 45-47), gender (48),

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anthropometry, cigarette smoking, and parity. There may well be other individual lifestyle factors such as diet and exercise habits, as well as a whole host of medical conditions, which affect an individual's predisposition to developing MSDs. Some, but not all, epidemiologic studies have used statistical methods to take into account the effects of these individual factors (e.g., gender, age, body mass index, and parity) when investigating the associations between job tasks and MSDs. These statistical methods control for the confounding or modifying effects when determining the strength of association between MSDs and occupational factors. The examples of individual factors that can influence a person's response to risk factors for MSDs in the workplace are described below:

Age

There are many studies and surveys found the relationship between age and MSDs. The US Health and Nutrition Examination Survey of 1971-1975 reported the overall prevalence of people with musculoskeletal impairment in the population aged 25-74 years (45). In the Canada Health Survey found the prevalence of symptoms and impact in terms of number of sited affected increases markedly with age. The prevalence among the population 65 years and over was also increased (46, 47). Some studies reported age as a risk factor for shoulder tendinitis, which was found to increase with age and occupation load (40, 49). Whereas trigger finger was reported to have peak incidence averaged in 50-59 years old (2, 5, 19).

Gender

The conclusion that the women are at greater risk for hand and wrist tendinitis development has been suggested by many studies. In many cases, this conclusion was made on the basis of clinical experience in which more female than male patients were seen by a particular clinic, such as de Quervain's disease, peri-tendinitis and tenosynovitis (50-52). Some investigators have used biomechanics to argue that women are exposed to higher stresses than men and, as a result, are at higher risk of a chronic tendon injury (53). Result of several hand and wrist tendinitis surveys, it can be argue that women may be exposed to higher stresses because the average dimensions of the female hand are less than these of male hand (14, 54). The stature of the average female is less than that of the average male, women often have to work in a different posture and may be exposed to greater stress than males (14).

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Weight/height

Weight, height, body mass index (BMI), and obesity have been reported to be possible risk factor for carpal tunnel syndrome, low back pain disorder, especially lumbar disc conditions (40). For carpal tunnel syndrome, the relation to BMI has been describing an increase fatty tissue within the carpal canal or an increasing of hydrostatic pressure throughout the carpal canal in obese individuals compared with slender individuals. Sungpet et al indicated that more BMI the patients had due to the greater number of trigger finger (55).

Medical history

Some specifics MSDs were found that a previous history is one of the most reliable predictive factors for subsequent WMSDs problems. Such as the workers who have low back problems tend to associated with the problem of neck and shoulder (49). Some studies have found association between the number or births or pregnancies and sciatica or low back pain, because of the mechanical stress placed on the pelvic ligaments during he final stages of pregnancy (40).

Sports and recreation

Some studies reported the association between playing sport with an increased risk of WMSDs, especially in the professional level (40). In examination, direct pressure from sports racquet may result to thickening of flexor tendon sheath due to trigger finger in later (15). Whereas, others seem to indicated a protective effect of sports (40).

Physical fitness and training

Most of clinicians accepted the concept that improving in physical fitness can reduce musculoskeletal injuries. But at the present, there is still no epidemiologic literature support the efficacy of physical fitness and training as a primary intevention for preventing muscuoskeletal and back injuries (40). However, exercise produces numerous health benefits to humans, which are well recognized by present health professions and sciences. Lack of exercise becomes a co-risk factor for many diseases and public health behavior problems.

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Socioeconomic status

Lower socioeconomic status (SES) employees were reported to have low back pain more frequently than workers with upper SES, it is probably because of the physical demanding occupations often held by people with lower SES (40).

2) Physical factors

A major incentive for ergonomic design is the improved performance and well being of workers. Fatigued or uncomfortable workers are less capable of maintaining safe performances of their task. If they are asked to perform repeatedly and beyond their force capabilities, breakdown will occur. The resultant injury is commonly called cumulative trauma disorder (CTD) (56). Although the human body has great self-reparative abilities, continued exposure to physical risk factors can result in injury. Risk factors that result in cumulative trauma are force, high repeition, awkward posture, reduce recovery time, and environmental factors (vibration and cold). All of these can produce injury alone, but the incidence of injury is increased when these risk factors are combined (57).

Force

Force is defined as the amount of the physical effect that is required to complete a task or motion. Force is an index of the effort exerted to get, hold, or use a work object or to support the weight of the body (58).

The force with when an employee must lift or grip is often associated with CTDs of upper extremities. The greater of force exerted result more potential for CTDs (59). Forceful hand exertion during work activities include carrying or using heavy tools, employing knives or scissors to cut, using wenches and pneumatic tools to tighten bolts, and using one finger or hands to shape or surface finish materials and part are risk factors for trigger finger and other hand tendinitis (15).

Repetition

All biological tissues are viscoelastic and prolong load may affect in residual deformation. Repetitiveness loading may also result in cumulative fatigue, which reduces their stress-bearing capacity and may reduce the threshold stress at which the tissue failure (60). Thomas et al (14) demonstrated the result of survey in workers that the risk of hand and wrist tendinitis in persons who perform highly repetitive and force jobs (highly repetitive job was defined as the job that have a basic

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cycle time of 30seconds or less and in which more than 50% of the work cycle involves similar patterns of upper extremity) was 29times greater than in persons who perform job that were low in repetitiveness and force (14). Highly repetition work may damage tendon directly through repeated stretching and elongation. Such works increase the likelihood of fatigue and decreases the opportunity for tissues to recover (15).

Posture

Locating work surfaces, tools, and raw materials at awkward reaches cause the individual to adopt harmful body postures that can over stress the neck, shoulder, elbow, wrists, and hands (56). Many task leads to prolonged static positioning of the neck, back, arms, and leg producing rapid fatigue and increasing the risk of chronic problem (61). In upper extremity, awkward postures increase the risk of overuse syndrome. These include pinch grips, wrist deviations such as flexion or extension and ulnar or radial deviation, forearm pronation or supination, and shoulder elevation or abduction. Wrist deviations from neutral position show significant losses in grip strength, which increase the amount of force require (15, 59).

Direct pressure

Local mechanic stresses are caused by physical contact between soft body tissues and an object or tool. These occur when a body part is in contact with a hard or sharp object or is used as a striking tool. Trigger finger is seen with tools that have hard, sharp, or small diameter handles. Tools with ringed handles (such as scissor) that rub on the sides and backs of fingers can compress the digital nerve. High pressure on the base of palm can lead to median nerve compression and carpal tunnel syndrome (15, 56). In addition, there are some studies, which investigated hand tool affecting on pressure exertion at the palm and fingers. Using powered tools will include pressure exerted on the palm and fingers than hand tools. Because of powered tools are usually heavier than hand tools, they require a more forceful grip to maintain the control of tolls and tend to vibrate during operation, causing the user gripping more forcefully to maintain the control of tools (62).

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Prolonged constrained posture

Workstation layout, equipment, tool features, and worker anthropometry interact to create a working posture. If work surfaces or tools are at awkward reaches, it can cause a worker to adopt harmful body postures that can overstress the neck, elbow, wrists, and hands (15).

Environmental condition

Vibration – Exposure of the upper extremities to occupational vibration has been associated with a condition known as hand arm vibration syndrome (HAVS) (15, 59). This comprises various circulatory disturbances, sensory and motor neural dysfunction, and musculoskeletal disorders (14). These are result numbness and loss of manual dexterity, muscle and tendon disorders include tendinitis and the symptoms commonly associated with carpal tunnel syndrome (59).

Temperature - Temperature extremes have been shown to increase vulnerability to musculoskeletal problems. It is important to note that employees exerting physical effort in a hot environment are prone to heat-related illnesses. In contrast, cold environments of 52º to 55º F reduce an employee's hand flexibility and manual dexterity, creating the potential for muscle strains and sprains. In addition, low relative humidity in a cold environment may disrupt the skin moisture that creates a good gripping surface(59).

3) Psychosocial Factors

During the past years the relationship between psychosocial work environment and WMSDs has came increasingly into focus added from physical factors. There is evidence to support a relationship between stress reactions and MSDs but it is difficult to conclude whether stress reactions are significantly involved in the development of MSDs or whether those with MSDs simply experience stress reactions due to the experience of pain and functional impairment.

The term "psychosocial" is commonly used in occupational health as an all-inclusive term to describe a variety of factors within and outside the workplace. Some of the psychosocial factors within the workplace that have been associated with work-related MSDs include: job dissatisfaction (63), intensified workload, monotonous work , limited job control (64), role ambiguity (65), and limited social

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support from supervisors and co-workers (64). These work and job environmental factors are often thought of as demands, or risk factors, that may pose a threat to health. Demands arising from roles outside of work, such as responsibilities associated with caring for a parent, spouse, or children may also constitute psychosocial factors that play a role in the development of MSDs. Interactions among factors within and outside of the workplace create what is referred to as a "stress process," the results of which are thought to impact upon both health status and job performance.

Psychosocial stress at work may thus contribute to the development of MSDs arising in the workplace. Hales et al (40) have been suggested the association between psychosocial factors and MSDs as follows:

1. Psychosocial demands may influence the individual's coping capability and produce a stress response. The stress response may increase muscle tension or static loading of muscle.
2. Psychosocial demands may affect MSDs awareness and reporting, or increase its attribution to the work environment.
3. In some work situations, psychosocial demands may be highly correlated with increased physical demands.

Moreover, Hales et al classified psychosocial factors into 2 categories including psychosocial factors from the workplace and individual (40). Workplace psychosocial factors were composed of job or task demand, organizational structure and physical work environment as present in Table 2.1. Individual psychosocial factors were included individual characteristics toward work (such as personality traits, coping ability, attitude toward life, etc.) and non-work factors as present in Table 2.2.

Psychosocial distress and mental disturbance have an important relation to work conditions. The symptoms occur in various occupational setting as a result of work stress such as lowered self-esteem, mental fatigue, loss of concentration, loss of spontaneity and creativity, reduced effectiveness in communication, emotional hypersensitivity, anxiety, problem to sleep or insomnia, suppression of feeling, withdrawal, depression, boredom, and job dissatisfaction (40, 66).

The most commonly identified sources of job stress are summarized in Table 2.3 with both contributing factors and possible consequence (66)

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Table 2.2 Example of workplace psychosocial factors and stressors (40)

Job-Task Demands*	Organization	Physical
Heavy workload	Job insecurity	Too hot or cold
High workload variability	Lack of participation in decision making	Noisy
Increasing work pressure	Poor communication	Noxious odors
Unrealistic deadlines	No opportunity for career advancement	Poor ventilation
Unrealistic production standards	Inadequate compensation	Poor lighting
No control over amount and quality of work	Performance evaluation done poorly	Crowding
	Computer monitoring	Isolation
No control over job-related matters	Long hours or required overtime	
Lack of meaningful work	Shift work	
Lack of autonomy	Little interaction with coworkers	
Underutilization of skills	Lack of social support from supervisors or coworkers	
Ambiguous job expections		
Monotonous task	Poor labor-management relationship	
Inadequate resources to accomplish job	Low priority for health and well-being	
Customer hostility	Racial or gender discrimination	
No opportunity for learning	Sexual harassment	
	No spirit of partnership or teamwork	

* Factor within these categories overlap

Table 2.3 Example of individual and outside work or non-work factors, which affect the psychosocial factors (40)

Individual	Non work
Personality trait	Marital problem
Psychological dysfunction (depression)	Living alone
Coping ability	Financial problems
Job dissatisfaction	Coping ability
Attitude toward life	Child-rearing problem
Attitude toward one's own health	Interpersonal conflict
Overall poor health	
Lower socioeconomic status	
Lower intelligent	

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Table 2.4 Summary of major job stressors (66)

Job stressors	Contributing factors	Possible consequences
Job conditions	Quantitative work overload	Physical and/or mental fatigue
	Qualitative work overload	Job burnout
	Assembly-line hysteria	Increased irritability and tension
	People decision	
	Physical dangers	
	Shift work	
	Technostress	
Role stress	Role ambiguity	Increased anxiety and tension
	Sex bias and sex-role Stereotypes	Lowered job performance
	Sexual harassment	
Interpersonal factors	Poor work and social support system	Increased tension
	Political rivalry, jealousy, or anger	Elevated blood pressure
	Lack of management concern for worker	Job dissatisfaction
Career development	Underpromotion	Lowered productivity
	Overpromotion	Loss of self-esteem
	Job security	Increases irritability and anger
	Frustrated ambitions	Job dissatisfaction
Organizational structure	Rigid and impersonal structure	Lowered motivation and productivity
	Political battles	Job dissatisfaction
	Inadequate supervision or training	
	Nonparticipative decision making	
Home-work interface	Spillover	Increased mental conflict and fatigue
	Lack of support from spouse	Lowered motivation and productivity
	Marital conflict	Increased marital conflict
	Dual-career stress	

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From the previous studies found that work task factors including forcefulness, repetitiveness, direct pressure and hand-tool use are totally the risk factors for developing trigger finger (7, 14, 17, 36, 42). Furthermore, hand function pattern is another one work task factor that should be consider their mechanisms and characteristics for analyzing the affecting with trigger finger or other hand and wrist tendinitis.

2.4.2 Pattern of Hand Functions

The hand is essentially a mobile organ. It can coordinate an infinite variety of movements in relation to each of its elements. This blending of movements of the wrist and digits allows the hand to mold itself to the shape of the object for palpation or grasp(67).

The movements of hand can be divided into two main groups: 1) Prehensile movements or movements in which an object is seized and held partly or wholly within the compass of the hand; and 2) Non-prehensile movements or movements in which no grasping or seizing is involved but by which objects can be manipulated by pushing or lifting motions of the hand as a whole or of the digits individually (68).

Prehensile movements of the hand are used in a broad range of purposive activities involve handling of objects of all shapes and sizes.

Efficient prehensile function depends on a multitude of factors. The most important of which are 1) mobility of carpometacarpal joint of the thumb and, to a lesser extent, of the fourth and the fifth metacarpophalangeal joints; 2) relative rigidity of the second and third carpometacarpal joints; 3) stability of the longitudinal finger and thumb arches; 4) balance synergism and antagonism between the long extrinsic muscles and the intrinsic muscles; and 5) adequate sensory input from all area of the hand. The precise relationships among the length, mobility, and position of each ray also play an essential role (69).

Many attempts have been made to classify different patterns of prehensile hand function. Griffiths in 1943 (70) divided the functions of the hand into cylinder grip, ball grip, ring grip, pincer grip and pliers grip. These terms are represented a series of functional end result rather than a fundamental analysis of the potential of the hand as a whole. The units of function devised by Slocum and Pratt (1946) (71)

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namely, grasp, pinch and hook. But these are not clearly defined nor are they comprehensive for the numerous functions of the hand in which the thumb is not in opposition. McBride in 1942 (72) divided the function of the hand into three types; grasping by the hand as a whole, grasping between the thumb and fingers and grasping by the combined use of the palm and the digits. These three types of movement are somewhat arbitrarily conceived and do not appear to have any particular functional and anatomical basis(68).

In 1956, Napier JR(68) distinguished two distinct patterns of prehensile movements in the normal hand: power grip and precision grip.

