THE APPLICATION OF THAI TRADITIONAL MASSAGE ON PARKINSON'S DISEASE SYMPTOMS ON PATIENTS IN KING CHULALONGKORN MEMORIAL HOSPITAL : A RANDOMIZED INTERVENTION STUDY

Miss Yuka Miyahara

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การประยุกต์ใช้การนวดแผนไทยในผู้ป่วยที่มีกลุ่มอาการพาร์กินสัน ในโรงพยาบาลจุฬาลงกรณ์: การทดลองแบบสุ่มมีการแทรกแซง

นางสาวยูกะ มิยาฮาร่า

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Thesis Title	THE APPLICATION OF THAI TRADITIONAL MASSAGE ON PARKINSON'S DISEASE SYMPTOMS ON PATIENTS IN KING CHULALONGKORN MEMORIAL HOSPITAL: A RANDOMIZED INTERVENTION STUDY
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ยูกะ มิยาฮาร่า : การประยุกต์ใช้การนวดแผนไทยในผู้ป่วยที่มีกลุ่มอาการพาร์กินสันในโรงพยาบาลจุฬาลงกรณ์: การทดลองแบบสุ่มมีการแทรกแซง (THE APPLICATION OF THAI TRADITIONAL MASSAGE ON PARKINSON'S DISEASE SYMPTOMS ON PATIENTS IN KING CHULALONGKORN MEMORIAL HOSPITAL: A RANDOMIZED INTERVENTION STUDY) อ.ที่ปรึกษาวิทยานิพนธ์หลัก: ดร. โรเบิร์ท เอส. แชบเม็น, อ.ที่ปรึกษาวิทยานิพนธ์ร่วม: รศ. นพ. รุ่งโรจน์ พิทยศิริ, ดร. สุรสา โค้งประเสริฐ, 125 หน้า.

วัตถุประสงค์ของการศึกษานี้คือการตรวจสอบผลกระทบของการนวดแผนไทยโบราณกับอาการเคลื่อนไหวช้าและอาการแข็งเกร็งบริเวณช่วงแขนและลำตัว ซึ่งเป็นอาการหลัก 2 ใน 4 อย่างของผู้ป่วยโรคพาร์กินสัน การออกแบบงานวิจัย เป็นการศึกษาแบบสุ่มตัวอย่างควบคุมแบบลองผิดลองถูก การติดตั้ง/สถานที่งานวิจัย งานวิจัยนี้จัดทำขึ้นโดยศูนย์รักษาโรคพาร์กินสันและกลุ่มโรคความเคลื่อนไหวผิดปกติ โรงพยาบาลจุฬาลงกรณ์ กลุ่มเป้าหมายของงานวิจัยนี้เสร็จสมบูรณ์ได้ด้วยความร่วมมือจากผู้ป่วยโรคพาร์กินสัน 56 คน ในช่วงอายุ 43 ถึง 85 ปี การทดลองเปรียบเทียบการรักษาด้วยยาแบบปกติกับการรักษาที่มีการนวดแผนโบราณด้วยทั้งหมด 6 ครั้ง ครั้งละ 20 นาที ในช่วงระยะเวลา 3 สัปดาห์ และจะวัดผลครั้งสุดท้าย 1 สัปดาห์หลังจากการนวดครั้งที่ 6 ผลการวิจัยแสดงว่า มีข้อแตกต่างอย่างมีนัยสำคัญในเรื่องของกำลังที่วัดได้จากการเคลื่อนไหวแบบ Isokinetic และการวัดแรงบีบมือ กับคะแนน UPDRS ของแขนช่วงบน ไม่มีข้อแตกต่างในเรื่องของแรง continuous passive motion และ PDQ39 คะแนนรวมของ UPDRS แสดงให้เห็นถึงพัฒนาการของกลุ่มวิจัยตัวอย่าง ผลการทำลองแสดงให้เห็นว่าการนวดแผนไทยโบราณอาจมีผลในเชิงบวกทำให้อาการเคลื่อนไหวช้าสำหรับผู้ป่วยโรคพาร์กินสันดีขึ้น การวิจัยพบว่าการนวดแผนไทยโบราณในช่วง 3 สัปดาห์สามารถใช้เป็นแนวทางที่สมบูรณ์ในการบำบัดผู้ป่วยโรคพาร์กินสันได้

สาขาวิชา สาธารณสุขศาสตร์ ลายมือชื่อนิสิต .....

ปีการศึกษา 2557 ลายมือชื่อ อ.ที่ปรึกษาหลัก .....

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YUKA MIYAHARA: THE APPLICATION OF THAI TRADITIONAL MASSAGE ON PARKINSON'S DISEASE SYMPTOMS ON PATIENTS IN KING CHULALONGKORN MEMORIAL HOSPITAL: A RANDOMIZED INTERVENTION STUDY. ADVISOR: ROBERT S. CHAPMAN, M.D., M.P.H., CO-ADVISOR: PROF. ROONGROJ BHIDAYASIRI, M.D.,FRCP,FRCPI, SURASA KHONGPRASERT, Ph.D., 125 pp.

The objective of this study was to investigate the effect of Thai Traditional Massage on bradykinesia (slowness of movement) and rigidity (stiffness of the limbs and trunk) which are two of four main symptoms of Parkinson’s disease (PD) patients. This was a randomized controlled trial study. The study was conducted at the Parkinson’s disease and movement disorder department of King Chulalongkorn Memorial Hospital. Participants were the total of 56 PD patients between the ages of 43 and 85 completed this study. Interventions, Usual medical care was compared to the usual medical care with TTM treatments which was for six TTM sessions for twenty minutes per session during three weeks. Post data was conducted after one week since the sixth TTM sessions. Result showed there were statistically significantly difference between two groups for the strength of Isokinetic motion and hand grip and UPDRS score of upper limbs extremities parts. There were no difference for the continuous passive motion and PDQ39. UPDRS total score was shown the improvement for study group. Results indicated that TTM may have a positive effect in improving bradykinesia symptoms in PD patients. Conclusions, the over a period of three weeks, our findings suggested that TTM could be used as a complementary therapy for PD patients.

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LIST OF ABBREVIATIONS

TTM	Thai Traditional Massage Wat Pho style
PD	Parkinson’s disease
KCM	King Chulalongkorn Memorial (Hospital)
CAM	Complementary Alternative Medicine
ISO	Isokinetic motion
CPM	Continuous Passive Motion
QOL	Quality of Life
ADL	Activities of Daily Living

CHAPTER I
INTRODUCTION

1.1 Introduction

Theoretical Background

Parkinson's disease (PD) is characterized by progressive disorder of the nervous system of which the cause is unknown, besides loss of dopamine-producing brain cells. Mostly found among those who are above 50 years and above common symptoms are disorder of motor symptom such as tremor, rigidity, bradykinesia, akinesia, postural instability, and disorder of non-motor symptoms such as dysesthesia and sleeplessness, dejection and fatigue, thought stagnation, hidrosis, and constipation (Aarsland et al., 2007).

The main treatment for PD involves L-dopa in various forms, dopamine agonists, Mucuna Prurients, MAO inhibitors, Nutrients, Deep Brain Stimulation, GDNF, Stem cell therapies and so on. Today, these numerous ways can be effectively used for its treatment. However, it is important to note that with longer suffering term its side effects also increases (Aarsland et al., 2007).

Nowadays complementary and alternative medicine (CAM) have emerged across the globe as a popular alternative for its cure. This treatment mostly focuses on diet, massage therapy, acupuncture, aromatherapy, yoga, herbal medicine, stretch, physical exercise, singing and music therapy. The evidence of CAM for PD can be found in the clinical practice guidelines of American Academy of Neurology. However for manual therapy, it mentions that there is not enough scientific evidence as yet to prove it clearly, even though many patients claim to have benefitted from its efficiency (Suchowersky et al., 2006) (Paterson, Allen, Browning, Barlow, & Ewings, 2005) .

Massage therapy is one of the very popular natural methods in CAM, as well as for PD. It makes the muscle flexible and soft, while enhancing smooth circulation of blood and lymph. The touching technique is found be very relaxing and noted that massage could immensely help to attain balance of the vegetative nervous system. It also helps to reduce stress and activate the parasympatic nervous system which leads to good sleep, smoother working of inner organs, among others. For example, good

sleep as non- motor symptom is produced from melatonin which could control dopamine, which is main factor of PD. As motor symptom, flexing the muscle is to help the rigidity, bradykinesia, akinesia, postural instability (Paterson et al., 2005). However there are still huge number of PD patients who are unaware of these CAM methods.

Thailand since time immemorial is known for its rich culture of Thai Medicine. The Thai traditional massage is believed to be one of most famous natural healing methods in the world and one can see that the usage of massage among Thai population has become a part of their daily lifestyle.

KCM Hospital in Bangkok is one of the most famous and long history in Thailand. It has Chulalongkorn Center of Excellence on Parkinson's disease and Related Disorders in the Chulalongkorn University Hospital which is the first and only organization for Parkinson's disease in Thailand. The prevalence of PD was reported in 2011 that 126.83/100,000 in urban areas and 90.82/100,000 in rural areas ($p<0.001$) in Thailand. And with the ever increasing number of aged people in our societies globally, it is believed that the proportion of PD patients will also increase with time. Therefore it is very meaningful to see the effect and reactions through applying TTM on PD patients in the country which is well known as a massage kingdom since ancient (Bhidayasiri et al., 2011).This research aimed to find out the effect of Thai Traditional Massage (TTM) on PD patients in KCM University Hospital.

1.2 Rationale of the Study

There are four main motor symptoms in PD which are Tremor, Rigidity, Bradykinesia and Akinesia and Postural instability. The Japan medical journal center shows that almost of all PD patients had the symptom of rigidity and about 80% of the patient had Bradykinesia. This shows that the prevalence of bradykinesia and rigidity are higher in the PD patients as compared with the remaining symptoms of the PD. So, my intervention mainly focused on the bradykinesia and rigidity symptoms of PD (Hashimoto, 2008).

1.3 Knowledge Gap

Some research reported that TTM was effective in reducing chronic symptoms such as back pain(Buttagat, Eungpinichpong, Chatchawan, & Kharmwan, 2011) , scapulocostal syndrome(Buttagat, Eungpinichpong, Chatchawan, & Arayawichanon, 2012) and autistic symptoms(Piravej, Tangtrongchitr, Chandarasiri, Paothong, & Sukprasong, 2009) which were not on PD. On the contrast, various complementary alternative medicine therapies were found out to be effective in reducing symptoms of Parkinson's disease among patients (Ferry, Johnson, & Wallis, 2002). Some report showed massage and aroma therapy were most popular. However, to the best of the researcher's knowledge, studies that characterize the role and benefits of Thai Traditional Massage (TTM) techniques/therapies in the management of PD has not been undertaken anywhere yet in the world including Thailand.

1.4 Research Objectives

1.4.1 General objectives

To find the effect of TTM on PD symptom on patients in KCM Hospital

1.4.2 Specific objectives

1.4.2.1 To find out the effect of TTM on bradykinesia (slowness of movement) of PD patients in KCM Hospital

1.4.2.2 To find out the effect of TTM on rigidity (stiffness of the limbs and trunk) of upper limb of PD patients in KCM Hospital

1.5 Research Questions

1.5.1 Does TTM have an effect on bradykinesia (slowness of movement) of PD patients in KCM Hospital?

1.5.2 Does TTM have an effect on the rigidity (stiffness of the limbs and trunk) of upper limb of PD patients in KCM Hospital?

1.6 Research Hypotheses

- **Null Hypothesis (H0)**: There is no effect of TTM on the two motor symptoms of bradykinesia and rigidity of upper limb of PD patients in KCM Hospital.

- **Alternative Hypothesis (H1)**: There is an effect of TTM on the two motor symptoms of bradykinesia and rigidity of upper limb of PD patients in KCM Hospital.

1.7 Conceptual Framework

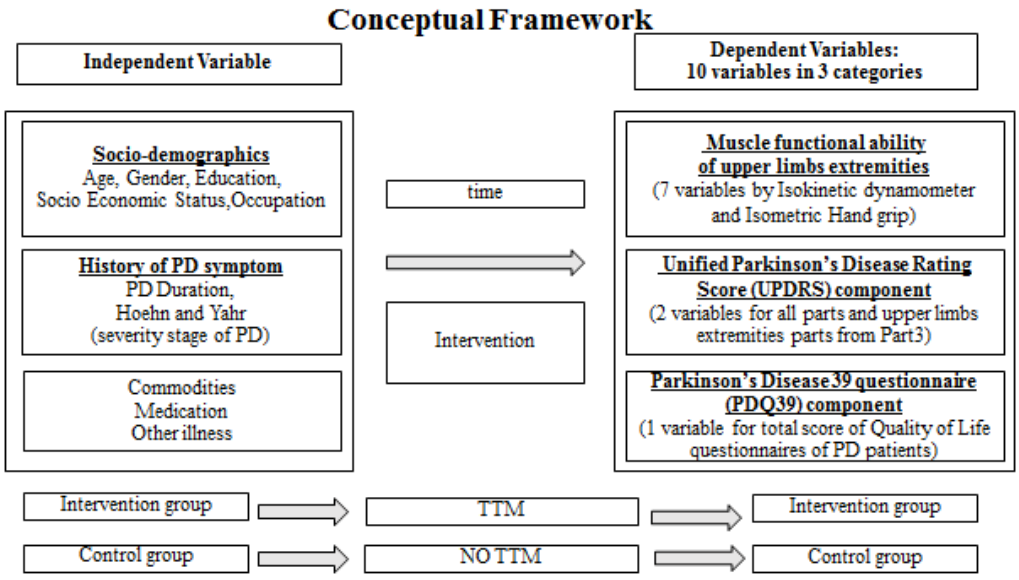

Figure 1 Conceptual framework

1.8 Operational Definitions

Table 1 Socio Demographic Characteristic

Age	Over 18 year's adult until 85 years old / PD symptom patients in KCM Hospital. (Most of PD patients are elder than 50 years old. However this research took wider generation to see more opportunities for PD patients.)
Gender	Male or Female
Educational level	The highest of education of the subject at the period of times of this study. The level can divided into 5 level of the education are Primary , Secondary , Bachelor degree , Master degree and Doctoral degree
Socio Economic Status	annual income in a family
Occupation	Office work, agriculture, industrial, teacher, other
Nature	Gentle, Sensitive, Hard worker, Aggressive, Positive, active, sociable
Genetic	Is there anybody PD symptom patients in the family? If yes, who?
Residence area	Bangkok, other prefecture

Table 2 Parkinson's disease Symptoms

Parkinson's Disease	➢ progressive disorder of the nervous system ➢ due to loss of dopamine-producing brain system ➢ Disorder of motor system ➢ Disorder of Non-motor system ➢ The cause is unknown yet ➢ Mostly found on those who are more than 50 years （Increasing as the aging society） ➢ Tremor, bradykinesia, rigidity, postal instability
Objective symptoms in this research	Bradykinesia and rigidity symptoms
Bradykinesia	Abnormally slow or sluggish motor activity and responses
Rigidity	Inflexibility or Stiffness of the limbs and trunk
Upper limb	Consists of four major parts: a girdle formed by the clavicles and scapulae, the arm, the forearm, and stabilized by muscles connected to the ribs and .
Range of motion	The full movement potential of a joint
Elbow joint of motion	Flexion and extension of elbow
Finger tap	Patients taps thumb with index finger in rapid succession with as large an amplitude as possible, each hand separately
Hand movement	Patients opens and closes hand in rapid succession
Rapid alternating movements of hands	Pronation and supination movements of hands, vertically or horizontally, with as large an amplitude as possible, both hands simultaneously
Symptoms of disorder of motor system	tremor, rigidly, bradykinesia, akinesia, postural instability, hypophonia
Symptoms of Disorder of Non-motor system	dysesthesia, sleeplessness, dejection, fatigue, thought stagnation, hidrosis, constipation
On	When Parkinson's medication is working well, Parkinson's symptoms will be well-controlled. This is called 'on' time.
Off	When symptoms are not well-controlled and do not respond medication, this is called being 'off'.

Table 3 Operational definition of Intervention and Measurement tools

TTM	Thai Traditional Massage Wat Pho style
SEN	Energy line on whole body where TTM is applied according to the principle theory of Thai Medicine
Isokinetic (ISO)	Pertaining to a concentric contractions that occurs at a set of speed against a force of maximal resistance produced at all points in the range of motion
Isometric	Maintaining, or pertaining to, the same measure of length; of equal dimensions.
Continuous Passive Motion (CPM)	A technique for maintaining or increasing the amount of movement in a joint, using a mechanical device that applies force to produce joint motion without normal muscle function.
Extension	The act of straightening or extending a flexed
Flexion	A movement which decreases the joint angle between two ventral surfaces of the body
Torque	A rotatory force causing part of a structure to twist about an axis
Torque max	The highest score of Torque in repeated times
Torque max average	The average of highest score of Torque in repeated times
Newton meter (Nm)	A unit of the MKS system, expressed as energy expended, or work d one, by a force of 1 N acting through a distance of 1 m; equal
Hand grip	The tool to measure the strength of hand grip
UPDRS	Unified Parkinson's disease Rating Scale to check the clinical study of PD
PDQ39	Parkinson's disease Quality 39 to check the quality of life of PD

1.9 Expected Benefit and Application

- PD patients usually suffer and struggle for long with medical care. However medical care at the moment is not focused on curing the underlying cause of PD. The disease often causes side effects which manifests' itself in the form of symptoms such as ON-OFF symptoms which is very difficult to control with medical care. Therefore the role of natural therapy such as massage is very much expected to be one of the most useful non-invasive, non-toxic therapeutic methods to help relieve the symptoms of PD patients.

- Touch therapy like massage usually heightens feelings of rest and relaxation which can help to balance the rapid rise of the vegetative nervous system. Therefore it might also be applicable for other neurologic disorders such as mental illness.

CHAPTER II
LITERATURE REVIEW

2.1 Aging Society and Aged Society in the World and Thailand

The life expectancy has become longer in the world because of the improvement of medical science, improved nutrition and knowledge of health care. The United Nation surveys found that 60% of the elder people of over 60 years old are living in the developing countries, and it is going to increase up to 80% in 2050. The speed of aging society is rather fast. Japan has been shifted from an aging society in 1970 to an aged society in 1994 during 24 years. It is a quite rapid speed compared to 126 years in France, 85 years in Sweden. And it is achieved to 25% which is the highest ratio of aging. The speed of being aging society of developed countries such as Thailand, Vietnam, and China is supposed to be higher than Japan soon. It faces the new themes which is the aging society before achieving economic developed which the developed countries have not experienced.

The population of Thailand is 64.46 million and 8.9% from total population is in over 65 years old. It is the fastest speed in south East Asian countries in 2010. Thailand became an aging society which United Nation defies, which has 7% of elder people. And it is supposed to be more than 14%, which is an aged society in 2024. This speed is faster than Japanese 24 years (Japan International Coorperation Agency, 2013)..

2.1.1 Parkinson's disease

Parkinson's disease is known as the symptom of disorder of the central nervous system which is degenerately. Therefore it causes the disorder of motor symptoms which result from insufficiency of dopamine in certain cells in the midbrain. PD generally becomes clinically apparent after 50 years of age. When they start to realize the differences of the physical conditions from usual so far, most have discomfort feeling on their movement such as slow movement, rigidity, shaking and gait. The specific motor symptom of PD has four kinds. One is tremor of hands and arms, face, legs. The second one is bradykinesia which means slow movement. The

third one is rigidity which is from stiffness of the muscles. The last one is postal instability which causes the body balance difficult (Jankovic, 2008).

After few years, many of them start to feel difficulties in thinking and behavior. Some continues to get suffering from dementia after severe stage of the symptom, especially depression. As well as motor symptom, non-motor symptom also typical one for PD patients, such as constipation, depression, difficulties for sleeping, sense of smelling and tasting, anxiety, excessive saliva, and less energy (Barnett-Cowan et al., 2010). Usually the progress of PD symptom is slow. Therefore it is not easy to identify PD at the initial stages which worsen the symptom. The main reason of difficulties in identifying PD is the fundamental cause of PD has not found yet. Many patients are sometimes wrongly diagnosed because of the quite similar symptom of other disease. Some patients are diagnosed after many years of medical care as Parkinsonism syndrome, not as PD. In fact, PD could be recognized as one of Parkinsonism syndrome (Davie, 2008; Schrag, 2007). Therefore for the prevalence of PD patients, it is said to be more than the official numbers (Barnett-Cowan et al., 2010; Davie, 2008; Schrag, 2007).

From pathology, PD is researched related to a protein alpha-synuclein gathered in Lewy bodies in neurons. And in the midbrain, lacking produce of dopamine which leads formation and activities. Medical cares for the moment are improved so rapidly and getting to be more effective. Especially dopamine agonists and levodopa are taken widely. However after long time of medical care, most of the patients are suffering from secondary effect such as dyskinesia and on-off symptom. Surgery has also been developed a lot these years. Especially deep brain stimulation has been more taken. It is reducing motor symptom from the last severe stage which is like drugs are not effective. For non-motor symptom, medical care is also used and developed a lot of the quality of medicine. And music therapy, doing hobbies, enjoying time with family and friends, diet therapy, rehabilitations are also getting to be used popularly (Jankovic, 2008; Pereira & Aziz, 2006).

Even though the cause is still unknown, PD has common tendencies. Even so, knowledge of risk factors is slowly increasing. Suspected risk factors include family history of PD, pesticide exposure, and smoking (Davie, 2008).

Parkinsonism could also be applied for multiple system atrophy, dementia with Lewy bodies, progressive supranuclear palsy, corticobasal degeneration (Nuytemans, Theuns, Cruts, & Van Broeckhoven, 2010; Samii, Nutt, & Ransom, 2004).. It is pathophysiology considered that PD is synucleiopathy which is from unusual gathering of alpha-synuclein protein in Lewy bodied. It is opposite from Alzheimer's disease. Because it is related to tau protein in neurofibrillary tangles (Galpern & Lang, 2006). However, there is a clear differences from those. For most of the typical Alzheimer's disease dementia, it occurs in severe symptom of PD. On the other hand, PD usually affects neurofibrillary tangles in the brain for causing dementia, PD and Dementia with Lewy bodies (DBL) is quite similar as synucleinopathy. However, correlation of both are still not clear well yet. It might be separated in different categories (Aarsland, Londos, & Ballard, 2009; Galpern & Lang, 2006; Nutymans, Theuns, MCruts, & Broeckhoven, 2010; Samii et al., 2004).

2.1.2 Signs and symptoms

1. Tremor

It is most well-known and apparently seen symptom. It could be recognized more than 70% of the PD patients and more as the progresses. It usually occurs at lest and without voluntary movement. It usually affects the digital limb. And for the beginning, it occurs on only one side of the leg or arm. Then after it occurs to both side. Frequency of the tremor of PD is around 4 to 6 cycles / second. It is usually like thumb and index finger of the hand are getting to be together and moving a circle (Cooper, Eichorn, & Rodnitzky, 2008; Jankovic, 2008).

2. Bradykinesia (slowly movement)

It is related to all kinds of movements such as planning, initiating and execution and it is also occurred in early time of PD symptom. It causes the inconvenient for dressing, eating and writing. In clinical checking, it is checked from comparing both hands and both legs by same activities. It is not the same way in all movements and all the time, depending on the emotionally or the activities. For example, they could ride a bicycle while they could not walk well (Jankovic, 2008; Rodriguez-Oroz et al., 2009; Samii et al., 2004).