Power grip or power grasp, is a forceful act performed with the finger flexed at all three joints so that the object is held between the finger and palm, with the thumb positioned on the palmar side of the object to force it securely into the palm. The wrist is deviated ulnarly and dorsiflexed to increase tension in flexor tendon. **Precision grip** involves the manipulation of small objects between thumb and the flexor aspects of the fingers in a finely controlled manner. The wrist position varies so as to increase the manipulative range. The fingers are generally in a semiflexed position, and the thumb is abducted and opposed. Some activities use both fundamental patterns of hand function, in this example, unscrewing the lid of a tightly closed jar. As the motion is begun, the hand assumes a power grip posture. Then the lid loosens; the hand assumes a precision posture to perform the final stages of unscrewing.

As a refinement of Napier's classification, Lansmeer in 1962 suggested that the precision grip be termed "precision handling" since it involves no forceful gripping of object and is dynamic process without a static phase. In both power grip and precision handling, full opposition of the thumb to the ring and little fingers is obtained via palmar displacement of the metacarpals of these fingers(73).

An important distinction between power grip and precision handling is the fundamentally different position of the thumb in each posture. In the power grip the thumb (68)is adducted, imprecision handling it is abducted.

A variant of precision handling is the often used namely **dynamic tripod** (74) wherein the thumb, index and middle finger have a dynamic action working in

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close synergy for precision handling of the object, while the ring and little finger offer support and static control, for example, the use of scissor and pencil.

A further refinement is pinching a small object between thumb and index finger. These grips are classified according to the part of the phalanges brought to bear on the object handle. Such maneuvers are commonly classified as tip pinch, palmar (or pulp) pinch, and lateral (or key) pinch(69, 75-77). Palmar pinch and lateral pinch are also used in high percentage in activities of daily living than the other types of pinch(78).

For **tip pinch**, the thumb tip to the index fingertip. **Palmar pinch** is thumb pad to pad of index finger. And **lateral pinch** (center) is thumb pad to lateral aspect of middle phalanx of index finger(76). Lateral pinch is less complicated prehensile activity than palmar pinch but is more capable of power pinch. The formation of lateral pinch requires interaction between the intrinsic and extrinsic muscles of the hand. The thenar and intrinsic muscles act to position the thumb in preparation for pinch and then participate along with the flexor pollicis longus to produce the power of pinch(79).

A type of prehensile grip in which the thumb plays little or no part. This is called **hook grip** when requires relatively little muscular effort to maintain and is employed under conditions when precision requirements are minimal and when power needs to be exerted continuously for long periods. The hook grip is also used when for any reason it is impossible to obtain more than a finger tip hold, for example, during the opening or closing of one half of a sash window. This latter function is to all intents and purpose, however, non-prehensile(68).

2.4.4 Mechanism of WMSDs occurrence

World Health Organization has been characterized work-related disorders as multifactor to indicate the inclusion of physical, organizational, psychosocial, and sociological risk factors. A disorder is work related when work procedures, equipment, or environment contribute significantly to the cause of the disorder. There is great variation in the diagnostic criteria for MSDs, ranging from clinical diagnoses based on symptoms and signs for some, to diagnoses based on structural and functional criteria

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for others. We note that "disorder" is a broader category than "injury" and better captures the range of phenomena being considered (80).

MSDs occur when there is a mismatch between the physical requirements of the job and the physical capacity of the human body. More than 100 different work-related MSDs may stem from repetitive motions that produce wear and tear on the body. Specific risk factors associated with WMSDs include repetitive motion, heavy lifting, forceful exertion, contact stress, vibration and awkward posture among others.

One of MSDs causes is the adaptation of static or constrained postures. Amount, duration and distribution of working position load will influence on the musculoskeletal system to discomfort, pain, fatigue, and disability. Dynamic muscular activity will generally sustain loading by ensuring sufficient nutritive blood flow to active muscles, facilitating removal of waste products causing ischemic pain and localized fatigue. Nevertheless, if the static loading is long lasting or repeated daily, pathological changes will occur and resulting in conditions such as arthritis and tendinitis. Repetitive movement under their conditions will perpetuate trauma, prevent resolution of inflammation and lead to chronically (81). The mechanisms of injury consist of acute (over load) and cumulative trauma. The acute trauma occurs with single application of load above the threshold of tissue tolerance, while the cumulative trauma requires repetitive application of submaximal load. Accordingly, heavy loads may be a causal risk factor or modifying factor (82). The worker impairment and disability as related to worker and work attributes and environment factors are shown in Figure 2.1 (82).

Chuffin and Andersson have described mechanisms of pain and disability from repetitive movement and prolonged static exertion as the process of muscle fatigue in 1984 as shown in Figure 2.2 (83). In which, prolongation of tissue loads or performance of frequent exertions resulting in diminished functional capacity. A fatigue process develops along in muscle with acute pain and mechanical damage due to tissue fatigue and interference with nutrition can occur in tendons and joints. When a muscle exertion have acute pain, which can be thought of as a warning sign, and if the pain causing exertion is continued on a daily basis, the muscle may occur adaptation that is become a stronger and gains in endurance with a concomitant

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decrease in pain level. And if the exertion is so heavy that pain does not decrease or even increases, other structures more than muscle tissue as tendon and joints tissue also can be initiated by an inflammatory process. Such inflammation can develop as reaction to mechanical strain of the tissues when there is not adequate rest to allow physiological adaptation. Thus, if frequently repetitiveness or continuous activities are performed for several weeks or longer, chronic pain and tissue degeneration can develop.

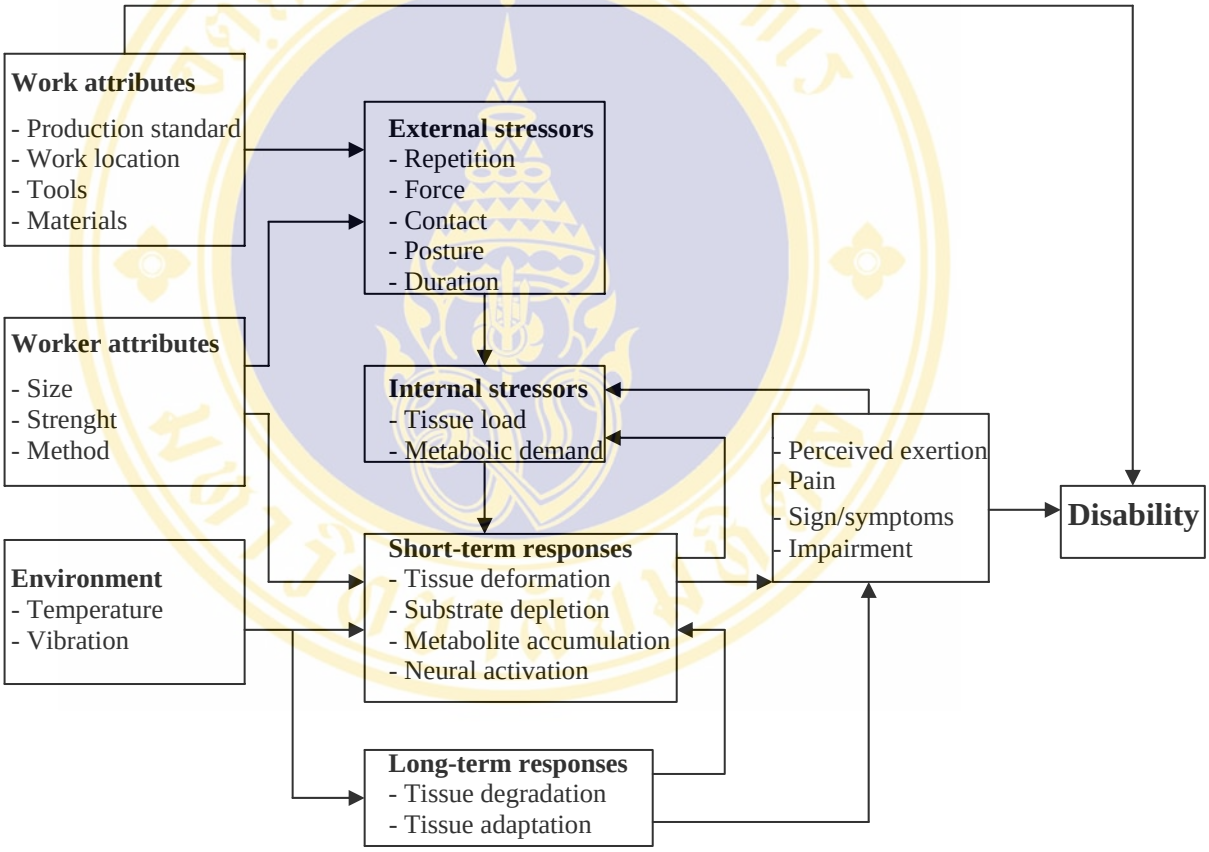

Figure 2.1 Worker impairment and disability as related to work attributes and environment factors (82)

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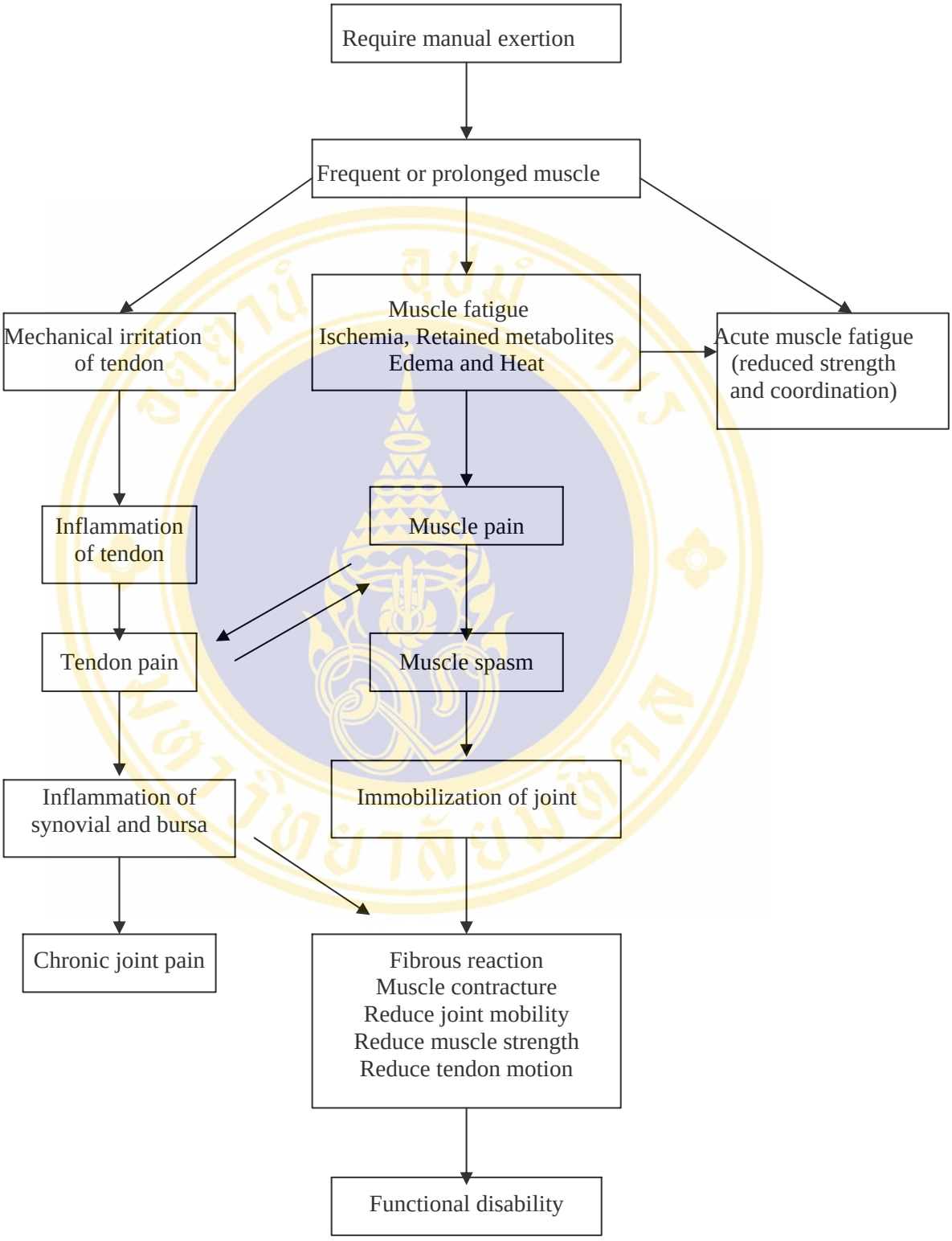

Figure 2.2 Sequences of even producing musculoskeletal pain and functional disability because of frequent or prolong muscle tension. Peripheral nerves may be involved also if adjacent to affected area (83)

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2.5 Biomechanics and Physiology of Tendon

2.5.1 Digital Flexor Tendon Sheath Pulley System

Most tendons in the hand are restrained to some extent by sheaths and retinacula that keep them close to the skeletal plane and maintain a relatively constant a moment arm rather than bowstring across joints. The pulley system of flexor tendon sheath in finger is the most highly developed of these restraints (14, 69).

In each digit these 2 tendons, surrounded by their synnovial sheaths, are held against the phalanges by a fibrous sheath. At strategic location along the sheath are 5 dense annular pulley (designated as A1, A2, A3, A4, and A5) and 3 thinner cruciform pulleys (C1, C2, and C3) (69, 84, 85). These pulleys allow for a smooth curve so that no sharp or angular bends exist in the course of tendon (85). Accordingly, local points of high pressure (stress raisers) between tendon and sheath are minimizing. There are 3 mechanical factors associated with pulley and slings as following (69);

1) The pressure between tendon and sheath on the bone is so great that high friction and drag might be expected. But in face, the contiguous surface of tendon and sheath on the concave side of a curve are never attached to any paratendinous tissues but rather are free – gliding surface lubricated with synovial fluid. There are paratendon tissues on the convex curve of the tendon and in area where it is free of friction under pressure.

2) There are no shapes or angular bends in normal tendon. The sheaths or pulley always allow for a smooth and minimizes local points of high pressure between tendon and sheath. On the century, when there is only one of narrow pulley, it is bad for two reasons. 1. A lot of force is concentrated on that narrow band. It may break or become stretched. 2. The narrow band distorts the tendon may cause an obstruction of gliding. Moreover, a narrow sling can deeply indent a tendon, making a swelling on each side of the sling so that it is difficult to start the tendon movement. However, it is better to use wider pulleys or multiple pulleys that will allow smaller changes of tendon direction at each.

3) When the joint is flexed, the tension in the tendon will tend to pull the pulley away from its attachment or to pull the bone that forms that attachment away

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from the joint. If all the tissues are strong and joint are stable, there is no problem, but if the joint is unstable as in RA, there may be a danger of severe subluxation.

2.5.2 Biomechanics and Physiology with Pathogenesis of Tendon

Tendon functions as mechanical link that transmit forces, stabilize movement, and move the kinematics chains of the extremities. As a result, tendons are subjected to tensile stresses by the muscle and to compressive and shearing stresses from adjacent bone ligament (69). Tensile stresses are related to the contractile force of the muscle and cross- sectional area of tendon. The compressive stress is related to the force, the radius of curvature, and the area of contract of the tendon. The shearing force is related to the tendon force and velocity, the area of contact, and the friction between tendon and the adjacent surface. Tendon responds mechanically to these stresses by becoming deformed (14).

In addition to mechanical response as mention above, tendon also respond physiologically include metabolic, circulation, and adaptive changes. Typical responses include thickening, proliferation of fibrocytes and fibrous connective, destruction of synovial membranes, and adhesions (14).