3. Rigidity

It is stiffness of the muscles, especially limb parts. Ratchety which is cogwheel rigidity and uniform which is lead-pipe rigidity is typical for Parkinsonism. It might be related to the frequent joint pain. During early time of PD, it seems to affect the shoulder and neck more than extremities and face. According to the progress of symptom, it is getting to occurs to the whole body. Therefore it causes the more difficulties for movements (Banich & Compton, 2011; Jankovic, 2008; Longmore, Wilkinson, Turmezei, & Cheung, 2007; Samii et al., 2004).

4. Postural instability

It occurs during the later time of PD. It causes the falls frequently from impaired balance. Young PD patients have fewer falls compared to the elder patients. Some report suggests nearly half of the patients have falls experiences and nearly 10% of the patients have weekly falls problem. The more severe stage of the symptom, the more falls experiences (Samii et al., 2004; Yao, Hart, & Terzella, 2013). For other motor disorder symptom, gait with festination and speech discomfort, swallowing difficulties, voice weakness, less facial expression, small handwriting (Jankovic, 2008; Russell, Ciucci, Connor, & Schallert, 2010).

5. Neuropsychiatric

One of other symptom of PD is neuropsychiatric such as disorder of cognition, thought, behavior, mood, depending on the stage. This factor is more important than diagnosis to increase the prevalence and duration in some meaning. The typical cognitive effects are executive dysfunction. It causes the difficulties of thinking, planning, initiating, inhibiting, selecting and so on (Caballol, Marti, & Tolosa, 2007; Jankovic, 2008).

PD patients have the risk of dementia 2 to 6 times more, compared to general people. The longer duration, the more prevalence of dementia. Dementia is very much related to quality of life, for both patients and caregivers. And It also increases the mortality (Caballol et al., 2007; Jankovic, 2008). Even no cognitive impairment, alterations of mood and behavior are typical symptom more than general with dementia. Depression, anxiety, apathy are main factors in mood. It is not easy to diagnoses depression from the symptom such as dementia, less facial expression, less movement, speak in a small voice. Behaviors to control impulse like craving,

hypersexuality, overusing medication, exceed eating, gambling are often recognized in PD. It is supposed that these are related to the medications for PD for long time (Ceravolo, Frosini, Rossi, & Bonuccelli, 2009; Jankovic, 2008). For psychotically, about 4% of PD patients have delusions and hallucinations (Friedman, 2010; Shergill, Walker, & Le Katona, 1998).

6. Wearing off

When Paekinson's medication is working well, Parkinson's symptoms will be well-controlled. This is called 'on' time. When symptoms are not well-controlled and do not respond to medication, This is called being 'off'. As Parkinson's progress, some people find that a dose does not last as long as it used to. This is called wearing off. Sometimes the effects of wearing off can happen quickly and there will be a sudden change between being 'on' and 'off'(Parkinson's UK, 2014).

2.1.3 Function of the hand and arm related to the daily life

Finger tap is one of the typical checking factors for PD which let the thumb and index finger tap several times repeatedly. This movement shows the various combined symptoms such as bradykinesia, slow movement, and dis-order of rhythm which means the symptoms from the movement dis-order from dis-order of neuro system. It is quite popular clinical method due to quite simple and easy to check. Also for the hand movement and elbow joint range of motion as well. Those functions are related to dairy activities very much. Therefore usually Parkinson's disease patients have more difficulties in dairy life according to the progress of the stage of the symptoms (Shima et al., 2009).

2.1.4 Parkinson's Disease Rating Scales

Several kinds of rating scales for measuring PD symptoms have been searched and developed. These are practiced and used in various researches to determine eligibility, assess severity, the degree of the progression. Unified Parkinson's disease Rating Scale (UPDRS) is one of the most popular used in worldwide that has been developed the combination of the elements of a number of scale and produced a flexible, efficient, comprehensive tool to inspect the symptoms of PD and the degree which the disability has caused. UPDRS was introduced in official in1987 after several versions of trial and has been researched and updated for combining the new

assessments for Non- motor symptoms by Movement Disorder Society. UPDRS is consisted from three sections which evaluate the main parts of disability, and the fourth section is to evaluate any complications of treatment. And as additionally, the Hoehn and Yahr, and the Schwab and England Activities of Daily Living (ADL) scale are accompanied for further scales frequently together with UPDRS. UPDRS is measured by points which divided into five (0-4). It is assigned to every item from the response individually as well as physical examination and observation. There are 44 questions for Part I, II, III. And for part IV contains 11 questions which the scale ranging is from 0-23. And the final accumulative score ranging is from 0 which means no disability to 199 which means total disability (National Parkinson Foundation, 2014; U.S. Department of Veterans Affairs, 2015).

2.1.5 Management

Actually no cure has found for PD so far except medications and surgery. However these are only for reducing or maintain the symptom. Levodopa and dopamine agonists and MAO-B inhibitors are widely taken (The National Collaborating Centre for Chronic Conditions, 2006).

2.1.6 Rehabilitation

Some research suggests that rehabilitation could help the movement disorder and speech. Physical exercise regularly, even apart from physiotherapy, could be effective to maintain and improve the quality of life such as strength, flexibility, mobility and gait speed (Goodwin, Richards, Taylor, Taylor, & Campbell, 2008; The National Collaborating Centre for Chronic Conditions, 2006). If it is compared to do by themselves at home, the program is better under physiotherapist to make more effective results (Dereli & Yaliman, 2010).

For rigidity symptom, gentle rocking techniques could be effective to relax muscles. The others are to make whole body movement slowly and rhythmically, deep breathing, mediation and so on. For gait and hypokinesia (slow movement), shuffling makes less arm swing. There are many effective techniques which is safety and no limitedly by physiotherapists for gait speed, supporting length, movement of swinging of arm and trunk. Equipment such as pole walking, exercises such as PNF patterns, changing environment such as open-closed, verbal cueing are applied usefully.

Exercises could support a lot for improvement of motor function, especially for the patients whose symptom stage is mild to moderate for strengthen muscles. Some report suggests the significant interaction between the effectiveness and the timing of medication. It suggests to exercise after 45 minutes to 60 minutes after taking medicine as much as possible.[39] And for the flexibility of forwarding posture and respiratory function of severe symptom PD patients, deep breathing exercises could support well to improve capacity and mobility of chest. Exercise might also help to reduce constipation. Lee Silverman voice treatment (LSVT) is well known as effectively for speech therapy. Occupational therapy (OP) is also often practiced widely to improve quality of life through helping them to participate their activities of daily living (O'Sullivan & Schmitz, 2007).

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2.1.7 Epidemiology

As neurodegenerative disorder, the first is Alzheimer and the second is PD. It is approximately 6 to 7 million people world widely and 1 million in the United States. The prevalence of PD patients in the world is likely to be more than 6 to 7 millions.(for 100,000 / Albania is the highest: 800, Ethiopia is the lowest: 7, Japan: 192, Thailand: 95) It shows that Asia is 1/2 of Europe and Africa is 1/4 of Europe. According from PD is usually found on the elder people, Ethiopia is the lowest prevalence from the very low life expectancy. About 0.3% of the all population in countries which is industrialized. And mostly in the elder age. The prevalence increases from 1% of over 60 years old to 4% of over 80 years old. Most of them are more than 60 years old. Only less than 10% are between 20 to 50 years old. Some paper mentions there are more men than women. However these are not shown evidentially (Lau & Breteler,

2006; Samii et al., 2004; Yao et al., 2013). Symptom of PD is also often diagnosed wrongly because of the similar symptoms. So the more prevalence might be supposed to be existed. And according to worldwide aging society, the more prevalence of PD is expected from now on. For general cause factors, some tendency could be shown. For gender, there are more men than women in Europe and more women than men in Japan. Probably because Japanese women has the longer life expectancy then men. In some countries, there are more prevalence in rural area, some are in manufacturing area like vicinities of ferromanganese plants, some are agricultural area using heavily insecticides and some are afflicted by genetic. Disorders in the specific tribe community. Some report suggests according to hair color. The highest is from Red, the next is brown, the third is blonde then black which is from the melanin, the pigment that colors hair is also initially made by turning L-tyrosine in to L-dopa. For occupational difference, there are higher among physician, teacher, dentist, lawyer, scientist, computer programmers, religion-related job, agriculture, clerical occupations. For lifestyle, there are higher significant among those who does not drink alcohol, does not smoke and does only work hard without any hobby and methodical, taciturn, introvert and so on. Many are suffering dementia also. It does not show the difference from the income status of the countries. However there are those reports, there is not so specific because scientific evidences clearly yet for any causes for PD in the world (Great Britian Viartis Organization, 2014; Suchowersky et al., 2006). For the risk factors, though many suggestions are not shown exactly yet, some reports mention about more prevalence industrialized area and where the more pesticides have been used. And smoking and caffeine are mentioned as the factors to reduce the risk (Lau & Breteler, 2006).

2.2 The Prevalence of Using CAM (Complementary Alternative Medicine)

Some report shows the reality using CAM among intractable neurological diseases patients in Japan. Massage is most popular for them. 51.3% of them mentions its efficiency for improvement of general health regardless of if the symptom progress since a year ago (Pecci et al., 2010; Zesiewicz & Evatt, 2009). From the research of Ibaraki prefecture in Japan, 11.7% of PD patients are user of massage and 29.8% of

neurology doctor recommend massage to PD patients for improving muscle movement (Ohkoshi, 2007).

2.3 Massage Effect

Massage is well known to make the muscle flexible as one of physiological function. The relation between flexible the muscle and the improvement of circulation after massage has generally reported. It leads to relaxation for physically and mentally. Therefore it supports to increase the activities of making the balance of the sympathetic nerve system and the parasympathetic nervous system. And touching therapy techniques are also effective to make relaxation. From meta-analysis of the evaluation for the effect of massage on psychological stress among those who are depression, pain syndrome, autoimmune disease, any kinds of stress such as from aging, work, pregnant, there were a significant decreasing of saliva, urinary cortisol for relief the stress and increasing urinary serotonin and dopamine for improving the activeness (Field, Hernandez-Reif, Diego, Schanberg, & Kuhn, 2005).

2.4 Impact of Massage on PD Patient

There is not enough evidence to prove the effectiveness of massage on muscle function on PD; probably it might be the similar to general healthy people as massage effect. Some researches about the impact of massage on PD patients are increasing. Some papers showed decreasing stress hormone level in urine, improvement of ADL and sleepless (Tomlinson et al., 2012), improvement of mental condition and so on (GC., 1994) after giving massage around twice a week to every two or three weeks during four weeks to six months and some reported the effectiveness of Anma-therapy for the various symptom of PD patients through case series study (N. Donoyama & Ohkoshi, 2012). From the review of the massage effect on PD patient in Diagnosis Guideline, some reports the improvement of ADL, QOL, and walking function from 6 cases (Pecci et al., 2010), the improvement of UPDRS, clinical effect, anxiety, and movement function of upper arms from 39 cases. It also shows the increasing of happiness feeling. Massage therapy is suggested the possibility to effect Dopamine. So the further comparative study is needed to determine the range of the improvement of

motor function and the duration (Zesiewicz & Evatt, 2009). Many pilot studies for reducing the PD symptom from Physical Therapy which is one of most popular one have reported. From 39 systematic review and meta-analysis cases of Physical Therapy for 1827 PD patients, there was significant of improvement for walking speed, total UPDRS score, ADL score from UPDRS, evaluation of movement ability, sleep condition, and reducing Norepinephrine which is stress hormone in yurin after massage has reported (GC., 1994).

The PD treatment guideline of American academy of Neurology and the PD treatment guideline of Societas Neurologica Japonica reported that it is useful to improve Physical movement function, muscle level, balance, gait utilized such as Physical exercise and music therapy. Massage therapy is suggested to effect on physically and mentally also from these reports on PD although the further studies are needed.

2.5 Thai Traditional Massage (TTM)

Thai traditional massage has been well-known as natural and manipulation method since 2500 years ago in Thailand, which was influenced from the Traditional Medicine of India, China, and Southeast Asian countries as well as yoga. In the Thai, it is called nuat phaen thai (Thai-style massage) or nuat phaen boran (ancient-style massage). The formal name is nuat thai (Thai massage) according to the Traditional Thai Medical Professions Act, BE 2556 (Cowen et al., 2006; Online Wellness Network, 2015).

TTM is a part of Thai medicine. We have believed the founder was Jivaka Komarabhacca , who was Pāli Buddhist Canon and the Buddha's medical doctor over 2,500 years ago. TTM has been influenced and combined through many culture which is surrounding Thailand such as China, India and South east Asian countries especially from traditional medicine. There are so many variety techniques in TTM, which can be seen the differences depends on the prefecture (P. Salguero, 2007).

TTM is defined as to examine, diagnose, treat to promote the health and prevent from disease. It uses the pressure, squeezing, bending, circular pressure, touching, stretching, steam baths, hot compress, traditional medicines which are based on the principles theory of Thai Traditional Medicine. In various kinds of techniques, it could

be divided into two kinds. The royal style (Rajasamnak) and the popular style (chaloey-sak). Rajasamnak is used only for Royal family which is the codified for acupressure on the pressure points and clearly divided position between the therapist and receiver. Chalosiak is commonly used and well-known in general people through the characteristic of the prefecture. And as more professional style, the Traditional Regional Medicine Style is in the important position in TTM. It is different in the content and the practicing style which is called Traditional Doctors. TTM can be divided into two main styles as the TTM for the health and for the therapy. For health, it also means for relaxation to relieve the muscle tension, pains, stress, which is more for health promotion. And for the therapy, it intends to cure, relieve the musculoskeletal disorders and symptoms of pain in various parts such as tension headache, myofascial pain syndrome, and also to relieve, prevent the joint stiffness, muscle spasms such as paresis, paralysis, Parkinson's disease. This focuses on the symptoms and tries to massage on the affected and related part of the body for therapeutic treatment. Thailand Ministry of Public Health mentions that TTM is effective for more than 60 symptoms such as to relief the pain, stiffness of the muscles, migraines, sprains, anxiety, inflexibility, insomnia, leading the awareness of body and mind, and balancing the energy for physical and mental well (Dewises, 1999; Ministry of Public Health, 2001; Tantipidok, 2007).

Thai Traditional Medicine has four categories such as Thai Medical Care, Thai Herbal Medicine, Midwife, Thai Traditional massage. The fundamental theory is that the human mechanism is composed from body and soul. And the human body is composed of four elements such as earth, water, wind, and fire. The balance of these four elements is very important to keep our health. Especially Wind element works as the flow of energy. The wind and the energy flow along "SEN". SEN is referred to in the inscription and the original textbooks of TTM of Thai medicine at Wat Pho which is the royal temple in Bangkok, Thailand which became "The Memory of The World Heritage" by UNESCO. It explains that SEN composes the human body. And SEN has 10 principle lines in 72000 lines for all. If the flow of the wind and energy along "SEN, it causes the unbalance of the health and causes the disease. Each SEN connect the specific parts of the body to maintain the health. Therefore several symptoms and diseases could be related to the condition of the SEN. TTM is a technique to approach

on SEN lines, acupressure points on the SEN lines. It could promote to relieve the symptoms through the flow of wind and energy along the SEN " (Dewises, 1999; Field et al., 2005; Tantipidok, 2007).

When TTM is conducted, the receiver changes their dress in comfortable and loose clothes to relax. Then lie down on the mat on the floor. It is done in a private room or public room. Massage is carried out in various positions such as lying on the back, lying on the side, on prone, and sitting. Pressing the acupressure points along to the energy lines(SEN) to control the balance of the physical and mental and stretching which is like yoga are the main factors by using the body weight through hands, fingers, elbows, knees, foot. The touching and the pressing are gently, but at the same time deeply in a certain rhythm which makes us relax. It usually takes from few minutes (instantly) to 2 hours session (Salguero & Pierce, 2007).

Although the origin of TTM is not clear, people have used it as the Health Care wisdom since ancient Thai. Since Ayutthaya period (1350-1767), TTM had been accepted by the royal court and quite popular among Thai people. During the reign of King Rama III (1868-1910), TTM was organized as a formal body of knowledge. And the 60 diagrams of TTM from the suggestions of the King in Wat Pho has shared the knowledge of SEN lines and acupressure points to heal the symptoms for general Thai people. During the region of Rama V (1868-1910), the King suggested the systematic organization for the knowledge of Thai Traditional Medicine. TTM was mentioned in the "Text book of medicine, Royal edition" published in 1906. Although it was declined by the role of allopathic medicine during the region of King Rama VI (1910-1925) (Pecci et al., 2010), the first Thai Traditional Medicine School which has 3 years curriculum was initiated to teach the royal massage (Tomlinson et al., 2012). This curriculum became the form of TTM by the National Institute of Thai Traditional Medicine within the Ministry of Public Health and some universities and colleges. At the same time, Nongovernment organizations also provided the role of TTM. These training courses were for the public people for primary health care, in particular to reduce the various pain medications (Tantipidok, 2007).

The National Institute of Thai Traditional Medicine was established in 1993 by an increasing interest of Thai Traditional Medicine from Ministry of Public Health. It

was to create the standard format of TTM to teach the same quality in different school. The Thai Ministry of Public Health issued a ministerial Regulation on 1 February 2001 according to the higher demand of TTM qualified which means to settle the branch of Thai Traditional Medicine and the Practice of the Art of Healing Act, B.E. 2542(1999) (Ministry of Public Health, 2011; Thai Traditional Medicine Services, 2002; WHO, 2010).Thai Traditional Medicine is necessary for health care system of Thailand. TTM and Thai Herbal compress are qualified by the National Health Security System. Nowadays Thai people could access to TTM much easier and TTM is a part of the most useful public health-care facilities (Ministry of Public Health, 2011; WHO, 2010).

Wat Pho (Wat Phra Chetuphon Vimolmangklararm Rajwaramahaviham) is the most important temple in Thailand which has been called the first University of Thailand due to multiple subjects were collected there. It also has been the center of Thai medicine since centuries ago. Wat pho Thai Traditional Medical and Massage School was established in 1955 in the temple as the first school which was approved by the Thai Ministry of Education, and also approved by the Thai Ministry of Public Health. It offers four primary courses which Thai medicine has been consisted, Thai medical practice, Thai Midwife, Thai Pharmacy and Thai Massage. For Thai massage course which is well-known as the center of it in Thailand, there are thousands of students coming to learn from more than 80 countries every year. They are working as Thai therapists in massage center, spa and so on in the world (WAT PHO, 2014; WAT PHO Thai Traditional Massage School, 2009).

2.5.1 The former research using TTM

One of the researches reported TTM could increase heart rate variability, reduce pain and improve stress-related parameters in patients with back pain associated with myofascial trigger points for the low back pain (Buttagat et al., 2012). Another found TTM could reduce over 50% in pain associated with myofascial trigger points intensity after 3 weeks of treatment as well as Swedish massage (WAT PHO, 2014). The other suggested TTM yields slightly more beneficial effects than joint mobilization on substance P and pain perception in patients with non- specific low back pain (WAT PHO Thai Traditional Massage School, 2009). And there was

the other found out that five sessions of Thai traditional massage was effective in the treatment of myofascial back pain in young Thai military personnel, and even the first session proved the effect significantly although Acupuncture showed more effective (Chatchawan U, 2005). Furthermore it was also suggested TTM was effective for increasing cardiac parasympathetic activity and reducing stress and pain from back pain associated to myofascial trigger points for 30 min on the back muscle with the prone position (Mackawan et al., 2005). The other research reported that TTM might relieve spasticity and increase the ability of function and improve QOL after 6 weeks for hand mobility (MD, 2009).

TTM was not evidently different from the Physical therapy for decreasing spasticity. There was the research suggested the combination of TTM with stretching exercises and heat which is the 2-week daily home program could be effective for improving hand mobility in scleroderma patients (Netchanok, Wendy, Marie, & obhan, 2014). The other reported that TTM was suggested to be effective for improving the behaviours of stereotype for Autistic children (Thanitta et al., 2014). And TTM was also reported to make an improvement significantly in pain, muscle tension and anxiety in patients with scapulocostal syndrome even after the first treatment, and quite the similar observation to physical therapy (Kunavut, Yodchai, Wichai, Supunnee, & Ratanavadee, 2014). Some research suggested TTM could make an acute effect on neural to decrease severe pain and anxiety and increase relaxation for patients who are scapulocostal syndrome (Vitsarut, Wichai, David, Uraiwon, & Preeda, 2012).

CHAPTER III
METHODOLOGY

3.1 Study Design

The study was Randomized intervention study

3.2 Study Area

Parkinson's disease Clinic, Neurology Department in KCM Hospital, Bangkok

3.3 Study Population

Patients diagnosed with PD on medical treatment and follow up at the Department of Neurology, King Chulalongkorn Memorial Hospital, Bangkok

3.4 Sampling Technique

1. Researcher recruited subjects following the criteria after proposal was approved by ethic committee.

2. Sampling was done via randomized sampling which randomly picked up through screening by doctor.

3. All Parkinson's disease patients under the follow up of the Parkinson's disease Clinic were screened to determine those who have upper limb muscle rigidity and bradykinesia symptoms. From this, a shortlist was drawn from those who had the symptoms and this list used to randomize them individually into the intervention or control group.

4. Researcher gave the information on objectives, benefits, risk factors, massage methods for the understanding of the patients and providing information allow them to make decision in participation and signed the informed consent. Agreement to participate of the patients were decided by patients upon agreement to participate.

5. Once patients had been randomized to either the control group or the intervention group, they were asked whether they were willing to participate in the

study or not. Those selected was informed of their selection into the study and upon their agreement was included or dropped if they refuse to participate

6. Patients had measurements of Unified Parkinson's Disease Rating Scale (UPDRS) component assessment, PDQ39 (Parkinson's Disease Quality of life 39 questionnaires), Muscle functional ability (Isokinetic dynamometer and Hand grip) assessed as baseline. At their respective follow-ups, they continued to be managed by the medical officer/consultant for their normal Parkinson disease follow up. At the baseline and the follow up these tests were re-administered again following the intervention/control arm measures that were carried out. These procedures needed to be carried out for 4 weeks consecutively until and when the study ended. All measurement scores were assessed during ON symptom period of PD.

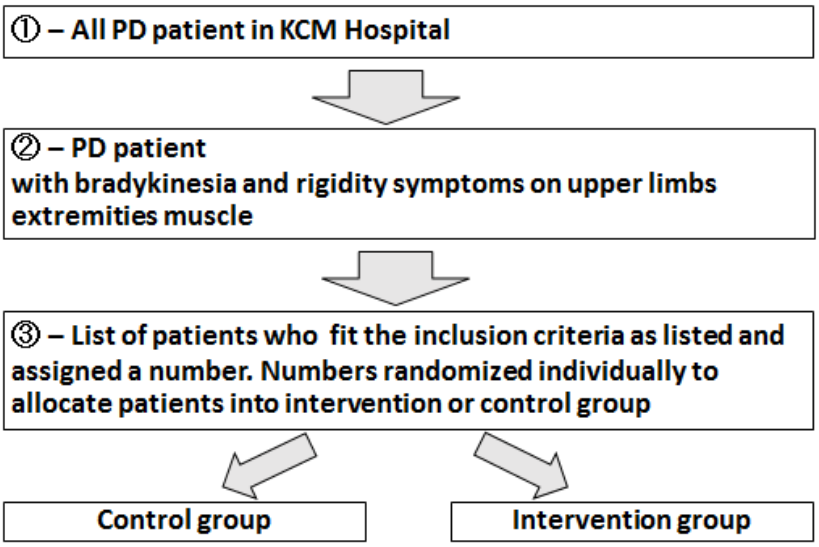

Figure 2 Sampling Technique

3.5 Inclusion & Exclusion Criteria

3.5.1 Inclusion Criteria:

- Adults patients 18-85 years old and diagnosed with Parkinson's Disease, who were all under the follow up of the Parkinson's Disease Clinic, Neurology Department, KCM Hospital.
- Patients with upper limb muscle rigidity and bradykinesia symptoms
- Patients who were able to attend the massage sessions
- Patients who were stable on medication during this research
- Patients who were willing and able to sign the consent form. (If they were willing to participate but unable to sign, their family members or caregivers may sign for them.)