The mechanism of these changes probable involves occlusion of blood flow and deprivation of nutrients. The nutrient pathway involves both bulk flow and diffusion (86). Diffusion requires a concentration gradient between the tendon and surrounding synovium that is maintained by circulation. Occlusion of blood flow caused by compression of the tendon against adjacent surfaces, thickening of tendon sheaths or increased diffusion distance due to thickened sheaths would contribute to deprivation of nutrients. The deprivation will be related to the intensity of the exertion, the duration of the exertion, and the frequency of exertion that is forcefulness and repetitiveness. Repetitiveness is best characterized as a number of times that tendon is stretched or squeezed per unit of times (14, 86).

Some tissues, such as tendons and tendon sheaths, are highly adapted to bearing mechanical loads, while other, such as nerves and blood vessels, are not. The result is that some tissues can endure much more trauma than others (14). Tendons are relatively avascular structures whose gliding is facilitated a surrounding layer of tenosynovium, which is subject to inflammation from a variety of cause, especially

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microtrauma in overuse syndrome (15). However, both have limits before the recovery becomes insufficient for the response (14).

2.6 Questionnaire as Survey Instrument

Questionnaire is one of the most popular tools to collect and analyze data of qualitative research. Survey questionnaire were developed for collecting information to describe, compare, or explain knowledge, attitude, and practices or behavior that are unknown facts (87, 88). Purposes of questionnaire are similar to interview but differ in techniques. The questions in questionnaire are typically arranged into mailed of self-administered whereas face-to-face between interviewer and interviewee is interview method. However, receiving data will approach to the fact the most when combine both questionnaire and interview more than use only one (87). Accordingly, the questionnaire was divided into 2 types that are self-administered questionnaire and interview form (87, 88).

2.6.1 Self-Administered Questionnaire

The question in this form will be completed for easy to understand and the respondents can fill it independently. The data will be collected by mailed or staffs distribute and explain the questionnaire before the respondents fill out by themselves.

2.6.2 Interview Form

In this form, the questions may be completed or incompleted because of the respondents will be explained and asked by staffs. In fact, this questionnaire was developed for reminding the interviewer and recording the answers from interview. To collect data can be arranged into in-person (face-to-face) or telephone interviews.

There are several different interview formats that can be applied in qualitative research. Three general categories of interviews are listed and defined in Table 2.5 (89).

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Table 2.5 Forms of interview

Form	Characteristic
Scheduled, standardized (orally administered Questionnaire)	Ask the same questions Use the same order of questions If follow-up questions are used, use the same questions
Nonscheduled, standardized	Ask the same questions May use a different order of questions Use the same follow-up questions
Nonstandardized	May use an interview guide with general questions Specific information is usually desired, but a variable format is used

The researcher may select to use the most structured interview approach a scheduled, standardized interview. In this form of interview, there is no variation in questions, sequence, or follow-up questions, so the researcher may devote full attention to the mechanics of the interview.

However, these types of questionnaire are varying in basic qualification and have both merits and demerits, so the researcher should consider and choose the form that is suitable for research and the respondents.

Both of questionnaire forms were applied in this study. Self-administered (distribute and explain by the researcher) can solve many problem such as a small amount of questionnaire return, the respondents can ask if they doubts, and to increase contact between researcher and respondents (87). Interview form was used for the section that is difficult to understand or some data that the respondents can not fill them (that is types of hand function pattern). Moreover, the interview form might be used for low education respondents who can not read and write.

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CHAPTER III
Materials and Methods

1. Study Design

The design of this study was a cross-sectional design using self-administered questionnaire and interview questionnaire to survey characteristics of trigger finger patients and determind factors affecting trigger finger. The survey was conducted in Leard-sin Hospital from May-June 2006.

2. Study population

The trigger finger patients who came for receiving treatment at Leard-sin Hospital Thailand in eight weeks period were the participants of this survey.

Exclusion criteria

The patients who had secondary (associated disease) and congenital trigger finger and who had other hand disease were excluded from this study.

3. Materials and Procedures

All patients were reviewed retrospectively. Questionnaire and physical examination were applied in this survey.

3.1 Questionnaire

Two sets of questionnaire were used for data collection. The first set was designed for self-administered, the other was designed for interview. Both of them were applied for all subjects.

Self-administered questionnaire

This set of questionnaire consisted of 4 sections as follows

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Section 1 The demographic data

This section consisted of 11 questions asking about individual characteristics including;

- Date of birth
- Age
- Gender
- Marital status
- Level of education
- Weight
- Height
- Hand dexterity
- Health status or associated condition (RA, DM)
- History of trauma or previous hand surgery during the last 12 months, and the last 7 days
- Family history of trigger finger

Section2 Psychosocial data

This section contained 18 questions in relation to psychosocial factors. The questions included work satisfaction, other professional relationship, social support, family support, economic support, time pressure, work stress, tiredness, fatigue, insomnia, monotonous work, depression, burnout or job turnover and improper environment.

Every answer to this section was assigned value between 1 and 5 (Strongly disagree, Disagree, Neither agree nor disagree, Agree, Strongly agree) (88)

Section 3 The work and activity related data

This section consisted of questions related to work task or activity factors including occupation, position or work task, work task characteristics, duration of current work task, former work, and other regular activities or hobbies

Section 4 Symptoms data

This section included behavior of symptoms such as time of the symptoms began, characteristics, behavior, duration, area of pain or discomfort, and activities affecting or limitation.

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Interview questionnaire

The questionnaire used in this study for the interview was designed to collect further information of work task or activities related data in order to identify details of subject's characteristic and manner. This questionnaire included type of hand function, duration and frequency of each hand activities.

3.2 Questionnaire development strategy

The strategy to develop the questionnaire for this study used the following steps (87, 88)

1) Defined the purpose of the questionnaire through this following guiding question.

- Are there specific individual factors associated with trigger finger?
- Are there specific work and activity factors associated with trigger finger?
- Are there specific psychosocial factors associated with trigger finger?

2) Reviewed the literatures, which were related to all relevant factors to trigger finger and existing questionnaires to determine if they were applicable or adaptable for this study.

3) Constructed an outline that listed all the pieces of information, which were required for the guiding question, by choosing the particular variables that most relevant to target population in this study.

4) Designed the questionnaire by writing series of questions, which reflected the guiding questions. The content should be in a logical sequence. Therefore the content of this questionnaire used 3 categories of trigger finger risk factors including;

I) Individual characteristics,

II) Work task and activity related characteristic,

III) Psychosocial factor.

The questions regarding to symptom were modified from existing questionnaire based on "The Standard Nordic questionnaires" of Kuoinka and colleagues in 1987 and Dickinson and colleagues in 1992 into Thai language (90, 91).

The prologue of questionnaire included the purpose of this survey and the source of this questionnaire. A statement of thanks to the subjects for completing the questionnaire was be included in epilogue (87).

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5) Questionnaire was designed to test the reliability of respondent's answer by using two different questions, which required consistent answers (such as the answer of the question asking for job turnover in patients who had recurrent trigger finger should be corresponded with the answer of question the job when they had trigger finger for the first time).

6) After the questionnaire was constructed, physical therapy lecturers who were ergonomic and orthopedic specialist assured the content validity.

7) For best achieving validity and reliability, the designed questionnaire had been piloted and was revised through the following process:

Questionnaires were tested in 10 colleagues for receiving their opinions on the questions.

Questionnaires were tested in 20 general populations in order to determine questions that were unclear or misleading.

After the questionnaires were tested to general populations, the hand function data section was revised from self-administered questionnaire to interview questionnaire due to it was quite difficult to understand the hand function types and most of subjects could not fill in questionnaire by themselves.

The interview questionnaires were administered to general populations who had various educations. The researcher was also trained to interview from the physical therapy lecturer, in order to ensure the same understanding in the questions of all correspondents.

Questionnaires were piloted in 37 trigger finger patients who attended at Leard-sin hospital and being observed by the researcher to ensure that they fully understood all items.

Table 3.1 Number of subjects in questionnaire development pilot study

Subjects	Numbers
Colleagues	10
General populations	20
Focus group	
First survey (9th Sep 04)	9
Second survey (13th Sep 04)	5
Third survey (16th Sep 04)	11
Fourth survey (23rd Sep 04)	12

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8) Based on the result of several pilot testing, the questionnaire was revised through following steps:

8.1 Revised some wordings or sentences which were difficult to understand or ambiguous to patients.

8.2 Designed new format of questionnaire to avoid some pages being overlooked and to emphasize on some keywords and answers.

8.3 Adding a question asking for direct trauma if it affected trigger finger and caused of going to see doctor at this time.

8.4 Adding a question in section 3 (work and activity related data), asking about the former work and the duration they had work.

8.5 Adding a question asking for which fingers were performed an operation on in history of previous hand surgery data.

8.6 Revised instruction statement in each part that patients could fully understand and completed the questionnaire according to the instruction.

3.3 Physical Examination

Physical examination was performed after the patients finished filling in self-administered questionnaire in order to confirm the fingers affected with trigger finger and assessed symptoms, severity of triggering and associated disease, which following this step:

1) Trigger finger grading were performed by palpation of tenderness and triggering in A1 pulley area (head of metacarpal bone), active and passive movement for assessing the severity of triggering. For this study, the patients were graded by Quinnell's classification as the following (27).

Grade 0	None	Even movement during flexion/extension
Grade I	Mild	Uneven movements during flexion/extension
Grade II	Moderate	Active correctable; interferes with normal hand function
Grade III	Severe	Passively correctable
Grade IV	Locked	Fixed in flexion

2) Pain level (Visual analog scale) and pain area were noted by the researcher.

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3) Associated diseases were screened from medical history, observation, inspection and special test might be performed for some disease as de Quervain's disease and carpal tunnel syndrome.

For achieving validity of physical examination, the researcher was trained to assess the symptom and severity of trigger finger by Dr.Vichai Vijitpornkul, who is orthopedic and trigger finger specialist. He had found new technique for percutaneous release of trigger finger by using the blade probe since 1999 and this technique was applied for treat more than 4000 patients effectively.

The results from physical examination were be recorded in physical examination form.

4. Data Collection

This survey was performed every Monday, Tuesday and Thursday, which are the hospital arrangement for treating trigger finger patients.

The questionnaires were completed within the same day. Each patient was performed physical examination after questionnaire is completed following these steps;

The first step The self-administered questionnaires were distributed to the patients who were waiting to see the doctor (the patients would arrive at hospital around 8 am, but the time they would see the doctor is around 9 pm). Each patient took about 10 minutes to finish filling the questionnaire based on the result obtained during questionnaire development.

The second step The personal interview and physical examination were made after the patients had seen the doctor but before they got a treatment which was minor surgery or steroid injection.

In first step, if the patients had more free time, the interview questionnaires were made for some patients in this step.

However, theses steps were performed during the patient's free time, so that it did not interrupt their medical services. All of the data collection steps are provided in the flow chart as follows;

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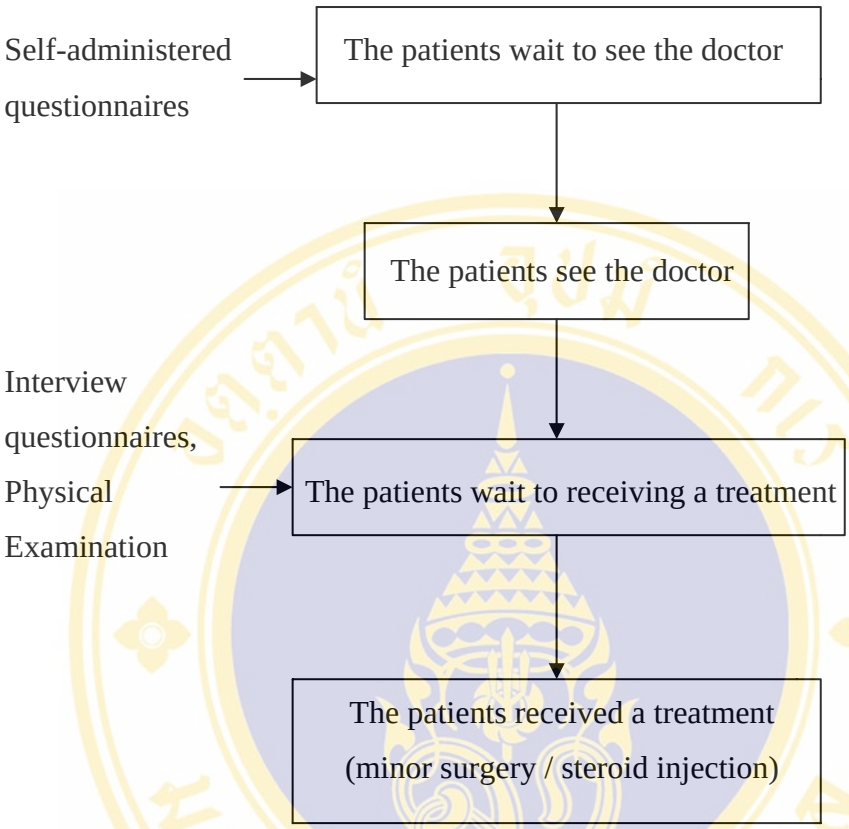

The process of data analysis was started after all completed questionnaires were collected.

5. Data Analysis

All data from this survey were analyzed using SPSS/PC for window release 13.0 as the following;

1. Descriptive statistics were used to summarize responses, i.e. frequency, percentage, mean, standard deviation, and prevalence rate of trigger finger.

2. Analytic statistics: The Chi-square statistic test of independence were used to determine the association between each of 4 categorical factors variables (hand function patterns, occupations, handedness, and gender) and affected fingers.

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CHAPTER IV
RESULTS

The results of this study were analyzed from total 320 questionnaires, including self-administered and interview form, completed by patients with trigger finger at Leard-Sin hospital from May- June 2006. Two hundred and fifty seven questionnaires, met inclusion criteria while 63 questionnaires were excluded (there were 35 diabetes mellitus, 8 de Quervain disease, 18 CTS and 2 osteoarthritis patients). These 257 questionnaires were checked for completeness and 7 questionnaires were eliminated because of incomplete data. Therefore, 250 completed and valid questionnaires were analyzed.

4.1 Demographic Characteristics

The average age of the respondents was 55.39 years (SD = 7.95, range = 31-81). There were 201(80.40%) women and 49(19.60%) men. The demographic characteristics of all respondents are shown in Table 4.1.

Table 4.1 Demographic characteristics and health report of all trigger finger patients

Respondent's demographic Characteristic	Female (n = 201)	Male (n = 49)	Total (n = 250)
Age (years)			
Mean	54.95	57.18	55.39
SD	7.76	8.54	7.95
Min-Max	31-81	42-79	31-81
Marital status (n(%))			
Single	32 (15.92)	8 (16.33)	40 (16.00)
Marriage	149 (74.13)	39 (79.59)	188 (75.20)
Widow/divorce	20 (9.95)	2 (4.08)	22 (8.80)
Education level (n(%))			
Never study	16 (7.96)	1 (2.04)	17 (6.80)
Pratom	60 (9.95)	6 (12.24)	66 (26.40)
Mathayom3	14 (6.97)	6 (12.24)	20 (8.00)
Mathayom6	27 (13.43)	11 (22.45)	38 (15.20)
Bachelor's degree	71 (35.32)	18 (36.73)	89 (35.60)
Post graduate degree	13 (6.47)	7 (14.29)	20 (8.00)

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Table 4.1 Demographic characteristics and health report of all trigger finger patients (Cont.)

Respondent's demographic Characteristic	Female (n = 201)	Male (n = 49)	Total (n = 250)
Income (n(%))			
<5,000	74 (36.82)	7 (14.29)	81 (32.40)
5,001-15,000	40 (19.90)	9 (18.37)	49 (19.60)
15,001-20,000	24 (11.94)	6 (12.24)	30 (12.00)
20,001-30,000	27 (13.43)	14 (28.57)	41 (16.40)
>30,000	36 (17.91)	13 (26.53)	49 (19.60)
Weight (kgs.)			
Mean	57.46	68.49	59.62
SD	9.28	9.13	0.22
Min-Max	40-74	47-87	40-108
Height (cms.)			
Mean	155.46	167.27	157.52
SD	5.21	6.53	7.30
Min-Max	142-178	147-180	142-180
BMI (kg/m^2)			
Mean	23.87	24.43	23.98
SD	3.35	2.54	3.21
Min-Max	17.78-38.54	17.99-29.04	17.78-38.54
Handedness (n(%))			
Left	16 (7.96)	2 (4.08)	18 (7.20)
Right	181 (90.05)	45 (91.84)	226 (90.40)
Both	4 (1.99)	2 (4.08)	6 (2.40)
Medical problem (n(%))			
No	121 (60.20)	29 (59.18)	150 (60.00)
Yes	76 (37.81)	17 (34.69)	93 (37.20)
No medical check up	4 (1.99)	3 (6.12)	7 (2.80)
History of accident in past 12 months (n(%))			
No	199 (99.00)	48 (97.96)	247 (98.80)
Yes	2 (1.00)	1 (2.04)	3 (1.20)
History of accident in past 7days (n(%))			
No	201 (100)	49 (100)	250 (100)
Yes	-	-	-
History of direct trauma (n(%))			
No	197 (98.01)	47 (95.92)	244 (97.60)
Yes	4 (1.99)	2 (4.08)	6 (2.40)
History of surgery (n(%))			
No	176 (87.56)	40 (81.63)	216 (86.40)
Yes	-	-	-
Yes (for trigger finger)	25 (12.44)	9 (18.37)	34 (13.60)

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Table 4.1 Demographic characteristics and health report of all trigger finger patients (Cont.)

Respondent's demographic Characteristic	Female (n = 201)	Male (n = 49)	Total (n = 250)
Family history (n(%))			
No	183 (91.04)	45 (91.84)	228 (91.20)
Yes			
Relationship			
Mother	4 (1.99)	1 (2.04)	5 (2.00)
Father	1 (0.50)	-	1 (0.40)
Brother/Sister	12 (5.97)	3 (6.12)	15 (6.00)
Son/Daughter	1 (1.50)	-	1 (0.40)
Take care of children/senile (n(%))			
No	163 (81.09)	44 (89.80)	207 (82.80)
Yes	38 (18.91)	5 (10.20)	43 (17.20)
Smoking (n(%))			
No	197 (98.01)	32 (65.31)	229 (91.60)
Yes	-	3 (6.12)	3 (1.20)
Yes but already quit	4 (1.66)	14 (28.57)	18 (7.20)
Alcohol (n(%))			
No	199 (99.00)	31 (63.27)	230 (92.00)
Yes	2 (1.00)	18 (36.73)	20 (8.00)

kg = kilogram , cm = centimeter
* BMI = body mass index = weight/(height)^2

4.2 Work Task Related Factors

The work task data were categorized into 13 groups according to the characteristics of tasks. The housewives were the most frequently found in this study (28.4%).

Table 4.2 Number of respondents in various work tasks

Work Task	Number of patients (n(%)[a])
Housewife	71 (28.4)
Business owner	10 (4.0)
Academic staff	33 (13.2)
Accountant, Computer user	15 (6.0)
Merchant	12 (4.8)
Retired government official	27 (10.8)
Chef	18 (7.2)
Executive	16 (6.4)
Documentation officer	7 (2.8)
Writer	3 (1.2)
Mechanical worker	9 (3.6)
Tailor	6 (2.4)
Others	23 (9.2)

[a] % of total 250 trigger finger patients

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Table 4.3 Work task related factors of all respondents

Work task related factors (n = 250)	
Work experience (years)	
Mean	19.61
SD	11.74
Min-Max	1-50
Length of continuous working day (hr./day)	
Mean	3.02
SD	1.45
Min-Max	0.5-12.5

However, there were other hand activities or hobbies had been reported beside main work task of 161 respondents (46.4%). Housework was the most frequently found (44.8%) as shown in table 4.4.

Table 4.4 Other hand use activity of the respondents

Activity	Number of patients (n(%)[a])
Housework	112 (44.8)
Gardening	57 (22.8)
Sport (Golf, Tennis, Handgrip)	25 (10.0)
Others	10 (4.0)

[a] % of total 250 trigger finger patients

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4.3 Psychosocial Factors

The answers of this data were divided in to negative, positive, and moderate answer, which "negative" is negative answer to the related factor, "positive" is positive answer to the related factor, and "moderate" is neither positive nor negative answer to the related factor. However, this result of psychosocial data shows no tendency of possible problem in each respondent.

Table 4.5 Psychosocial factor of all trigger finger patients

Psychosocial factor	**Number of patients (n(%)[a])**		
	Neg.	**Post.**	**Moderate**
Work satisfaction (n = 148)	2 (1.35)	88 (59.46)	58 (39.19)
Other professional relationship (n = 148)	5 (3.38)	95 (64.19)	48 (32.43)
Social support (n = 148)	23 (15.54)	68 (45.95)	57 (38.51)
Family support (n = 250)	7 (2.80)	201 (80.80)	42 (16.80)
Economic status problem (n = 250)	24 (9.60)	128 (51.20)	98 (39.20)
Time pressure (n = 250)	77 (30.80)	95 (38.00)	78 (31.20)
Work stress (n = 250)	25 (10.00)	150 (60.00)	75 (30.00)
Tiredness (n = 250)	40 (16.00)	80 (32.00)	130 (52.00)
Fatigue (n = 250)	55 (22.00)	108 (43.20)	87 (34.80)
Insomnia (n = 250)	25 (10.00)	140 (56.00)	85 (34.00)
Monotonous work (n = 250)	19 (7.60)	126 (50.40)	105 (42.00)
Depression (n = 250)	4 (1.60)	212 (84.80)	34 (13.60)
Burn out, Job turnover (n = 250)	9 (3.60)	197 (78.80)	44 (17.60)
Inappropriate environment (n = 250)	9 (3.60)	185 (74.00)	56 (22.40)

[a] % of patients calculated for each psychosocial factor

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4.4 Affected Fingers

The numbers of patients listed depending on affected finger are shown in Table 4.6. The right middle finger was most frequently found at the rate of 40% followed by left middle finger (28.8%) and right thumb (26%). While the left little finger was the least affected finger (1.66%).

Table 4.6 Numbers of respondents who had trigger finger affected in each finger

Affected finger	Number of patients (n(%)[a])
Right thumb	65 (26.0)
Right index	57 (22.8)
Right middle	100 (40.0)
Right ring	49 (19.6)
Right little	8 (3.2)
Left thumb	40 (16.0)
Left index	27 (10.8)
Left middle	72 (28.8)
Left ring	34 (13.6)
Left little	3 (1.2)

[a] % of total 250 trigger finger patients

The numbers of affected fingers in both male and female are displayed in Figure 4.1. All fingers trended to present trigger fingers in both gender. In female, thumb and middle finger were the affected fingers trended to found more than male in this study.

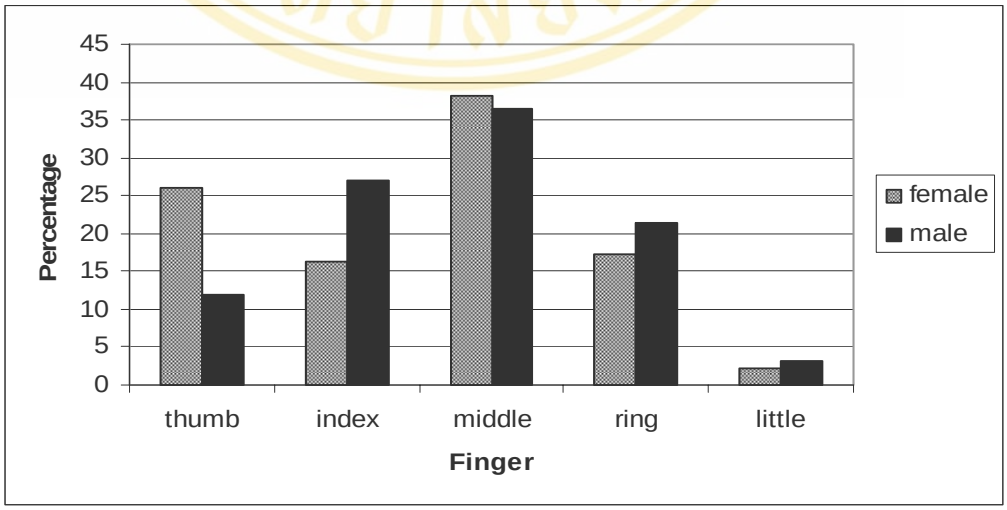

Figure 4.1 Graph shows percent of trigger finger reported in each finger among genders

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From the result, trigger finger tended to present on right hand on both the handedness side. The data of affected hand side with trigger finger and hand dexterity are presented in Figure 4.2.

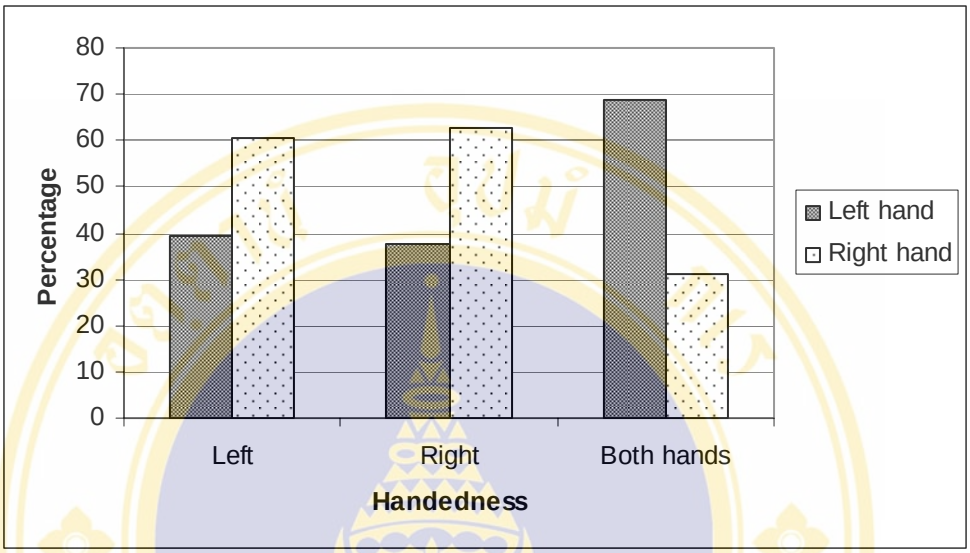

Figure 4.2 Graph showing percent of trigger finger and handedness

4.5 Affected finger with different pattern of hand function

Respondent's hand function patterns that had mostly been reported depending on their work task or activity shown in Table 4.7. The hand function pattern mostly reported is the power grip (47.2% in right hand and 45.6% in left hand), followed by hook grip (28.4% in right hand and 42.4% in left hand). Figure 4.3 and 4.4 present the numbers of affected fingers in both hands in each hand function pattern. Hand function patterns that could affect all fingers, most in middle finger, are power grip and hook grip. The patients who always use pinch pattern, that are pulp pinch, tip pinch and lateral pinch had trend to present trigger finger mostly on thumb. On the other hand, all of affected fingers in this study were reported that power grip and hook grip were used more than other hand function pattern.

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Table 4.7 Percentage and number of patients in various hand function in each hand

Pattern of hand function	Number of patients (n(%)[a])	
	Right hand	Left hand
Power grip	118 (47.2)	114 (45.6)
Precision grip	1 (0.4)	2 (0.8)
Power + Precision grip	1 (0.4)	1 (0.4)
3-digit pinch	47 (18.8)	9 (3.6)
Pulp pinch	3 (1.2)	5 (2.0)
Tip pinch	3 (1.2)	2 (0.8)
Lat pinch	2 (0.8)	1 (0.4)
Hook grip	71 (28.4)	106 (42.4)
Others	4 (1.6)	10 (4.0)

[a] % of patients calculated for each hand side

In the power grip, the most activities were clothes washing, wringing and in hook grip was reported mostly used to carry bag on both hand side. Writing was frequently found in 3-digit pinch on right hand whereas "others" hand function had typing was the most activity on left hand. The numbers of hand activities in each hand function pattern are shown in table 4.8

Table 4.8 Top three percentages and number of patients in various hand activities

Pattern of hand function	Activity	Number of patients (n(%)[a])
Right hand		
Power grip	clothes washing, wringing	34 (28.57)
	cooking (stir-frying, chopping, cutting)	22 (18.48)
	brooming, mopping	9 (7.56)
Hook grip	bag carrying	61 (85.92)
3- digit pinch	writing	34 (72.34)
	scissors using	7 (14.39)
Left hand		
Power grip	clothes washing, wringing	46 (40.35)
	car driving	7 (6.14)
	golf driving	6 (5.26)
Hook grip	bag carrying	96 (90.5)
Others	typing	7 (70)
	Pressing	3 (30)

[a] % of patients calculated for each hand function pattern

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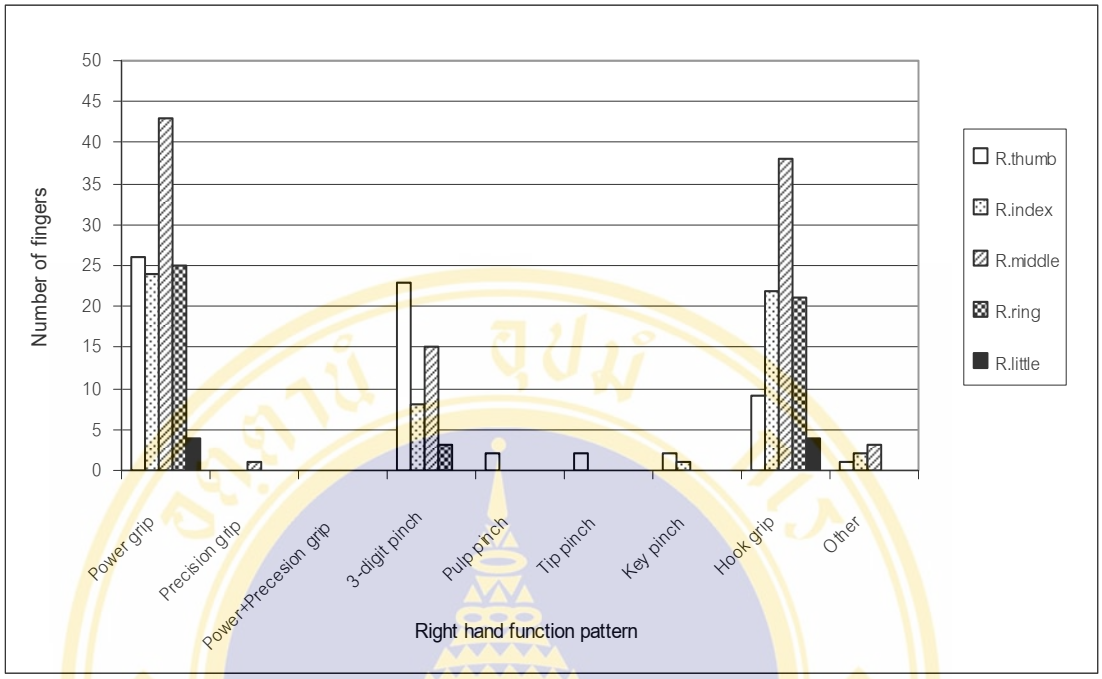