3.5.2 Exclusion Criteria:

- Patients who were pregnant
- Patients who had fever higher than 38.5 Degrees Celsius
- Patients who had a bone fracture or other unhealed musculoskeletal disorders
- Patients who were known to be susceptible to osteogenic fractures or being treated for osteoporosis.
- Patients who had an open wound in the region which was to be massaged.
- Patients who had an active localized or systemic infection during the recruitment process.

3.6 Sampling Technique

The dependent variables for this study were 10 which were divided into 3 categories. The first category was consisted with Muscle functional ability of upper limbs extremities which had 7 dependent variables which were 1) Continuous Passive Motion (CPM) Torque max aver./kg (Nm/kg), Extension, 2) CPM Torque max aver./kg (Nm/kg), Flexion, 3) Isokinetic motion Torque max, Extension, 4) Isokinetic motion Torque max, Flexion 5) Isokinetic motion Torque max average, Extension, 6) Isokinetic motion Torque max average, Flexion, 7) Isometric motion Hand Grip. The second dependent category was consisted with UPDRS component

which had 8) UPDRS all parts, 9) UPDRS Upper limbs Extremities Parts from Part3 of UPDRS. The third category was consisted with PDQ39 component which was 10) PDQ39.Dependent variables are all continuous, so sample size calculations are based on means and standard deviations, as shown in the equation below.

$$n = \frac{[z_{\frac{\alpha}{2}} + z_{\beta}]^2 \times 2\sigma^2}{\delta^2}$$

With n = the sample size required in each group d is the size of difference

σ = standard deviation of the outcome variable.

$Z_{\alpha/2}$ is 1.96

Z_{β} = 0.84

Estimates for these outcomes were made based on previously conducted studies.

For UPRDS component assessment:

In a previous study conducted by Shinpei et al.(2012) the size of difference for UPRDS component was given at 1.9 points and the SD was 1.8 (Shinpei Fukuda, 2012)

$$n = \frac{(1.96+0.84)^2 \times 2(1.8)^2}{(1.9)^2}$$

Thus n was 15 per group × 2 = 30

For Elbow joint of motion:

Size of difference for elbow joint of motion was taken from a previous study conducted by Sachie et al (2013) and was given at 16.5 degrees and the SD was 13.6 (Suoh, 2013).

$$n = \frac{(1.96+0.84)^2 \times 2(13.6)^2}{(16.5)^2}$$

Thus n was 20.2 per group × 2 = 40.4 or 42 rounded up. Taking the largest required sample size to see a difference, was taken 56 people in the sample. Added 20% for dropout rate, brings to a total of 67 patients. Sample size is then set at

34 patients per group.

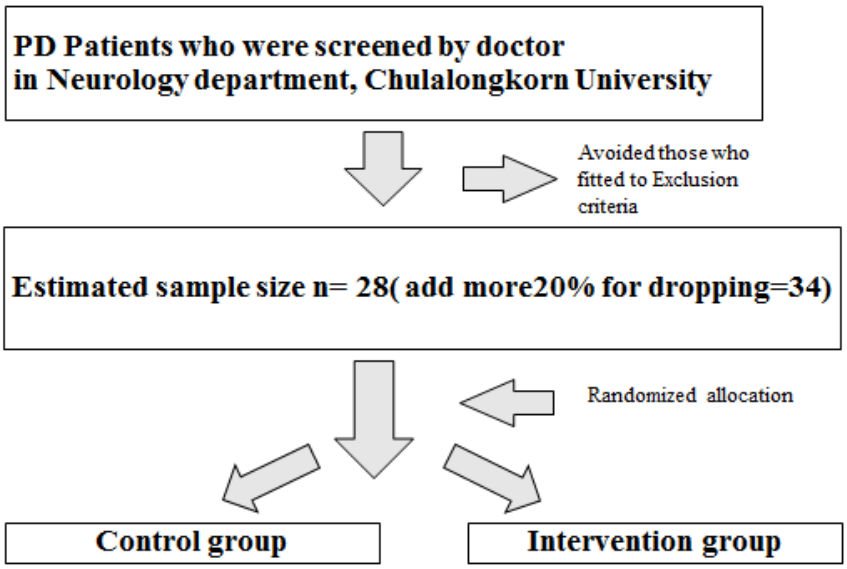

Figure 3 Screening for sample size

3.7 Research Instrument

3.7.1 Hand Grip

The purpose of this test was to measure the maximum isometric strength of the hand and forearm muscles. Handgrip strength was important for any sport in which the hands were used for catching, throwing or lifting. Also, as a general rule people with strong hands tended to be strong elsewhere, so this test was often used as a general test of strength (Top end spots, 2008).

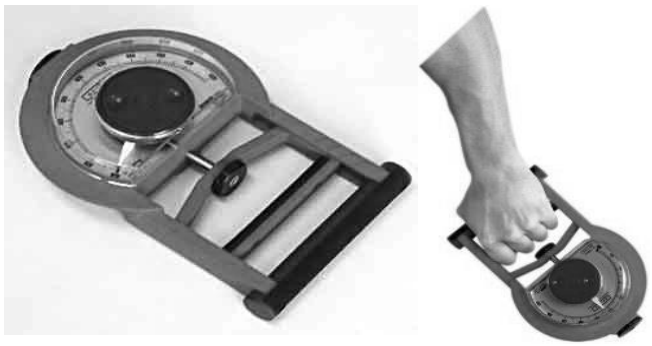

Figure 4 Hand grip

Scoring: The best result from several trials for each hand was recorded, with at least 15 seconds recovery between each effort. The values listed APPENDIX1 (in kg and lbs) gave a guide to expected scores for adults. These values were the average of the best scores of each hand (APPENDIX 1 Standard of Handgrip strength).

3.7.2. ISOKINETIC DYNAMONETER (CON-TREK)

ISOKINETIC DYNAMOMETER (CON-TREX) modules were biomechanical testing, training and therapy machines for rehabilitation, sport and research. They worked in isokinetic, isometric and isotonic movement modes as well as with continuous passive motion (CPM), freely definable position profiles and bio-feedback. Percent loss of use of the arm is described in APPENDIX 3. Setting for this research was CON/CON (60/60) for speed and six times for repeated measure as standard (APPENDIX 2 Elbow extension concentric strength age groups 45-78) (APPENDIX 3 Percent Loss of Use of the Arm) (PHYSIOMED, 2014).

Figure 5 Checking elbow joint with Isokinetic dynamometer

3.7.3.1 Case Report Form

This case report forms which were used for data collection for the patients were filled by the assessing nurse or doctor who had been in charge of the patients. It consisted of four sections: Section 1 Socio demographic and medical history, Section 2 UPDRS, Section 3 PDQ39, Section 4 Muscle functional ability.

3.7.3.2 Section 1 Socio demographic and medical history

This section was filled in using patient medical records and was to check age, gender, education level, Socio Economic Status (SES), occupation of the patient as well as to determine his/her disease characteristics, including onset of disease, severity, grade of symptoms (motor and non-motor) as well as types of comorbid diseases and medication history of the patients. The complete socio demographic section was taken from the KCM Hospital questionnaire which was approved and currently for this purpose (APPENDIX4).

The severity of PD was described by Hoehn and Yahr scale (H&Y) which was published in 1967 and a world widely used clinical rating scale, which defined broad categories of motor function in PD. Among its advantages were that it was simple and easily applied. It captured typical patterns of progressive motor impairment which could be applied whether or not patients were receiving dopaminergic therapy. Hoehn and Yahr had 5 stages. Stage 1 meant only unilateral involvement, usually with minimal or no functional disability, Stage 2 meant bilateral or midline involvement without impairment of balance, Stage 3 meant bilateral disease, mild to moderate disability with impaired postural reflexes, physically independent, Stage 4 meant severely disabling disease which was the patient was still able to walk and stand unassisted but was markedly incapacitated, and Stage 5 meant confinement to bed or wheelchair unless aided. Progression in H&Y staged had been found to correlate with motor decline. Deterioration in quality of life, and neuroimaging studies of dopaminergic loss (Bhidayashiri & Tarsy, 2012).

3.7.3.3 Section 2 UPDRS Component Assessment

UPDRS was developed to address the need for a comprehensive PD measurement tool, and introduced in 1987 by a team of PD investigators as an overall assessment scale that would quantify the signs and symptoms of PD. It was world widely used as the standard comprehensive PD measurement tool. It allows for both an overall measure of disability and individual sub scores and encompasses earlier rating scales: Hoehn and Yahr staging scale (assessed motor skills), and the modified Schwab and England activities of daily living (ADL) scale.

Total UPDRS consists of four parts. Parts I, II, and III contain 44 questions each

measured on a 5-point scale (0-4). Part I was Mentation, behavior, and mood: intellectual impairment, thought disorder, motivation/initiative, and depression. Part II was Activities of daily living (ADL): speech, salivation, swallowing, handwriting, cutting food, dressing, hygiene, turning in bed, falling, freezing, walking, tremor, sensory complaints. Part III was Motor examination: speech, facial expression, tremor at rest, action tremor, rigidity, finger taps, hand movements, hand pronation and supination, leg agility, arising from chair, posture, gait, postural stability, and body bradykinesia. In monotherapy, a "Total UPDRS" score was the combined sum of parts I, II, and III. The score can be ranged from 0 (not affected) to 176 (most severely affected). In adjunct therapy, part IV was included. Part IV contains 11 questions and the scale can range from 0 to 23. Part IV was Complications of therapy: dyskinesia-duration, dyskinesia-disability, dyskinesia- pain, early morning dystonia, "offs"-predictable, "offs"-unpredictable, "offs"-sudden, "offs"-duration, anorexia-nausea-vomiting, sleep disturbance, symptomatic orthostasis (ISIS INNOVATION Health Outcomes, 2014).The lower score meant the better symptoms. The higher score meant the more severe symptoms. The total UPDRS was available as Appendix 5. UPDRS upper limbs extremities parts from Part III were 20 Tremor at rest (Right Hand, Left Hand),21 Action or postural tremor of hands (Right Hand , Left Hand), 22 Rigidity (Right Upper Extremity, Left Upper Extremity), 23 Finger taps (Right, Left), 24 Hand movements (Right, Left), 25 Rapidalternating (Right, Left).

3.7.3.4 Section 3 PDQ39 Component Assessment

The PDQ-39 (Parkinson's disease 39 questionnaire) was primarily used in clinical trials of therapeutics intended to benefit individuals with Parkinson's disease. It was world widely used as the standard comprehensive assessment tool for quality of life of PD patients. Substantial evidence is available to suggest that the PDQ is reliable, valid, responsive, acceptable and feasible as the tool for the assessment of quality of life in Parkinson's disease patients. For these reasons it has been widely adopted and generally considered the industry „gold standard (PHYSIOMED, 2014). There are 39 questions in the long form Parkinson's Disease Questionnaire, with 8 discrete scales which are mobility (10 items), activities of daily living (6 items), emotional well-being (6 items), stigma (4items), social support (3 items),

cognitions(4items), communication(3 items), bodily discomfort (3 items) (ISIS INNOVATION Health Outcomes, 2014).