Figure 4.3 Number of affected fingers reported in each right hand function patterns

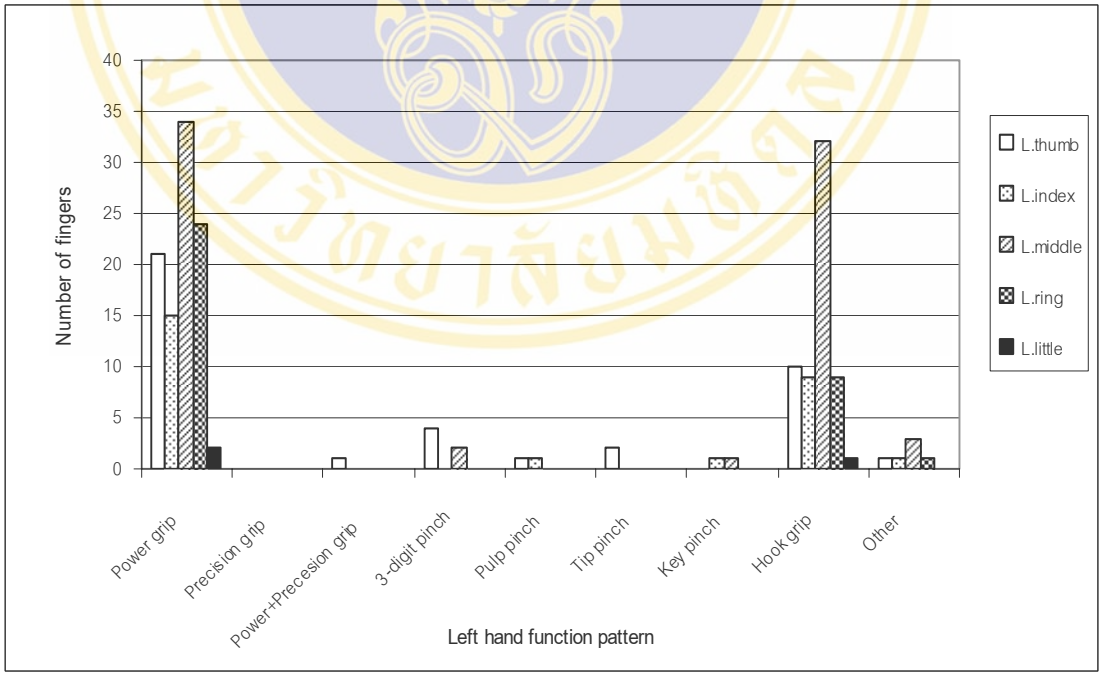

Figure 4.4 Number of affected fingers reported in each left hand function patterns

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4.6 Affected fingers with work task

From the result, housewife, merchant, chef, executive and retired government official are the occupations that trigger finger was found to occur in all fingers. Academic staff and writer have been affected mostly on thumb. Furthermore, little finger was found more in merchant, executive, and retired government official than other occupations. Moreover, all occupations mainly occurred on middle finger. The percentage and numbers of affected finger in various occupations are presented in Figure 4.5and 4.6

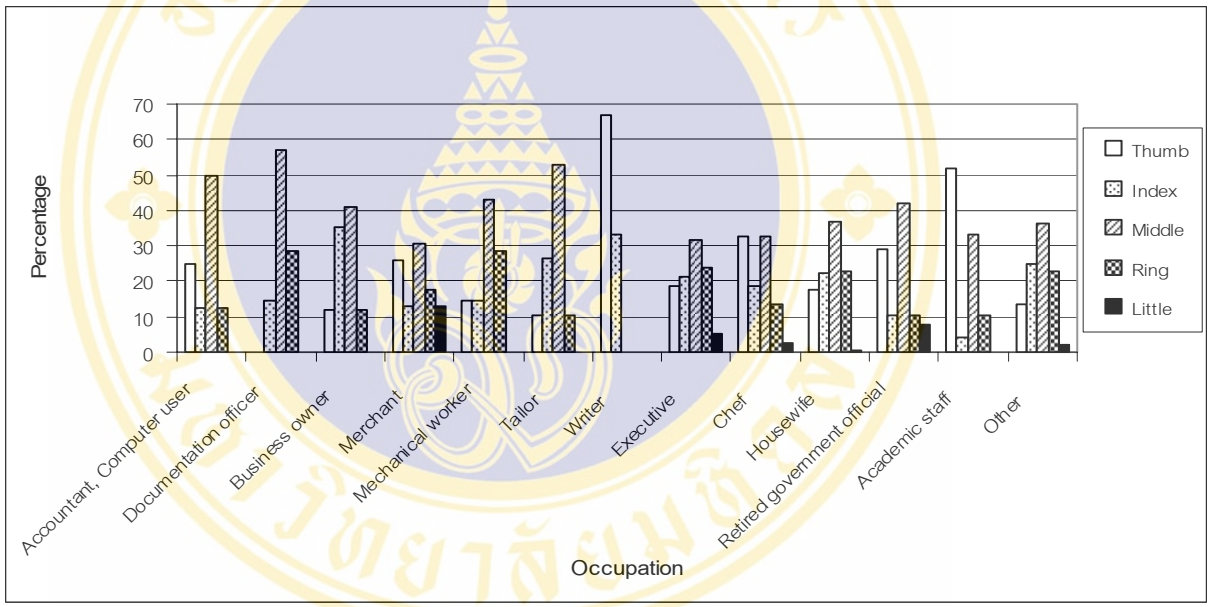

Figure 4.5 Percentage of affected finger reported in each occupation

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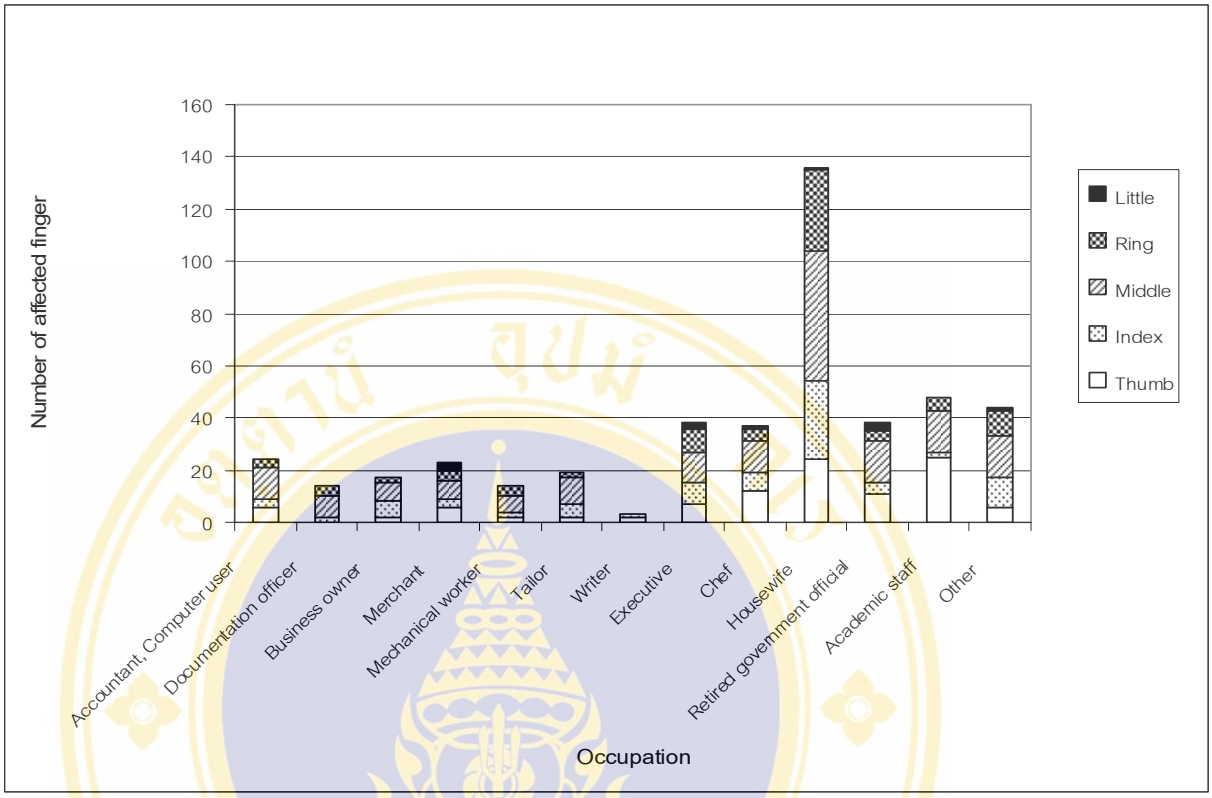

Figure 4.6 Numbers of affected finger reported in each occupation

4.7 Symptom Characteristics of Trigger finger

4.7.1 Clinical symptom

The first three symptoms of trigger finger that mostly occurred in patients in this study were pain (88%), stiffness (62.4%), and tension (56.8%). Details of clinical symptom of trigger finger are displayed in Table 4.9.

Table 4.9 The clinical symptom of trigger finger among trigger finger patients

Clinical symptom	Number of patients (n(%))
Pain	220 (88.0)
Weakness	36 (14.4)
Numbness	42 (16.8)
Discomfort	58 (23.2)
Edema	42 (16.8)
Tension	142 (56.8)
Stiffness	156 (62.4)
Others	86 (34.4)

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4.7.2 Symptom behavior

Most of symptom behaviors were found to be “in the morning” (76%), followed by symptom “during working” (42.4%) and “all the time” (29.6%). Details of symptom behavior of trigger finger are shown in Table 4.10.

Table 4.10 The symptom behavior of trigger finger among trigger finger patients

Symptom Behavior	Number of patients (n(%))
In the morning	190 (76.0)
During working	106 (42.4)
After working	26 (10.4)
All the time	74 (29.6)
Others	35 (14.0)

4.7.3 Severity of symptom

In the interview form, pain scale 0 – 10 was used to measure severity of symptom during period having most symptoms. 0 = no symptom, 1-2 = very mild symptom, 3-4 = mild symptom, 5-6 = moderate symptom, 7-8 = severe symptom and 9-10 = very severe symptom. As shown in table 4.11, the results revealed that trigger finger symptoms of respondents having most symptoms fall in range 7-8 which is defined as “severe symptom” (37.2%), followed by “very severe symptom”(27.2) and “moderate symptom” (17.6%).

Table 4.11 The severity of symptom of trigger finger among trigger finger patients

Severity of symptom	Number of patients (n(%))
No pain	1 (0.4)
Very mild	16 (6.4)
Mild	28 (11.2)
Moderate	44 (17.6)
Severe	93 (37.2)
Very severe	68 (27.2)

4.8 Causes of symptom

The result from questionnaires should be pointed that housework was the majority causes for trigger finger which were 49.6%, followed by working (45.6%). Details of the causes of symptom are presented in Table 4.12

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Table 4.12 The causes of symptom of trigger finger among trigger finger patients

Cause of symptom	Number of patients (n(%))
Accident	6 (2.4)
Sport/Exercise	11 (4.4)
Housework	124 (49.6)
Working	114 (45.6)
Others	55 (22.0)

4.9 Association between hand function patterns and affected fingers

Table 4.13, 4.14 show the results of chi-square test to determine the association between hand function patterns and affected finger. All hand function pattern were organized into 3 groups depending on their finger use. On the right hand, hand function was found to have significantly association with the finger that were thumb ($p<0.001$) and ring and little finger ($p<0.01$). The highest percent of thumb was found in the respondents who always use pinch pattern (i.e. 3-digit pinch, pulp pinch, tip pinch and key pinch) while ring, little finger was found in hook grip.

On left hand, there was only one finger that could be associated with hand function pattern that was thumb and the highest percent of affected finger was on pinch pattern ($p<0.01$). While ring, little finger could not be analyzed chi-square to determine the association with hand function pattern because there was one expected number less than 1. However, it is noteworthy that there was no respondent who always use pinch pattern had trigger finger on their ring and little finger.

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Table 4.13 Association between hand function patterns and affected fingers (right hand)

Hand function pattern		Number of affected fingers (%)[a]			
		Thumb***	Index	Middle	Ring, Little***
Power grip, Precision grip, Power+Precision grip	(n=123)	26 (21.1)	24 (19.5)	44 (35.8)	29 (23.6)
3-digit pinch, Pulp pinch, Tip pinch, Key pinch	(n=56)	29 (51.8)	9 (16.1)	15 (26.8)	3 (5.4)
Hook grip	(n=94)	9 (9.6)	22 (23.4)	38 (40.4)	25 (26.6)

The chi-square test of independence between each affected fingers and each hand function pattern

n = number of affected fingers

[a] % of affected fingers calculated for each hand function patterns

*p < 0.05 **p < 0.01 ***p < 0.001

Table 4.14 Association between hand function patterns and affected fingers (left hand)

Hand function pattern		Number of affected fingers (%)[a]			
		Thumb**	Index	Middle	Ring, Little
Power grip, Precision grip, Power+Precision grip	(n=97)	22 (22.7)	15 (15.5)	34 (35.1)	26 (26.8)
3-digit pinch, Pulp pinch, Tip pinch, Key pinch	(n=12)	7 (58.3)	2 (16.7)	3 (25.0)	-
Hook grip	(n=61)	10 (16.4)	9 (14.8)	32 (52.5)	10 (16.4)

The chi-square test of independence between each affected fingers and each hand function pattern

n = number of affected fingers

[a] % of affected fingers calculated for each hand function patterns

*p < 0.05 **p < 0.01 ***p < 0.001

4.10 Association between occupations and affected fingers

Table 4.15 shows association between respondent's occupation and finger affected with trigger finger. The occupations which have similar work task were included in the same group. Result of chi-square test of independence reveals that there was only thumb had association with occupation which was found highest on the group of retired government official, academic staff, and writer ($p<0.001$)

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Table 4.15 Association between occupations and affected fingers

Respondent's occupation		Number of affected fingers (%)[a]			
		Thumb***	Index	Middle	Ring, Little
Accountant, Computer user, Doccumentation officer	(n=38)	6 (15.8)	5 (13.2)	20 (52.6)	7 (18.4)
Business owner, Executive	(n=55)	9 (16.4)	14 (25.5)	19 (34.5)	13 (23.6)
Merchant	(n=23)	6 (26.1)	3 (13.0)	7 (30.4)	7 (30.4)
Mechanical worker	(n=14)	2 (14.3)	2 (14.3)	6 (42.9)	4 (28.6)
Tailor	(n=19)	2 (10.5)	5 (26.3)	10 (52.6)	2 (10.5)
Chef	(n=37)	12 (32.4)	7 (18.9)	12 (32.4)	6 (16.2)
Housewife	(n=136)	4 (17.6)	30 (22.1)	50 (36.8)	32 (23.5)
Retired government official, Academic staff, Writer	(n=89)	38 (42.7)	7 (7.9)	32(36.0)	12 (13.5)

The chi-square test of independence between each affected fingers and each respondent's occupations

n = number of affected fingers

[a] % of affected fingers calculated for each respondent's occupations

*p < 0.05 **p < 0.01 ***p < 0.001

4.11 Association between gender and affected fingers

The result of chi-square test of independence in table 4.16 shows statistically significant association between gender and affected fingers. Female reported more trigger finger on thumb ($p<0.01$) than male while male were found on index finger ($p<0.05$) than female.

Table 4.16 Association between gender and affected fingers

Gender		Number of affected fingers (%)[a]				
		Thumb**	Index *	Middle	Ring	Little
Female	(n=361)	94 (26.0)	59 (16.3)	138 (38.2)	62 (17.2)	8 (2.2)
Male	(n=93)	11 (11.8)	25 (26.9)	34 (36.6)	20 (21.5)	3 (3.2)

The chi-square test of independence between each affected fingers and each gender

n = number of affected fingers

[a] % of affected fingers calculated for each gender

*p < 0.05 **p < 0.01 ***p < 0.001

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4.12 Association between handedness and affected hand

There was association between handedness and affected hand ($p<0.05$) as shown in table 4.17. Most of respondents who had trigger finger on their right hand are right handedness whereas the highest percent of respondents who had trigger finger on their left hand are both handedness. However, this result might not represent for both handedness because there were just a small group of respondents with both handedness. If considered for percentage of affected fingers in each handedness side, found that, trigger finger had mostly occurred on right hand on both handedness side.

Table 4.17 Association between handedness and affected hand

Handedness		Number of affected fingers in each hand (%)[a]	
		Left hand*	Right hand*
Left	(n=28)	11 (39.3)	17 (60.7)
Right	(n=411)	154 (37.5)	257 (62.5)
Both side	(n= 16)	11 (68.8)	5 (31.3)

The chi-square test of independence between each affected fingers and each handedness

n = number of affected fingers

[a] % of affected fingers calculated for each handedness

*p < 0.05 **p < 0.01 ***p < 0.001

4.13 Association between BMI and than number of affected fingers

BMI was classified into five types. A BMI equal to or less 21 is considered slender. Medium ranges from a BMI of 21.01 to 24.99 and overweight from a BMI of 25.00 to 29.99. A BMI from 30.00 to 34.99 is termed obese and anything equal to or greater than 35.00 is considered morbidly obese. Table 4.18 BMI was grouped into 2 groups that are slender to medium and overweight to morbidly obese. The number of affected finger was also divided into 2 groups. One group was the respondent who had trigger finger more than 2 fingers in one hand or more than 4 fingers in both hand while another group was less than. However, the result of chi-square test of independence shows no significant association between BMI and the number of affected fingers.

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Table 4.18 Association between BMI and number of affected fingers

BMI classification		Number of affected fingers in each group (%)[a]	
		Group A	Group B
Slender - Medium	(n=182)	168 (92.8)	13 (7.2)
Over weight – Morbidity obese	(n=69)	61 (88.4)	8 (11.6)

The chi-square test of independence between each affected fingers and each BMI classifications

[a] % of affected fingers calculated for each BMI classifications

*p < 0.05 **p < 0.01 ***p < 0.001

Group A was the respondent who had trigger finger >2 fingers in one hand or >4 fingers in both hand

Group B was the respondent who had trigger finger ≤ 2 fingers in one hand or ≤4 fingers in both hand

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CHAPTER V
DISCUSSION

5.1 Methodological Aspect

This study aimed to survey factors affecting trigger finger of the patients at Leard-Sin hospital, to determine the individual characteristics, work task characteristics, and psychosocial factors. This study mainly emphasized on hand function patterns normally used by each patient and analyzed the association between hand function patterns and affected fingers.

Cross-sectional retrospective survey studies was used in this study, as it was said be useful for identifying risk factors of a relatively frequent disorder with long duration that is often undiagnosed or unreported (58). This study was designed to use self-administered and interview questionnaire to determine those risk factors and to use physical evaluation to find which fingers were most affected and how its severity was.

The questionnaires were distributed to patients with trigger finger at Leard-Sin hospital every Monday, Tuesday, and Thursday for two months period from May to June 2006. The data collecting process were finished within one day, including both completion of the questionnaire and physical examination.

The respondent rate of this study was 100% as the researcher stayed with the patients throughout the data collecting process to assure that the respondents had no doubts and if so, they could be asked the researcher immediately. Moreover, there were small numbers of incomplete questionnaires because the questionnaire would be checked by the researcher suddenly after they were returned and the subjects were asked for fill the missing data.

According to the exclusion criteria of this study, the respondents who had diabetes mellitus, de Quervain's disease, rheumatoid arthritis, carpal tunnel syndrome, and osteoarthritis were excluded from this survey because these are the systemic disease affecting tendon or tendon sheath (2, 3, 6) and Carpal tunnel syndrome and de Quervain's disease that seem to be associated with trigger finger (23, 92, 93).

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However, this study found a large number of trigger finger patient also had diabetes mellitus (13.13%). This was similar to the study of Ballantyne and Hooper (92) which found 24 diabetic patients (12.44%) in a review of 193 trigger finger patients.

Since some studies found the association between trigger finger with diabetes mellitus, it could be explained that the diabetes mellitus can have effects on damaging the connective tissue resulting in change of collagen properties. Chronic hyperglycemia lead to abnormal glycosylation of collagen affects the tendon and periarticular tissues directly (30, 92). Moreover, there were some studies found that diabetic trigger finger patients had a higher incidence of multiple digit involvement (92-94) and had a poor outcome of treatment by steroid injection (30).

The varieties of educational level indicated that there were some patients having ability to read and complete the questionnaire rather well and the others could not read and write. Moreover, some of them had eyesight problem, most were far-sighted and this effected on ability to read and write, whereas some could not write because of pain in palm and fingers. Therefore, the researcher needed to help complete the questionnaire by asking questions and writing down the answers.

Regarding the physical examination process of this study, the only one researcher which was physical therapist worked through out the process to ensure the valid and reliability of the physical finding. In addition, the researcher was trained and proved to examine patients with trigger finger by Dr. Vichai Vijitpornkul, a medical specialist in orthopeadics.

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5.2 Individual, Work task and Psychosocial factors

5.2.1 Individual Factors

Table 4.1, most of trigger finger patients in this study were female (80.4%) and the rest were male (19.6%), majority of them were in middle age (average age was 55.39 years). These findings are also similar to other studies of other countries in many survey studies (5-10, 16, 18, 23). Some investigators have used biomechanics and physiologic consideration to argue that female may be exposed to higher stress because the average dimensions of female hand are less than those of male hands (14). When a handle diameter is too large (for female's hands) and force is applied at the distal phalanx of the fingers, the tendon forces force become 2 to 3 times greater than when the force is applied at the middle phalanx (56). Moreover, the female in the older age groups prone to have degenerative changes (7). However, types of work seem to be the high risk of trigger finger more than gender (14).

Trigger finger could be presented on all educational levels. This study found much more on pratom (elementary school) and bachelor's degree levels. Thus, the educational level may not be associated with trigger finger. Even if the education can probably be an indirect indicator of work task load, it seemed that the patients who have loaded work may have high risk of trigger finger but the patients who have light work may perform other activities such as housework and sport which may probably be the causes of trigger finger.

Income of trigger finger patients in this study mostly was reported to be less than 5,000 Bahts which was quite low earning and also included the patients who had no income. This is not surprising as most of them were unemployed housewives who had less income.

There was no association between BMI and trigger finger patients. The average BMI was 23.98 that is in medium range. This is different with carpal tunnel syndrome that BMI and obesity have been reported to be potential risk factors (40).

There were 6 patients who presented trigger finger after their trauma which found both direct trauma and indirect trauma (were mostly hyperextension injury). Hyperextension injury can be divided into single and repeated, both can tear the tendon sheath. Severe tears can be healed with fibrosis and stenosis of the sheath

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producing irreversible triggering. Normally, trauma alone may not cause triggering in the fingers, but it may be the sole initiating in other causes of trigger finger (95).

Bonnici and Spencer in 1988 (10) claimed that the heredity is one cause of trigger finger. This study found that 22 patients had close relations with whom had trigger finger, such as mother, father, brother or sister, and son or daughter. The relationship most frequently found was brother or sister. However, there have been no studies of association between trigger finger and hereditary factor yet.

5.2.2 Work task Factors

Among patients with trigger finger, housewife were mostly reported which is similar to previous study (18), followed by academic staff, retire government official, and chef respectively as seen in Table 4.2.

Work task characteristics differed in each occupation such as the housewives always use hands to do housework, clothes washing, cleaning, cooking, and shopping, whereas academic staffs such as teachers and lecturers always use hand to write and carry document bag. Chefs normally do cooking, they have to chop, cut, and stir-fry for a long time. Besides, these patients did not do only their main work task, most of them had other activities and hobbies too. Housework was most frequently found as well as sports such as golf, tennis, and handgrip (Table 4.4). These may increase direct pressure from sports racquet or equipment may resulting in thickening of flexor tendon sheath. Therefore, other activities besides main work should be also considered.

The average work experience of the patients in this study was quite long (19.61years) and they had the duration of continue working about 3.02 hours as seen in table 4.3. Work experience is one factor influence WMSDs including hand and wrist tendinitis (7, 96). Fahey et al found trigger finger was frequently encountered in female manual workers in unaccustomed occupations or activities or in work which requires unusual excessive activity of fingers (7). An inexperience operator will often use excessive force, because of the misconception that it “does a better job” as they just started. When experience is coupled with lack of training and supervision, then the use of excessive force is occurred (96). In the other hand, long experience may be cause of cumulative trauma disorders especially who perform high repetitive and

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forceful job and become worse when it had to be repeated day after day (14, 15, 56, 96, 97). High repetitive work and job pressure lead to muscle and tendon damage through increases muscular and tendon tension and decrease the opportunity for tissue recovery. This could accelerate fatigue in muscles being used most of the time due to probability of tenosynovitis, unless there are adequate rest periods for recovery (13, 15, 96, 97). However the person who performs the same job may not experience the same problems. This has led to consider in personal factors that might explain individual differences including strength, work experience, work habits, vitamin deficiencies, wrist size, wrist shape, previous traumatic injuries, systemic diseases, congenital defects, heredity, and gender (98) which these were not included in this study.

5.2.3 Psychosocial Factors

The number of patients on 3 psychosocial factors that were work satisfaction, other professional relationship, and social support were less than the residual factors. Because of some patients were unemployed including housewife and retire government official. The result had shown no tendency of psychosocial problems in trigger finger patients. Because this study did not survey the characteristics of psychosocial factors in control group (who are not trigger finger patient). Therefore, the association with trigger finger in this factor could not be performed.

5.3 Association between Affected fingers and Hand function patterns, Occupations, Handedness, Gender, and BMI

5.3.1 Hand function patterns

According Table 4.6, trigger finger was most frequently found on middle finger followed by thumb, index, and ring finger. Little finger was less found in this study. These findings are similar to several survey studies in other countries, except index finger that previous studies found less than ring finger (2, 5, 7, 8, 10). Anyhow, the number of index and ring finger were nearly equal in this study.

From the report of hand function mostly been used (Table 4.7) were reported to be the top three were power grip, hook grip, and 3-digit pinch. Moreover,

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there was a report of activities of each hand function pattern. In power grip, the most often activities were clothes washing and wringing, cooking (stir-frying, chopping, and cutting), brooming, mopping, and golf driving respectively. To perform these activities, the grip should be tight on the handle. Bag carrying was performed by using hook grip. Whereas writing and using scissors was performed by using 3-digit pinch.

This study found trigger finger being much more on middle finger as mention previously. This may resulted in the middle finger being one finger used in all hand function patterns which had been reported in first ranking of affected fingers. As well as the thumb is used in both power grip and pinch pattern (68, 69, 71).

It seems that the affected fingers probably have association with hand function patterns. The percentages of affected fingers reported in each hand function patterns were presented in Figure 4.3, 4.4. Power grip could affect all fingers. Similar to hook grip but thumb was less affected in this pattern. This may be because hook grip does not require use of thumb. Furthermore, pinch pattern which uses thumb, index, and middle fingers, also presented trigger finger mainly on thumb and those fingers. Ring and little finger were seen in power and hook grips.

However, there were some hand function patterns presented trigger fingers on unused fingers too. It probably explains that no one use only one hand function pattern. Therefore, those affected fingers may be resulted from other hand function patterns that be used less than the main one.

According to the result above, it seems the hand function patterns probably influence affected fingers. In order to verify this finding, the significantly association between affected finger and hand function pattern could be considered. Table 4.13 and 4.14 showed the association between hand function pattern and thumb and ring, little fingers. The thumb was frequently found in the patients who always use pinch pattern while ring and little finger were found in hook grip. However, there was no significant association in index and middle finger but they had tendency to be found much more in hook grip.

The result of affected finger and hand function pattern could be signified that work task and hand use can influence development of trigger finger because they had tendency to present trigger finger on the fingers always being used. Biomechanically, when grip or hold the object, the fingers need to flex and extend. As

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the finger moves, each tendon slides in a certain distance, which defines the “excursion of the tendon” (69). If there is an external load performed due to the tendon are subjected to tensile stress by the muscle and to compressive and shearing stresses from adjacent bone and ligament (14).

The lesion of trigger finger was found in long flexor tendon that glides under A1 pulley. This may be the tendon excursion increases with the number of joints flexed and moment arm, which tend to be larger as the joint more proximal, so metacarpophalangeal joint flexion will require more tendon excursion than any interphalangeal joints (14, 69, 73, 99). As a result, there are more compressive force, shearing force, and friction between tendon and A1 pulley which acts the most palmar restraint of the finger flexors in the region of the metacarpophalangeal joint (4). In addition, Greenwald et al (42) concluded in their analysis of profundus tendon function that as tendon loads increase, the load exerted on the pulleys perpendicular to the axis of finger also increase as the sine of tendon-pulley angle and in full finger flexion, it has been reported that pressure or compressive force on the A1 pulley increase from neutral position (4)

Moreover, there is a direct pressure to the A1 pulley from a sport racquet or another forceful gripping tool in some hand function patterns (11, 13, 15).

Occlusion of blood flow caused by direct pressure or compression of the tendon against adjacent surfaces, results in an inflammatory response and a fibrocartilagious metaplasia including increases in matrix glycosaminoglycans (26, 100). Furthermore, thickening of tendon sheaths or increases diffusion distances due to thickened sheath would contribute to deprivation of nutrients (14). The deprivation will be related to the intensity of exertion, the duration of the exertion, and the frequency of exertion or forcefulness and repetitiveness (86).

That was related to the work task or activities of patients in this study which most of them are high load and high repetitive work. For example, housework have several tasks and many tasks have to use hand extremely, as frequently seen in clothes washing and wringing which metacarpophalangeal joints were squeezed from wringing, whereas cooking has to grasp any handle or shaft of a knife to stir-frying, chopping or cutting, even sports that are golf driving and tennis. These may produced direct pressure and forcefulness on the hand. Writing was also frequently found, and

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always performed for a long period of time, this action of thumb must have the dexterity to handle a fine object and need strength to resist the force during pinch. Bag carrying which was found as a task much more in housewives and other occupation who preferred shopping may lead to tension load at tendon followed by injury of tendon and A1 pulley.