PDQ39 was fulfilled by patients. If the patients unable to mark by themselves, their caregiver or nurse were asked to answer these questions. The answer was expected to due to having Parkinson's disease, how often during the last month. Total score was measured by the points which are 0.Never, 1.Occasionally, 2.Sometimes, 3.Often, and 4.Always from thirty nine questions. The lower score meant the better symptoms. The higher score meant the more severe symptoms. Details of the PDQ39 are described in APPENDIX 6.

3.7.3.5 Section 4 Muscle functional ability

For Continuous Passive Motion (CPM), Torque max average / Body Weight (Nm/kg) for extension and flexion were measured by Isokinetic dynamometer (Nm) on elbow joint of severe effected side. For Isokinetic Motion (ISO), Torque Max and Torque max average for extension and flexion were measured by Isokinetic dynamometer (Nm) on elbow joint of severe effected side. For Isometric, score of Hand grip was measured (kg) on severe effected side.

3.8 Reliability and Validation Studies of the Instrument

UPDRS was world widely used as the standard comprehensive PD measurement tool. It was reliability and validity was well established according to Martienzet al.2014. It was filled up by checking from professional doctor. Thai language version which was translated from international Standard English was used (McDermott, Kieburtz, Blindauer, Plumb, & Shoulson, 2002).

PDQ39

This is used worldwide as the standard assessment tool for quality of life of PD patients. From item generation, item reduction and scale generation, and testing reliability and validity by neurologists using conventional non-specific measures and clinical assessments, PDQ39 was found with excellent rate for reliability and validity. Following all the testing the PDQ39 was translated into numerous languages using established double - back translation and linguistic validation methods (Rehab, 2014b).

HAND GRIP /validity: The validity of this test as a measure of general strength had been questioned, as the strength of the forearm muscles does not necessarily represent the strength of other muscle groups. / Reliability: the dynamometer needed to be calibrated regularly to ensure consistent results. Having consistent technique and adequate rest were required to ensure reliability (Rehab, 2014a).

ISOKINETIC DYNAMOMETER

The reliability of isokinetic dynamometers was extremely high. The studies which had examined the accuracy of peak torque, work and power have shown correlation coefficients between 0.93 and 0.99. Isokinetic dynamometry has content validity with respect to specific aspects of muscle performance. For instance, maximum isokinetic derived power (during plantar flexion) was reached at the functional velocity equal to that of toe off during walking (ISOKINETICS, 2014).

3.9 Recruitment and Data Collection Procedures

Once patients had been randomized to either the control group or the intervention group, they were called in to agree to participate in the study or not. Upon agreement to participate, patients had measurements of UPDRS and PDQ39 component assessment and muscle functional ability assessed as baseline. At their respective follow-ups, they continued to be managed by the medical officer/consultant for their normal Parkinson disease follow up. At the baseline and post, these three kinds of tests were re- administered again following the intervention/control arm measures that were carried out. These procedures needed to be carried out for 3 weeks

consecutively until and when the study ends. TTM was applied on both sides of upper limbs. Biomechanical testing from Isokinetic dynamometer and Hand grip were conducted on the severe effected side. And the only elbow joint was measured by Isokinetic dynamometer for Continuous Passive Motion and Isokinetic Motion.

3.9.1. INTERVENTION GROUP

The patients received TTM 6 sessions as the additional care in the daily life during three consecutive weeks. One TTM session took 20 minutes at both upper limbs including shoulder and scapula and neck. Checking were conducted before and after all TTM sessions (6 sessions).

Baseline data were collected before the first TTM, questionnaire about socio demographic (Appendix 4) was completed by the patients. And the score of UPDRS (Part I, II, III, IV) (Appendix 5), the muscle functional ability and PDQ39 (Appendix 6) were completed. Then TTM for 20 minutes was given. There were 6 sessions of TTM which were done during 3 weeks with a Post test (follow-up data collection) 1 week after the last TTM session (N. Donoyama & Ohkoshi, 2012; Kunikata, Watanabe, Miyoshi, & Tanioka, 2012; Sato, 2012).

TTM techniques on this session were chosen from the basic techniques used and taught at Wat pho Thai Traditional Medical School certificated by Ministry of Public Health and Ministry of Education, Thailand. The only one therapist who had been well trained and certificated by Wat Pho Thai Traditional Medical School delivered the massages to all patients in the intervention group to avoid variations in the massage technique. The massage position was sitting on chair.

UPDRS and muscle functional ability and PDQ39 were assessed before the beginning of the first session as baseline and after 1 week after the sixth session as post. TTM was applied on both sides of upper limbs. Biomechanical testing from Isokinetic dynamometer and Hand grip were conducted on the severe affected side. And only the elbow joint was measured by Isokinetic dynamometer for Continuous Passive Motion and Isokinetic Motion.

During participating this research, patients did not get any TTM in other places to see the effect clearly.

Table 4 Summary of literature supporting choice of a 20 minute per TTM session *(Kunikata et al., 2012)*

Reference	Objective	Methodology	Interventions	Outcomes
Hiroko et al.2012	To examine the effects of hand massage on autonomic activity, anxiety, relaxation and sense of affinity by performing it to healthy people before applying the technic in actual clinical practice.	Before and after evaluation single group design 14 healthy women	Hand massage (include arm and shoulder) for 1 session 1 session = 20 min for both hands	1)Increased the autonomic nervous activity, improved the parasympathetic nerve activity, reduced the sympathetic nerve activity 2)The score of the state of anxiety decreased 3)The willingness for communication increased in the 70% of the subjects

Table 5 Summary of literature supporting TTM 6 sessions for 3 weeks

(Chatchawan U, 2005)

Reference	Objective	Methodology	Interventions	Outcome
Chatchawan et al.2005	To verify the effectiveness of traditional Thai massage among patients with back pain associated with myofascial trigger points	Prospective, parallel group,randomized clinical trial (RCT) 180 patients with spontaneous back pain with at least one trigger point in either the upper or lower torso	TTM or Swedish Massage for 6 sessions during 3-4 week period, 1session = 30 min +10 min of passive streching	Both group showed over 50% reduction in pain intensity after 3 weeks of treatment

3.9.1.2 Schedule

Figure 5 and 6 explain about the schedule of intervention group and the control group

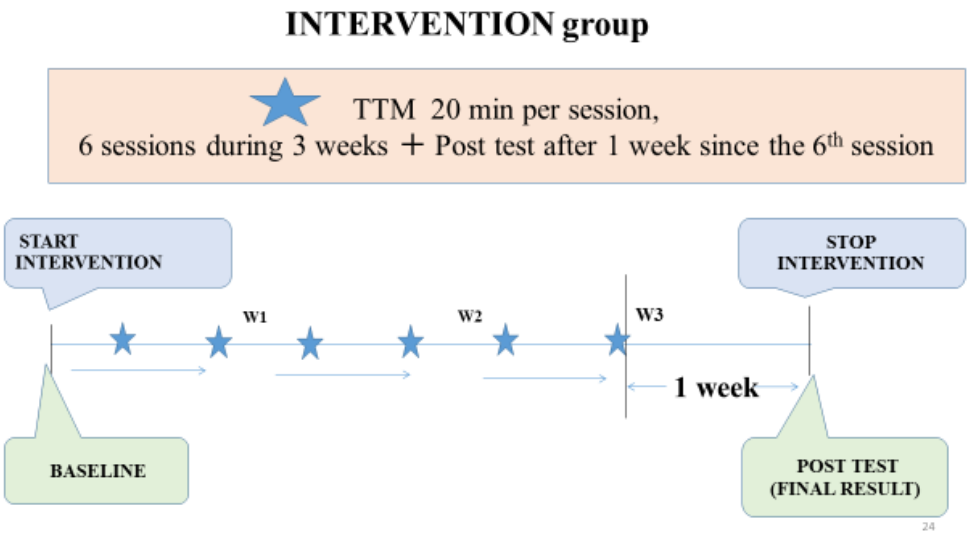

Figure 6 Intervention group schedule

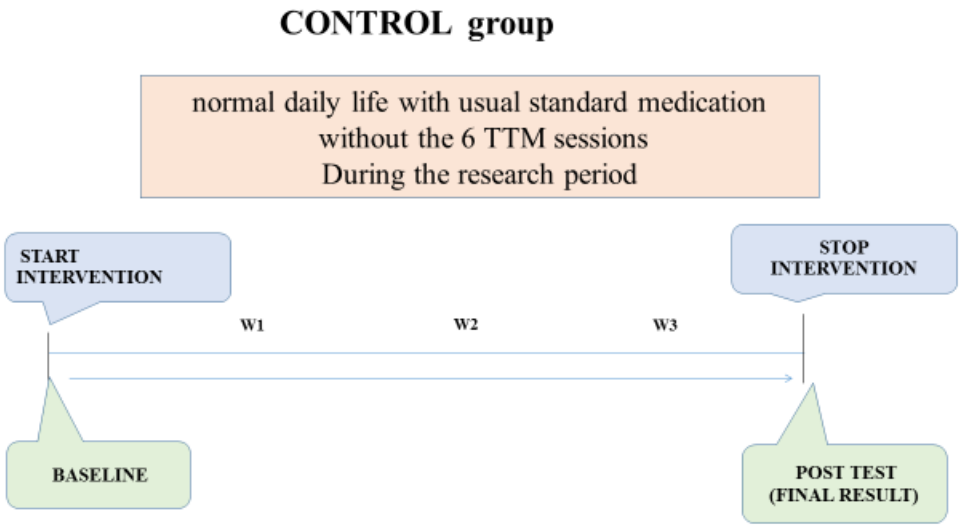

Figure 7 Control group schedule

3.9.1.3 TTM Procedure

The massage position was sitting on the chair. The TTM techniques were based on arm and hand massage techniques which is used at Wat Pho Thai Traditional Medical School, as shown in Figure 6 and Table 6.

Figure 8 Thai Traditional Massage style

Table 6 Whole flow of TTM of 20 min

Flow of TTM	Area on the body	Time
(A)Warm up whole upper limb by palm	Hands and Fingers, Inner arm, Outer arm,	0.5min
(B)Focus on following the Lines by thumb and palm	Hands and Fingers, Inner arm, Outer arm,	4min
(C)Try to make acupressure on points per lines, about 3 seconds per point.	Hands and Fingers, Inner arm, Outer arm,	3min
The other side		
(A)Warm up whole upper limb by palm	Hands and Fingers, Inner arm, Outer arm,	0.5min
(B)Focus on following the Lines by thumb and palm pressing	Hands and Fingers, Inner arm, Outer arm,	4min
(C)Try to make acupressure on points	Hands and Fingers, Inner arm,	3min
And slight massage around shoulder and neck for both sides	Shoulder and Scapula and Neck	4min
Warm up again whole upper limbs for both sides	Inner arm, Outer arm, Hands and Fingers	1min

3.9.1.4 TTM Safety issues

According to WHO manual 「Benchmarks for training in traditional complementary and alternative medicine, Benchmarks for Training in Nuad Thai 2010, TTM Safety issues and TTM Accidents and adverse reactions were mentioned like below.

All kinds of massage practitioners were always supposed to consider well the safety and the risk factors during and after their therapy. The same for TTM practitioners as well. And it was necessary and important to make the examination and screening the patients or clients to check their contraindications by any kinds of the practitioners including medical doctors, other professional health-care practitioners before treatment or suggesting them for TTM.