5.3.2 Occupation

Accordingly each occupation had different work task characteristics and main hand function pattern, thus, there were may various affected trigger finger in each occupation. Figure 4.5, some occupation could be a risk of trigger finger of all fingers such as housewife, merchant, chef, executive, and retired government official whereas some occupations had trigger finger mainly on some fingers such as academic staff and writer always affected on thumb. However, trigger middle finger was presented mostly in many occupations.

There was only one finger had association significantly with occupation that was thumb which found mostly in the group of retired government official, academic staff, and writer (Table 4.15). These occupations had writing as their main work task. They had to often use thumb mainly participated with index and middle finger (3-digitpinch), so that a present of trigger finger was many more on thumb. In the retired government official group, most of them used to be the teacher , so the previous main work task were also writing and not surprisingly trigger finger was found much more frequently on thumb.

Moreover, these occupations could be trigger finger on other fingers too, because of their other activities beside the main work which always found in housework and shopping. As well as this study found that some patients are unemployed and they gave information of never do any work. But after interview and asked for other activities or hobbies, it was found that they always exercise by drive golf, play tennis, and squeeze the handgrip.

Therefore, in some occasion, it can not be predicted that the risk factors or which fingers will be affected with trigger finger from only the occupation. However, the other hand used activities have to be taken in to consider as it can alter exertion of the hand use and resulting in conflicting result.

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5.3.3 Handedness

Dominant hand of trigger finger patients in this study was reported more frequently in right hand (90.4%). Some previous survey studies found trigger finger affected more often in dominant hand (5-9, 97). If trigger finger have association with hand use, dominant hand can probably be developed trigger finger much more often than non-dominant hand as the related studies mention above. But the result of this study was different because the finding in Figure 4.2 represented that trigger finger tended to occur on right hand on both the handedness side. As the result shown the association between right affected hand side with handedness which were found most frequently on right handedness patients (Table 4.17). However, the association found on left affected hand that found much more in both handedness patients might not be accurate because there were just a small group of patients that are both handedness. However, if consider only left and right handedness, the patients who had trigger finger on left hand were right handedness more than left handedness which was non-dominant hand.

This result may be able to be explained that in general the dominant hand is always used in individual and this may cause of repetitive motion that is a major risk factors in the development of cumulative trauma disorders and trigger finger maybe present later (97). However, there are some activities needed to use both hands such as clothes washing and wringing, carrying bag (in this study, many people usually carry on their non-dominant hand in order to use dominant hand to do other activities together), and golf driving. Strength of non- dominant hand is less than the dominant one (76, 101), this has to require more excessive force in the same task (7, 96). So this may cause more loading in the tendon and can also probably develop trigger finger.

5.3.4 Gender

In Figure 4.1 both of male and female could present trigger finger of all fingers. There was no different of affected fingers in each gender. It seems that the gender might not influence finger affected with trigger finger. The significant association between gender and affected fingers was found on thumb and index finger (Table 4.16). In female presented trigger finger was more on thumb than male, whereas male were found to have trigger finger on index finger than female. These

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finding can not be explained because the main factors affecting trigger finger probably are work task characteristics, thus it needed to consider details of occupation, and work task in each male and female which may have difference of work task characteristics or their hand function pattern often used. However, this study did not consider the work task of both genders separately.

5.3.5 Association between the number of affected fingers and BMI

Sungpet et al (1999) studied trigger finger and BMI of 1630 patients and demonstrated that more than 2 trigger fingers in one hand or more than 4 trigger fingers in both hand were found only in patients whose BMI were obese and morbidly obese (55). However, this study did not find an association between number of affected fingers and BMI (Table 4.18) so that it was different to Sungpet et al who indicated that the more BMI the patients had due to the greater number of trigger finger. It seems in this study that affected fingers and the number of them may depend hand function and work task than body mass index.

To be concluded, the relationship of trigger finger and work tasks as mention above, it indicated that trigger finger had association with both work tasks or activities and hand function patterns. Occurrence of trigger finger in individual had to be considered from their occupation or work task and hand used activities, after that it could be analyzed which fingers were used in which hand function pattern always performed. If trigger finger occur on those fingers, it may represent that work task or hand used activity had association or may be a cause of trigger finger

Since the finding of this study, the occupation, which is the main factor determining work task and hand use characteristic in individual, was found to be related to the affected fingers. For example, academic staff and writer who presented trigger finger much more on thumb, it may be caused by they always use hand for writing which in terms indicate a 3-digit pinch hand function which thumb was used mainly participate with index and middle finger. In addition, it had to consider other hand used activities or hobbies because of those activities might be cause of trigger finger also. Thus, this study could be suggested that the causes of trigger finger development are related to work task.

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This probably explains that forcefulness, repetitiveness activities of hand and finger movements provide tendon gliding under A1 pulley lead to compression force, shearing force, and friction between tendon and pulley including deprivation of nutrients from blood flow occlusion resulting in inflammation and thickening of tendon sheath until present trigger finger later.

5.4 Symptom Characteristics of Trigger Finger

The symptoms of trigger finger that were most reported in this study were pain, stiffness, and tension (Table 4.9). These are the symptoms always seen and lead to the patients comes to see doctor(2). Regarding the pathology of trigger finger, overusing of hands effect the flexor tendon inflame and swelling and it causes a formation of a nodule in flexor tendon until a disproportion between size of flexor tendon and retinacular pulley are presented. Therefore, pain, stiffness, tension, and triggering always presented in trigger finger patients (1, 2, 22).

The level of symptom was mostly rated as “severe” (Table 4.11) which represented the high level of pain. Most of patients had the highest pain during active flexion or extension of fingers especially when the fingers were locked (22).

From the reported of symptom characteristics and its level, these may affect work task efficiency as most symptoms often occurred during working and several patients had all the time which were reported in Table 4.10. It should be noted that one of the most of symptom behaviors were found to be in the morning which may be the reason of tension after immobilization (or less movement) of fingers during sleeping all night (2, 22).

Most of patients felt that work and housework were the majority causes of trigger finger (Table 4.12). This probably work and housework were the activities that several people always perform and they might presented symptoms or it would be worst during performing those activities. Moreover, the information receiving could influence to individual’s attitude (88)

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5.5 Application of the Study for Prevention of Trigger finger

Since more than 300 trigger finger patients were found on two months period in this study. It represent that trigger finger is one of hand problems can be found frequently. The analysis from the questionnaire and physical examination in this study found that there were association between occupations and hand function patterns with affected fingers, revealed that work task was one of the important risk factor of trigger finger.

In order to present trigger finger, the job should be designed to minimize work load and repetitiveness which are the majority risk factors of hand and wrist tendinitis including trigger finger (14, 15, 35, 36, 59, 89, 96, 97). Avoiding a prolonged use of tools requiring twisting or force and avoiding repetitive clenching or excessively hard gripping or pinching are need to ensure a sufficient recovery time for the muscle to rest. Give workers an opportunity to break during manual activities (e.g. for continuous highly repetitive operations, provide 5 minute breaks every hour) and design work rotation schedules or change the process to alter the muscle use with other types of task (14, 35, 56). Moreover, exercise (bend and straighten) of the fingers and wrist should perform often during use for relax the action of muscles and tendons (35).

Tendon force is related to the force exerted with the hand. To prevent trigger finger, it have to avoid forceful hand movement by using mechanical advantage and appropriate tool for holding or lifting the objects (14, 35). Spread the load over as many muscle groups as possible to avoid overloading the small muscle group (56). For example, clothes washing and wringing and bag carrying were perform much more in this study. Forceful wringing during clothes washing should be avoided by using washing machine in order to reduce and avoid the excessive exertion of the hand. Palm and forearm should be used for carrying heavy objects rather than using fingers for force distribution. Pushing and sliding should be used instead of lifting objects (14, 35, 56).

The result of this study had shown the large number of patients who used hand tools to perform their activities such as cooking (hold a knife to cut or chop and a ladle or handle to stir-fry), brooming, mopping, writing and golf driving. The force should be estimated from the weight of tools and their characteristics (14). Avoiding using a

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heavy tool must be concerned. The tool design should also be appropriate, to prevent hand to be vulnerable to injury.

The tool handle size is essential in tool design to maximize grip strength and reduce stress on the digital flexor tendon. When handle diameter is too large and the force is applied at the distal phalanx, the tendon forces will be greater than when the force is applied at the middle phalanx. Conversely, a small handle cannot effectively apply force because of the mechanical disadvantage of the shortened extrinsic finger flexors (56).

Texture in the tool handle is one of the most important elements. A handle with a slippery finish or a dry hand requires added strength to retain the tool. If the texture is too coarse, skin will be irritated and reduced efficiency occur. Moreover, the sharp edge of the tool may increase contact stress on hand, direct pressure to the A1 pulley can result in trigger finger (56).

Therefore, these problems from the hand tool can be prevented by the suggestion that a handle should be fit the hand with no overlap of the fingers and thumb had advantages for reducing required grip force. The textured rubber handles should be used to provide enough friction for a good grip. The handle should be cushioned in order to reduce contact stress and trauma, distribute force, and even to increase the handle size in too small handle (35, 56, 102).

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5.6 Limitations of the Study

The current survey was first conducted in Thai trigger finger patients, so it is better to begin the study among the patients who attended at Leard-Sin hospital. Because of a new technique for percutaneous release trigger finger by using the blade probe were found and well-known in this hospital, so that a large number of trigger finger patients come for receiving the treatment at this hospital. However, this questionnaire should also survey in other hospital including government and private hospital, and also other parts of Thailand so that the result could be compared.

Since this study surveyed in only one government hospital. It may result that the government officials and the patients who had low income were found much more. This is probably that the doctor's fee or the expenses are cheaper than the private hospital and it can be claimed from work or the government for the government official. This limitation might lead to the patients who are housewives, workers, and academic staffs including retired government officials were frequently found in this study.

There were some patients who had changed their job and who were unemployed at the time of survey but they used to do some works in the past. This study did not report the hand function which had been used in their previous work task and might be the actual cause of trigger finger development.

The lack of exposure assessment made it impossible to identify the force and repetitiveness in each work task or activity. This study was more a description of work task characteristics and hand function pattern types from subjective method. However, the estimation of force and repetitiveness in population who performed those work tasks suggests a need for further investigation.

This survey study was performed in one group of population. It could not determine the differences when compared with normal people who do not present trigger finger. Therefore, to support the result, it should be conducted other kind of study.

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5.7 Suggestion for Further Study

1) Since the present cross-sectional survey study signified trigger finger had association with occupation or work task and hand function pattern always perform. Therefore, it is interesting to identify more details of work task characteristic that are forcefulness and repetitiveness. It may be performed in the work place by observing from videotape to analyze grip patterns, repetitiveness and duration of exertion. The estimation of force may receive from the weight and size of pertinent tools, and their friction characteristics should be also considered.
2) The questionnaire and survey method used in this study should be applied to the study of trigger finger patients in other hospital, including government and private hospital, so that the results could be compared.
3) The study should consider the factors influencing trigger finger in male and female separately, in order to determine the difference of those factors in each gender and why trigger finger is mainly occur in female.
4) A large number of trigger finger patients who had diabetes mellitus were found in the present study. The relationship of associated disease and trigger finger should be concerned in the further study. The study may include the prevalence of trigger finger in those associated diseases, and how their severity is to compared with trigger finger patients who have no the disease.
5) The next survey should be conducted in plants or workplaces to compare the prevalence of trigger finger in each work task or assembly line which use different types of hand function pattern
6) In order to test the hypothesis and study the development of trigger finger, the study will be designed as the longitudinal or case-control study. In order to find the appropriate interventions to decrease incidence of trigger finger. Pre and post control study should be conducted in those work tasks or activities which were reported to have high risk in the present study. However, this is a very strong study and may take a long time to perform.

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CHAPTER VI
CONCLUSION

This cross-sectional design for the present study was aimed to determine factors affecting trigger finger of patients at Leard-Sin hospital including individual characteristics, work task characteristics, and psychosocial factors and the association between affected fingers and occupations, hand function patterns, and handedness. This study was performed by using self-administered and interview questionnaires to survey those factors retrospectively.

The result of this study revealed that most of trigger finger patients were female (80.4%) with an average age 55.39 years. It could be found in all educational levels and 20 patients had close relatives with who had trigger finger. Moreover, there were the reports of direct trauma in 6 patients.

Housewives were mostly found in this study, followed by academic staffs, retired government officials, and chefs respectively. Clothes washing, wringing, cooking, bag carrying, and writing were the activities that usually be performed by those patients. From the report of work task, hand function mostly been used were power grip, hook grip, and 3-digit pinch.

According to the result of physical examination, trigger finger was most frequently found in the middle finger followed by thumb, index, ring, and little finger respectively. The association between affected finger and occupation, hand function, and handedness were analyzed.

From the result of affected fingers and hand function patterns, the patients had tendency to present trigger finger on the fingers being used most of the time, which depended on their work tasks or occupation.

Some hand function patterns, occupation under this study were found to be significantly associated with affected fingers. There were; thumb had association with pinch patterns, ring and little finger had association with hook grip, and the group of retired government official, academic staff, and writer had association with thumb.

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This study found that trigger finger was not affected more often in dominant hand as several previous studies. It may be explained by the reasons of overusing in dominant hand and requiring more excessive force in non-dominant hand. Moreover, many activities require using both hands.

However, due to this study did not survey the characteristics of psychosocial factors in control group, therefore, the association with trigger finger in this factor could not be performed.

Although the relationship of trigger finger and work tasks and hand function patterns was found in this study, however, other personal factors that might explain individual difference including strength, work experience, work habits, wrist and finger size, previous trauma injuries, systemic diseases, heredity, and gender, moreover in hand tool characteristics should be considered in the next study.

Regarding the result of symptom characteristics of the patients with trigger finger, the symptoms may affect work task efficiency as most symptoms often occur during working period such as pain and stiffness. The level of symptom was mostly rated as “severe” and most of patients felt that the work and housework caused the pain.

The large numbers of patients with trigger finger found in this study emphasized the need for further study in order to reduce trigger finger problems especially in the person who perform high risk work task, including individual factors that were age and gender, as mentioned in this study. The corrective and prevention programs should be considered in further study.