TTM practitioners had to consider that the contraindications for TTM were any of these following, numbness, sharp pain, tingling, and weakness along the legs which might indicate acute symptoms such as herniated disc, and the arm fever more than 38.5 ℃, and the hypertension with systolic blood pressure more than 160 mm Hg and/or diastolic blood pressure more than 100 mmHg combined with syncope, headache, tachycardia, nausea, vomiting, surgery within 1 month, osteoporosis which was severe stage, communicable diseases, particularly airborne types such as tuberculosis, influenza, the hypo gastric massage for pregnant women with bloody or watery vaginal discharge, oedema of the extremities severely, morning sickness, the less baby movement within 24 hours, open wounds, recent injury, fresh wounds, vascular problems such as dislocation, broken bone, multiple myeloma, severe osteoporosis, ankylosing spondylitis, rheumatoid arthritis with joint deviation or deformity, skin disease, dermal infections such as chronic wounds, cellulitis, herpes zoster, herpes simplex, tinea, deep vein thrombosis, inflammation, burns, cancer.

TTM practitioners also had to consider that the cautions for TTM were any of these following, vascular disease such as aneurysm, atherosclerosis, vasculitis, hypertension with systolic blood pressure more than 160 mm Hg and/or diastolic blood pressure more than 100 mmHg combined with syncope, headache, tachycardia, nausea, vomiting, osteoporosis, abnormal blood clotting, excessive bleeding who are taking the thrombolytic agents, dislocated joint, the parts of the body where has

inserted prosthetic or screws points, steel plates, metal pins, the parts of the body where the wounds are not healed completely yet, broken section on the skin, skin grafts (WHO, 2010).

3.9.1.5 TTM Accidents and adverse reactions

TTM is generally considered as a safe manual therapy. However, some clients or patients might have experiences of adverse reactions. In particular, on those who were receiving TTM for the first time and were not got used to the pressure on the acupressure or trigger points to relieve the syndrome of myofascial pain. Too much pressure also might be the cause.

Typical adverse reactions are bruising, mild inflammation, soreness, dizziness, subcutaneous haemorrhage, and vertigo, earlier or heavier menstruation.

Some persons had moderate adverse reactions, too much pressure and massage on the unsuitable parts from the lack of knowledge, experiences, skills could cause. Typical reactions for moderate level are weakness, numbness in the extremities, cardiac arrhythmia or fainting from the pressure on the large arteries of the neck, inflammation, severe soreness, oedema. If these symptom could be found, the patients or clients are needed to medical check.

A small number of people had severe adverse reactions and accidents, the wrong techniques could cause from inexperienced practitioners or lacking knowledge of contraindications. Typical reactions for severe level were injured nerves, aneurysm of blood vessels, disc herniation‟s, tearing of the intestine or blood vessels, compressed spinal nerves, rupture of lymphatic vessels, ischaemia of the brain or the heart. If these symptoms could be found, the patients or the clients are needed to medical check immediately.

Patients were alerted to all possible adverse reaction. They were also be finished with number of study coordinator registered staff to call if they have a suspected adverse reaction. All adverse reaction will be recorded in a form and documented at the end of the study. Patients with adverse reaction will be advised to seek treatment immediately. Patients with moderate or severe reaction were dropped from the study due to safety (WAT PHO Thai Traditional Massage School, 2009; WHO, 2010).

3.9.2 CONTROL GROUP

For the control group, the patients had their own usual medication and they did not receive any TTM during intervention period. Intervention was done to compare between the symptom who had normal life with usual medication and without additional massage sessions in control group and with additional 6 massage sessions in intervention group during the research period.

All patients who attended was checked for the three kinds of tests which are UPDRS and muscle function ability and PDQ39 at the first as baseline on the beginning of the participating research and after four weeks since baseline as a post test of the research period. Biomechanical testing from Isokinetic dynamometer and Hand grip were conducted on the severe effected side. And the only elbow joint was measured by Isokinetic dynamometer for Continuous Passive Motion and Isokinetic Motion.

During participating this research, patients did not get any TTM in other places to see and compare the effect of TTM intervention in the intervention group clearly.

3.10 Ethical Consideration

- The study was reviewed by ethical committee from KCM Hospital (IRB No. 083/58, COA No. 388/2015).(Respect for persons)
- All participants got a written informed consent prior to conducting the research.
- Researchers faithfully and clearly gave scope, purpose, methods, demands, risks, inconveniences, discomfort and possible outcomes throughout the research process at participants‟ level of understanding and clarified any question or doubt as respect to the capacity of human beings to make their own decisions. Any specific agreements made with the participants were fulfilled. And the participants were informed that they had the right to withdraw from the study anytime and this was not affect the standard of treatment they received.
- Where participants were unable to make their own decisions or had diminished capacity to do so, researchers empowered them where possible and providing for their protection as necessary.

- Researchers respected the privacy, confidentiality and cultural sensitivities of the participants and, where relevant, their welfare, beliefs, perceptions, customs and cultural heritage. Researchers did not write the names of participants in the report and not discuss the results with others in a way that identify the participants.
- Researchers ensured that respect for the participants was not compromised by the aims of the research, by the way it was carried out, or by the results. (APPENDIX 10 Beneficence/Non-maleficence, Justice)

3.11 Data Analysis

Categorical variables: Chi square test

Continuous variables: Independent T test

Intervention effect: Repeated-measures ANOVA and Mann-Whitney test

The intervention effect is the difference between the baseline-to-follow-up change in the intervention group and the corresponding change in the control group. Statistically, the null hypothesis is that this difference does not differ between the 2 groups. Statistical significance was established at $p<0.05$.

The statistical test of association to compare the effectiveness of each outcome variables between the intervention group and control group was done via Repeated-measures ANOVA. That compares the baseline-to-post-test differences in the outcomes between the intervention and control groups.

Table 7 Dependent variables

No.	Name	Checking factors	Measurement score	Direction of beneficial intervention effect
1	**Continuous Passive Motion (CPM)** Torque max aver./kg(Nm/kg), Extension	Rigidity level	Newton Meter / Body Weight (Nm/kg),	down ↓
2	**CPM** Torque max aver./kg(Nm/kg), Flexion	Rigidity level	Newton Meter /Body Weight (Nm/kg),	down ↓
3	**Isokinetic motion** Torque max, Extension	Bradykinesia level	Newton Meter (Nm)	up↑
4	**Isokinetic motion** Torque max, Flexion	Bradykinesia level	Newton Meter (Nm)	up↑
5	**Isokinetic motion** Torque max average	Bradykinesia level	Newton Meter (Nm)	up↑
6	**Isokinetic motion** Torque max average	Bradykinesia level	Newton Meter (Nm)	up↑
7	**Isometric motion** Hand Grip	Bradykinesia level	kg	up↑
8	**UPDRS** All parts	Clinical study of PD for whole symptom	Points	down ↓
9	**UPDRS** Upper limbs Extremities Parts	Clinical study of PD for upper limbs extremities parts	Points	down ↓
10	**PDQ39**	Quality of life of PD patients	Points	down ↓

CHAPTER IV

RESEARCH RESULTS

4.1 Characteristic of Respondent

Table 8 shows the general characteristics of gender, age, PD duration, Medication period, Hoehn and Yahr in intervention group and control group. There were 19(67.9%) male for intervention group and 12(42.9%) male for control group, and there were 9(32.1%) female for intervention group and 16(57.1%) female for control group (p=0.060 Chi squire). The mean age for the intervention group was 66.71±7.45 years and it was 63.71±11.12 years for the control group (P=0.241 Independent t test). The duration of PD was 8.36±4.85 years for intervention group and 9.39±8.00 years for control group (p=0.560 Independent t test). The medication period for PD was 7.21±4.66 years for intervention group and 8.36±8.10 years for control group (p=0.520 Independent t test). There were two and three stages from five stages from Hoehn and Yahr. For Hoehn and Yahr 2, there were 25(89.3%) patients for intervention group and 20(71.4%) patients for control group, and there were 3 (10.7%) patients for intervention group and 8(28.6%) patients for control group for Hoehn and Yahr 3 (p=0.093 Chi squire). There was none of characteristics differed significantly between the intervention group and the control group. Therefore, the assessment of the intervention effect on the outcomes was not adjusted for any of these characteristics.

Table 8 The General Characteristics
(Gender, age, PD duration, Medication period, Hoehn and Yahr in the intervention group and control group)

	Intervention Group	Control Group	p-value
Number	28	28	
Gender (%)			
Male	19 (67.9)	12 (42.9)	0.060
Female	9 (32.1)	16 (57.1)	
Age (years)	66.71 ± 7.45	63.71 ± 11.12	0.241
PD Duration (years)	8.36 ± 4.85	9.39 ± 8.00	0.560
Medication Period (years)	7.21 ± 4.66	8.36 ± 8.10	0.520
Hoehn and Yahr (indicator of 5 severity stages of PD)			0.093
Hoehn and Yahr 2	25 (89.3)	20 (71.4)	
Hoehn and Yahr 3	3 (10.7)	8 (28.6)	

4.2 Primary Outcome and Secondary Outcome

The research outcomes for effectiveness of TTM on bradykinesia and rigidity symptoms on PD patients which were categorized in primary and secondary outcomes into ten dependent variables.

4.2.1 Primary and Secondary Outcome

Table 9 Dependent variables for primary outcome and secondary outcome

Table 9 shows 7 dependent variables for primary outcome and 3 dependent variables for secondary outcome, and the checking factors, Measurement score and direction of significant.

No	Name	Checking factors	Measurement score	Direction of beneficial effects
	Primary outcome			
1	**Continuous Passive Motion(CPM)** Torque max aver./kg(Nm/kg), Extension	Rigidity level	Newton Meter / Body Weight (Nm/kg),	down ↓
2	**CPM** Torque max aver./kg(Nm/kg), Flexion	Rigidity level	Newton Meter /Body Weight (Nm/kg),	down ↓
3	**Isokinetic motion** Torque max, Extension	Bradykinesia level	Newton Meter (Nm)	up ↑
4	**Isokinetic motion** Torque max, Flexion	Bradykinesia level	Newton Meter (Nm)	up ↑
5	**Isokinetic motion** Torque max average, Extension	Bradykinesia level	Newton Meter (Nm)	up ↑
6	**Isokinetic motion** Torque max average, Flexion	Bradykinesia level	Newton Meter (Nm)	up ↑
7	**Isometric motion** Hand Grip	Bradykinesia level	kg	up ↑
	Secondary outcome			

8	**UPDRS** all parts of UPDRS	Clinical study of PD for whole symptom	Points	down ↓
9	**UPDRS** Upper limbs Extremities Parts From Part3 of UPDRS	Clinical study of PD for upper limbs extremities parts	Points	down ↓
10	**PDQ39**	Quality of life of PD patients	Points	down ↓

4.2.2. CPM (Continuous Passive Motion) expressed rigidity level

Table 10 explains about Continuous Passive Motion (CPM) Torque max average / body weight (Nm/kg), extension. The checking factor is rigidity level, the measurement score is Newton Meter / Body Weight (Nm/kg), the direction of significant for improvement is down. Checking factor, magnitude, direction of significant of CPM Nm/kg Extension were shown in table 10.

Table 10 Continuous Passive Motion (CPM)

No	Name	Checking factors	Measurement score	Direction of significant
1	**Continuous Passive Motion(CPM)** Torque max aver./kg(Nm/kg), Extension	Rigidity level	Newton Meter / Body Weight (Nm/kg)	down ↓

Table 11 and Figure 7 show CPM (Continuous Passive Motion) expresses upper limbs extremities extensors rigidity. The data which was decreasing shows the better symptom. There was no statistically significant difference between the two groups in upper limbs extremities extensors rigidity. Repeated measures ANOVA showed p-value was 0.470, neutral. Mann Whitney test showed p-value was 0.737, neutral.