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APPENDIX

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APPENDIX A
SELF-ADMINISTERED QUESTIONNAIRE
(In Thai Language)
Fill by Trigger Finger Patients

แบบสอบถาม ปัจจัยที่มีผลต่อการเกิดโรคนิ้วล็อก

คำชี้แจง

ด้วยดิฉัน นางสาวศิวพร จันทรจำนง เป็นนักศึกษาหลักสูตรวิทยาศาสตร์มหาบัณฑิต คณะกายภาพบำบัดและวิทยาศาสตร์การเคลื่อนไหวประยุกต์ มหาวิทยาลัยมหิดล อยู่ระหว่างทำวิทยานิพนธ์ เรื่อง การสำรวจปัจจัยที่มีผลต่อการเกิดโรคนิ้วล็อกของผู้ป่วยนอก โรงพยาบาลเลิดสิน ซึ่งผลจากการสำรวจดังกล่าวจะถูกนำไปวิเคราะห์ถึงสาเหตุของโรคนิ้วล็อก เพื่อใช้เป็นแนวทางในการแก้ไข และกำหนดวิธีการป้องกันก่อนที่จะเป็นปัญหาเรื้อรัง

ท่านเป็นบุคคลที่สำคัญผู้หนึ่งในการให้ข้อมูล เพื่อทำให้การวิจัยครั้งนี้มีความสมบูรณ์ และสามารถนำไปใช้ให้เกิดประโยชน์สูงสุดตามวัตถุประสงค์ ซึ่งการศึกษาวิจัยครั้งนี้ผู้วิจัยใคร่ขอทราบข้อมูลลักษณะส่วนบุคคล ลักษณะงานที่ทำ สภาวะจิตสังคม และอาการของโรคนิ้วล็อกที่เกิดขึ้น ข้อมูลในการตอบแบบสอบถามจะถือว่าเป็นความลับ ไม่มีการเปิดเผยชื่อจริงของท่าน การนำเสนอผลการวิจัยจะเป็นในลักษณะภาพรวม จึงไม่ส่งผลต่อหน้าที่การงานของท่านแต่อย่างใด

เพื่อให้ข้อมูลจากการศึกษาวิจัยครั้งนี้เกิดประโยชน์สูงสุดตามวัตถุประสงค์ ขอความร่วมมือจากท่าน โปรดตอบแบบสอบถามให้ครบทุกข้อตามความเป็นจริง ผู้วิจัยหวังเป็นอย่างยิ่งว่าจะได้รับความกรุณาจากท่านที่สละเวลาอันมีค่า ในการทำให้งานวิจัยครั้งนี้มีความสมบูรณ์ยิ่งขึ้น จึงขอขอบพระคุณในความร่วมมือมา ณ โอกาสนี้

ขอขอบพระคุณในความร่วมมือ
น.ส. ศิวพร จันทรจำนง
ผู้วิจัย

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แบบสอบถามผู้ป่วยนิ้วล็อก

โปรดทำเครื่องหมาย✓ลงใน หรือเติมข้อความที่เป็นคำตอบที่เหมาะสมลงในช่องว่างที่เว้นไว้

ตอนที่ 1 ข้อมูลทั่วไปเกี่ยวกับผู้ตอบแบบสอบถาม

1. อายุ _____ ปี

2. เพศ 1. หญิง 2. ชาย

3. สถานภาพ 1. โสด
2. คู่ จำนวนบุตร_____คน
3. ม่าย, หย่า จำนวนบุตร_____คน
4. อื่นๆ โปรดระบุ_____

4. ระดับการศึกษา
1. ไม่ได้เรียน 2 ประถม 3. มัธยมต้น
4.ชั้นมัธยมปลาย/ปวช. 5. ปริญญาตรี/ปวส. 6. สูงกว่าปริญญาตรี โปรดระบุ_____

5. รายได้ต่อเดือน
1. ต่ำกว่า 5,000 บาท 2. 5,001-15,000 บาท 3. 15,001-20,000 บาท
4. 20,001-30,000 บาท 5. สูงกว่า 30,000 บาท

6. น้ำหนัก _____ กิโลกรัม

7. ส่วนสูง _____ เซนติเมตร

8. ถนัดมือข้าง 1. ซ้าย 2. ขวา 3. ทั้ง 2 ข้าง

9. โรคประจำตัว 1. ไม่มี 2. ไม่เคยตรวจ
3. มี โปรดระบุ_____ เป็นมานาน_____ปี
โรคที่เป็นมีผลต่อการทำงานหรือไม่ มี ไม่มี

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10. ในช่วง **12 เดือน** และ **7 วันที่ผ่านมา** คุณเคยประสบอุบัติเหตุ หรือได้รับบาดเจ็บที่ส่วนของมือและนิ้วหรือไม่

    1. ไม่เคย

    2. เคยในช่วง **12 เดือน**ที่ผ่านมา

        โปรดระบุบริเวณที่บาดเจ็บ_____

        อาการที่เกิดขึ้นคือ_____

    3. เคยในช่วง **7 วัน**ที่ผ่านมา

        โปรดระบุบริเวณที่บาดเจ็บ_____

        อาการที่เกิดขึ้นคือ_____

11. คุณเคยใช้นิ้ว หนึ่งหรือสองนิ้วในการเกี่ยว, หิ้ว, ยกของ หรือใช้มือกำ, กระชากวัตถุอย่างรุนแรง แล้วมีอาการเจ็บที่บริเวณนิ้วหรือมือนั้น **จนเป็นสาเหตุให้ต้องมาพบแพทย์ในครั้งนี้**หรือไม่

    1. ไม่เคย

    2. เคย โปรดระบุกิจกรรมนั้น_____

12. คุณเคยได้รับการผ่าตัดบริเวณมือและนิ้วหรือไม่

    1. ไม่เคย

    2. เคย โปรดระบุบริเวณหรือนิ้วที่ผ่าตัด_____

13. มีญาติหรือคนในครอบครัวเป็นโรคนิ้วล็อกหรือไม่

    1. ไม่มี

    2. มี โปรดระบุว่ามีความเกี่ยวข้องกับคุณโดยเป็น _____

14. คุณมีหน้าที่ต้องดูแลเด็กเล็กหรือผู้สูงอายุในครอบครัวของท่านหรือไม่

    1. ไม่มี

    2. มี ได้แก่ 1. เด็กเล็ก จำนวน_____คน

        2. ผู้สูงอายุ จำนวน_____คน

15. คุณสูบบุหรี่หรือไม่ 1. ไม่สูบ 2. สูบ และปัจจุบันยังสูบอยู่ (สูบมานาน____ปี)

    3. เคยสูบ แต่ปัจจุบันเลิกแล้ว (เคยสูบเป็นเวลา____ปี)

16. คุณดื่มสุราหรือไม่ 1. ไม่ดื่ม 2. ดื่ม

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<u>ตอนที่</u> 2 ข้อมูลเกี่ยวกับการทำงานและกิจกรรมที่ทำ

1. ปัจจุบันคุณประกอบอาชีพ

1. รับจ้าง 2. รับราชการ 3. พนักงานรัฐวิสาหกิจ
4. ค้าขาย 5. ธุรกิจส่วนตัว 6. อื่นๆ โปรดระบุ _____

2. คุณทำงานในตำแหน่ง (หรือหน้าที่) _____

3. อธิบายลักษณะงานที่คุณต้องทำในแต่ละวัน_____
_____

4. งานที่ทำอยู่ปัจจุบันนี้ ทำมานาน_____ปี_____เดือน

5. คุณต้องทำงานวันละ_____ ช.ม.
ทำติดต่อกันนานครั้งละประมาณ_____ ช.ม. _____ นาที, พัก_____ช.ม. _____ นาที

6. คุณเคยเปลี่ยนงานหรือไม่
ไม่เคยเปลี่ยน เคยเปลี่ยนงาน งานเดิมคือ_____ ทำมานาน_____ปี

7.ตอนที่เป็นนิ้วล็อก**ครั้งแรก**คุณทำงานในตำแหน่ง (หรือหน้าที่)_____

8. คุณมีงานอดิเรก หรือกิจกรรมอื่นๆที่มีการใช้มือที่ทำอย่างสม่ำเสมอ นอกเหนือไปจากงานประจำหรือไม่
ไม่มี
มี โปรดระบุ โดยเลือกทำเครื่องหมาย✓ในช่อง ❍
❍1. งานบ้าน
❍2. งานอดิเรก โปรดระบุกิจกรรม(เช่น ทำสวน, เล่นกีฬา, เล่นดนตรี เป็นต้น)
1)_____
2)_____
3)_____
❍3. อื่นๆ โปรดระบุ_____

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<u>ตอนที่ 3</u> ข้อมูลเกี่ยวกับสภาวะจิตใจและสังคม

โปรดทำเครื่องหมาย✓ลงในช่องว่างของแต่ละข้อ ที่ตรงกับความรู้สึกและความคิดเห็นของคุณมากที่สุด

	น้อยที่สุด 1	น้อย 2	ปานกลาง 3	มาก 4	มากที่สุด 5
1. คุณ**พึงพอใจ**กับงานที่ทำในปัจจุบัน					
2. คุณ**เข้ากับเพื่อนร่วมงาน**ได้ดี (ไม่มีปัญหาในการทำงานเป็นกลุ่ม)					
3. เมื่อคุณมีปัญหาเดือดร้อน **เพื่อนร่วมงาน**จะรีบให้ความ-ช่วยเหลือด้วยความเต็มใจ					
4. เมื่อคุณมีปัญหาไม่สบายใจคุณสามารถ**ปรึกษา**กับคนในครอบครัวคุณได้					
5. คุณมักมีปัญหาและกังวลเรื่อง**ค่าใช้จ่าย**ในครอบครัว					
6. คุณต้อง**เร่งรีบทำงานแข่งกับเวลา**เสมอ					
7. คุณรู้สึก**เครียด**เวลาทำงาน					
8. คุณรู้สึก**เหน็ดเหนื่อย**ต่อการทำงานในแต่ละวัน					
9. บ่อยครั้งที่คุณต้องฝืนทนทำงานทั้งที่ร่างกาย**เมื่อยล้า**					
10. คุณมีปัญหา**นอนไม่ค่อยหลับ**					
11. คุณรู้สึกว่างานที่ทำนั้น**ซ้ำซาก จำเจน่าเบื่อ**					
12. งานที่คุณทำอยู่ ทำให้รู้สึก**จิตใจห่อเหี่ยว**					
13.คุณ**ไม่อยากทนทำงานนี้ต่อไปอีกแล้ว** (อยากเลิกทำงาน, หยุดงานไปเที่ยวหรือพักผ่อนนานๆ)					
14.**สภาพแวดล้อมทางกายภาพ**ในที่ทำงานของคุณ**ไม่เหมาะสม** เช่น รู้สึกไม่อยากทำงาน (เช่น อากาศร้อน, อึดอัด, สถานที่-คับแคบเกินไป)					

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<u>ตอนที่ 4</u> ข้อมูลเกี่ยวกับอาการที่เป็น

1. ลักษณะอาการที่เกิดขึ้นบริเวณมือและนิ้วมือของคุณคือ (ตอบได้มากกว่า 1 ข้อ)

1. เจ็บปวด 2. อ่อนแรง 3.ชา 4. รู้สึกไม่สบาย

5.บวม 6. ตึงๆ 7 ขัดๆ 8. อื่นๆ โปรดระบุ_____

โดยมีอาการดังกล่าวเฉพาะเวลา 1. ตื่นนอน ระบุอาการ_____

(ตอบได้มากกว่า 1 ข้อ) 2. ขณะทำงาน ระบุอาการ_____

3. หลังเลิกงาน ระบุอาการ_____

4. ตลอดเวลา ระบุอาการ_____

5. อื่นๆ โปรดระบุ _____

2. คุณมีปัญหานิ้วล็อกมานาน_____เดือน

3. อาการที่เป็นจะแย่ลงเมื่อ

1. เคลื่อนไหวในท่า_____

2. ทำงาน ระบุลักษณะงานที่ทำ_____

3. เล่นกีฬา/ออกกำลัง ระบุประเภท_____

4.ทำงานบ้าน ระบุงานที่ทำ_____

5. อื่นๆ โปรดระบุ_____

4. อาการที่เป็นจะดีขึ้นเมื่อ_____

5. คุณคิดว่าปัญหาที่เป็นน่าจะเกิดจาก (ตอบได้มากกว่า 1 ข้อ)

1. อุบัติเหตุ 2. การเล่นกีฬา 3. งานบ้าน

4. งานที่ทำ 5. อื่นๆ โปรดระบุ_____

6. ปัญหาที่เป็นทำให้ความสามารถในการทำกิจกรรมต่างๆ ลดลงจากปกติหรือไม่

1. ไม่

2. ทำไม่ได้ตามปกติ โปรดระบุกิจกรรม_____

7. ปัญหานิ้วล็อกที่คุณเป็นอยู่ขณะนี้เกิดขึ้นเป็นครั้งแรกใช่หรือไม่

1. ใช่ เกิดขึ้นเป็นครั้งแรก

2.ไม่ใช่ เคยเป็นมาก่อน ที่นิ้ว _____ ข้าง ขวา ซ้าย

→ ถ้าคุณเคยเป็นโรคนิ้วล็อกมาก่อน งานที่ท่านทำเมื่อครั้งที่เป็นโรคนิ้วล็อกครั้งแรก กับปัจจุบันนี้มีการ เปลี่ยนงานหรือไม่

1. ไม่ได้เปลี่ยน

2. เคยเปลี่ยนงาน โปรดระบุงานเดิมที่เคยทำ_____

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APPENDIX B

INTERVIEW QUESTIONNAIRE
(In Thai language)

(Fill by researcher)

Pattern of Prehensile hand function data

งาน, อาชีพ, งานอดิเรก หรือกิจกรรมต่างๆที่คุณทำเป็นประจำ มีการใช้มือในลักษณะใด พร้อมทั้งระบุว่าลักษณะการใช้มือนั้น คุณใช้ทำกิจกรรมใดบ้าง

มือขวา ลักษณะมือ ที่ใช้มากที่สุด 3 ลำดับ (เรียงจาก**มากไปน้อย**) ได้แก่

1. ลักษณะมือ_____ กิจกรรมที่ทำ คือ 1. _____ ทำ_____วัน/สัปดาห์ นาน_____
   2. _____ ทำ_____วัน/สัปดาห์ นาน_____
   3. _____ ทำ_____วัน/สัปดาห์ นาน_____

2. ลักษณะมือ_____ กิจกรรมที่ทำ คือ 1. _____ ทำ_____วัน/สัปดาห์ นาน_____
   2. _____ ทำ_____วัน/สัปดาห์ นาน_____
   3. _____ ทำ_____วัน/สัปดาห์ นาน_____

3. ลักษณะมือ_____ กิจกรรมที่ทำ คือ 1. _____ ทำ_____วัน/สัปดาห์ นาน_____
   2. _____ ทำ_____วัน/สัปดาห์ นาน_____
   3. _____ ทำ_____วัน/สัปดาห์ นาน_____

มือซ้าย ลักษณะมือที่ใช้มากที่สุด 3 ลำดับ ได้แก่

1. ลักษณะมือ_____ กิจกรรมที่ทำ คือ 1. _____ ทำ_____วัน/สัปดาห์ นาน_____
   2. _____ ทำ_____วัน/สัปดาห์ นาน_____
   3. _____ ทำ_____วัน/สัปดาห์ นาน_____

2. ลักษณะมือ_____ กิจกรรมที่ทำ คือ 1. _____ ทำ_____วัน/สัปดาห์ นาน_____
   2. _____ ทำ_____วัน/สัปดาห์ นาน_____
   3. _____ ทำ_____วัน/สัปดาห์ นาน_____

3. ลักษณะมือ_____ กิจกรรมที่ทำ คือ 1. _____ ทำ_____วัน/สัปดาห์ นาน_____
   2. _____ ทำ_____วัน/สัปดาห์ นาน_____
   3. _____ ทำ_____วัน/สัปดาห์ นาน_____

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APPEENDIX C
PHYSICAL EXAMINATION FORM

Affected Finger

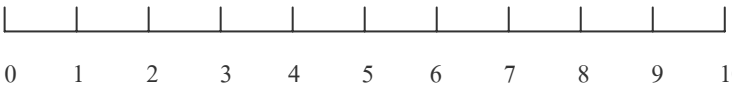
1)_____ Grading _____ Deformity specification _____

2)_____ Grading _____ Deformity specification _____

3)_____ Grading _____ Deformity specification _____

Pain

Left Right



ไม่มีอาการเจ็บปวด เจ็บมากที่สุด

Possible Associated Diseases

DM RA OA CTS de Quervain

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BIOGRAPHY

NAME	Miss Sivaporn Chantrachamnong
DATE OF BIRTH	25 October 1979 (2522)
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