Table 11 Intervention effect of CPM Torque

	Intervention group		Control group		Repeated measures AVOVA	Mann Whitney test
Variables	Baseline	Post	Baseline	Post	p-value	p-value
<CPM>						
Torque max aver./kg(Nm/kg) , Extension	0.11 (0.09)	0.13 (0.08)	0.15 (0.13)	0.14 (0.08)	0.470 (Neutral)	0.737 (Neutra)

Intervention effect= 0.03

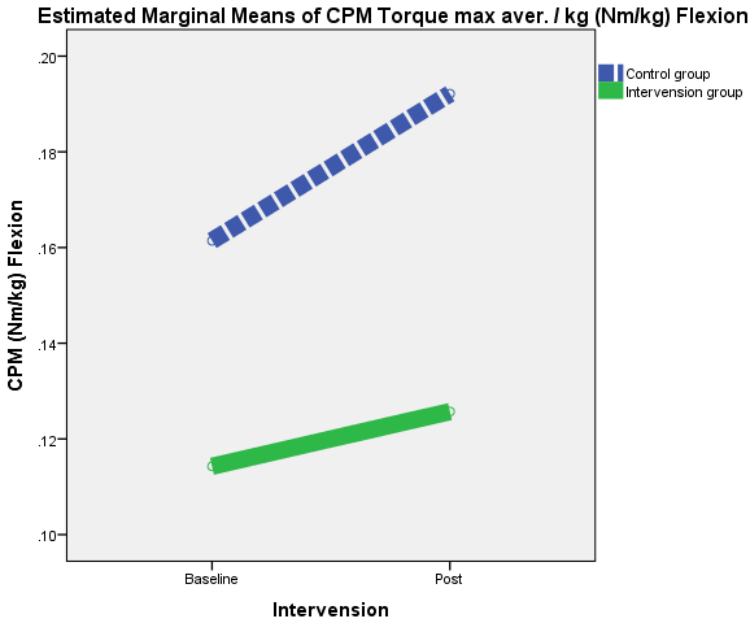

Figure 9 CPM Torque max aver. /Body Weight (Nm/kg) Flexion

4.2.3. Isokinetic motion expressed bradykinesia level

Isokinetic Motion (Torque Max)

Table 12 explains about Isokinetic Torque max, extension. The checking factor is bradykinesia level, the measurement score is Newton Meter (Nm), the direction of significant for improvement is up.

Table 12 and Figure 10 show Isokinetic Torque max expresses upper limbs extremities extensors bradykinesia. Torque max expresses the max data from six repeated motions. The data which is increasing shows the better symptom. There was statistically significant difference between the two groups in upper limbs extremities extensors bradykinesia. Repeated measures ANOVA showed p-value was <0.001, beneficial. Mann Whitney test showed p-value was <0.001, beneficial.

Table 12 Isokinetic Torque

No	Name	Checking factors	Measurement score	Direction of significant
3	**Isokinetic motion** Torque max, Extension	Bradykinesia level	Newton Meter (Nm)	up ↑

Table 13 and Figure 10 show Isokinetic Torque max expresses upper limbs extremities extensors bradykinesia. Torque max expresses the max data from six repeated motions. The data which is increasing shows the better symptom. There was statistically significant difference between the two groups in upper limbs extremities extensors bradykinesia. Repeated measures ANOVA showed p-value was <0.001, beneficial. Mann Whitney test showed p-value was <0.001, beneficial.

Table 13 Intervention effect of Isokinetic Torque max, Extension from Repeated measures ANOVA and Mann Whitney test

	Intervention group		Control group		Repeated measures AVOVA	Mann Whitney test
Variables	Baseline	Post	Baseline	Post	p-value	p-value
Isokinetic,						
Torque max, Extension	24.59 (9.83)	38.62 (14.48)	23.99 (12.15)	23.75 (11.2)	<0.001 (Beneficial)	<0.001 (Beneficial)

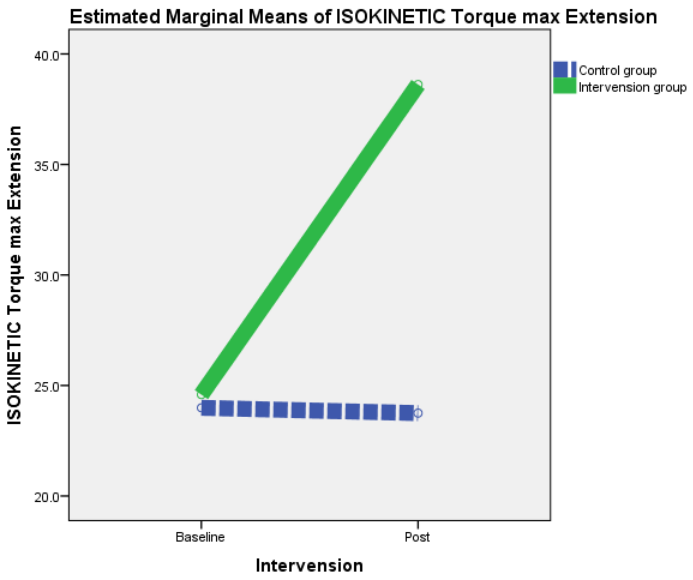

Figure 10 ISOKINETIC Torque Max Extension

Table 14 explains about Isokinetic Torque max, flexion. The checking factor is bradykinesia level, the measurement score is Newton Meter (Nm), the direction for improvement is up.

Table 14 Checking factor, magnitude, direction of significant of Isokinetic Torque max, Flexion

No	**Name**	**Checking factors**	**Measurement score**	**Direction of significant**
4	**Isokinetic motion** Torque max, Flexion	Bradykinesia level	Newton Meter (Nm)	up ↑

Table 15 and Figure 11 show Isokinetic Torque max expresses upper limbs extremities flexors bradykinesia. Torque max expresses the max data from six repeated motions. The data which is increasing shows the better symptom. There was statistically significant difference between the two groups in upper limbs extremities flexors bradykinesia. Repeated measures ANOVA showed p-value was <0.001, beneficial. Mann Whitney test showed p-value was <0.001, beneficial.

Table 15 Intervention effect of Isokinetic Torque max, Flexion from Repeated measures ANOVA and Mann Whitney test

	Intervention group		Control group		Repeated measures AVOVA	Mann Whitney test
Variables	Baseline	Post	Baseline	Post	p-value	p-value
Isokinetic,						
Torque max, Flexion	23.97 (9.40)	38.88 (14.8)	22.98 (12.40)	23.20 (11.3)	<0.001 (Beneficial)	<0.001 (Beneficial)

Intervention effect=14.69

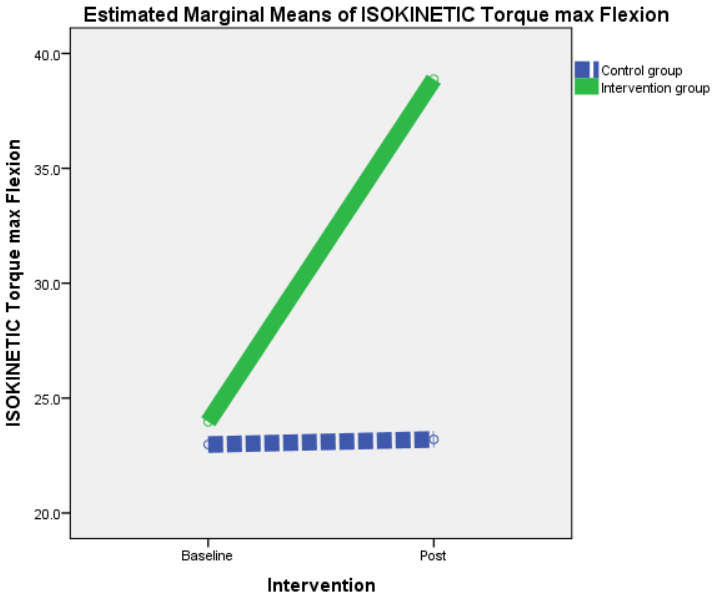

Figure 11 ISOKINETIC Torque Max Flexion

Isokinetic Motion (Torque max Average)

Table 16 explains about Isokinetic Torque max average, extension. The checking factor is bradykinesia level, the measurement score is Newton Meter (Nm), the direction for improvement is up.

Table 16 Checking factor, magnitude, and direction of significant of Isokinetic Torque max Average, Extension

No	Name	Checking factors	Measurement score	Direction of significant
5	**Isokinetic motion** Torque max average, Extension	Bradykinesia level	Newton Meter (Nm)	up ↑

Table 17 and Figure 12 show Isokinetic Torque max average expresses upper limbs extremities extensors bradykinesia. Torque max expresses the max data from six repeated motions. The data which is increasing shows the better symptom. There was statistically significant difference between the two groups in upper limbs extremities extensors bradykinesia. Repeated measures ANOVA showed p-value was <0.001, beneficial. Mann Whitney test showed p-value was <0.001, beneficial.

Table 17 Intervention effect of Isokinetic Torque max average, Extension from Repeated measures ANOVA and Mann Whitney test

	Intervention group		Control group		Repeated measures AVOVA	Mann Whitney test
Variables	Baseline	Post	Baseline	Post	p-value	p-value
Isokinetic,						
Torque max average, Extension	21.48 (8.88)	33.61 (14.71)	20.76 (11.41)	20.91 (9.92)	<0.001 (Beneficial)	<0.001 (Beneficial)

Intervention effect=11.98

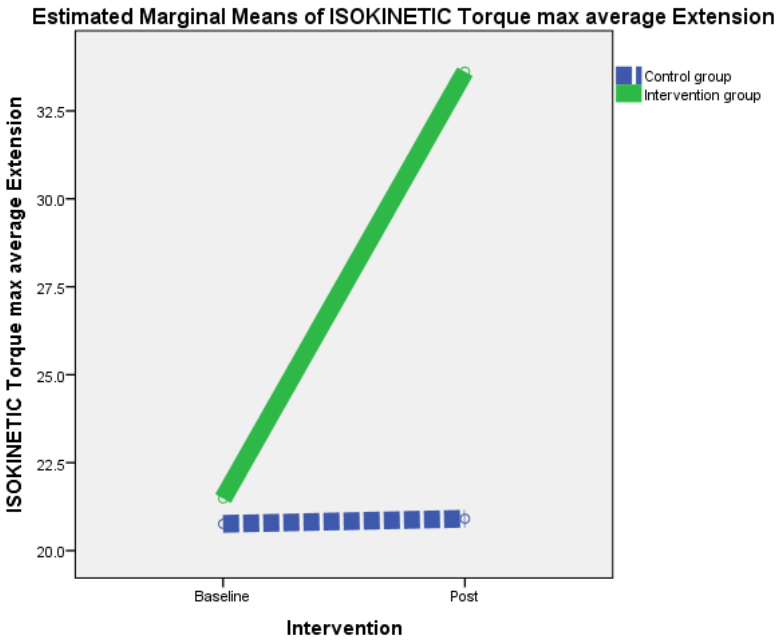

Figure 12 ISOKINETIC Torque Average Extension

Table 18 explains about Isokinetic Torque max average, flexion. The checking factor is bradykinesia level, the measurement score is Newton Meter (Nm), the direction for improvement is up.

Table 18 Checking factor, magnitude, direction of significant of Isokinetic Torque max average, Flexion

No	Name	Checking factors	Measurement score	Direction of significant
6	**Isokinetic motion** Torque max average, Flexion	Bradykinesia level	Newton Meter (Nm)	up ↑

Table 19 and Figure 13 show Isokinetic Torque max average expresses upper limbs extremities flexors bradykinesia. Torque max expresses the max data from six repeated motions. The data which is increasing shows the better symptom. There was statistically significant difference between the two groups in upper limbs extremities flexors bradykinesia. Repeated measures ANOVA showed p-value was <0.001, beneficial. Mann Whitney test showed p-value was <0.001, beneficial.

Table 19 Intervention effect of Isokinetic Torque max average, Flexion from Repeated measures ANOVA and Mann Whitney test

	Intervention group		Control group		Repeated measures AVOVA	Mann Whitney test
Variables	Baseline	Post	Baseline	Post	p-value	p-value
Isokinetic,						
Torque max average, Flexion	20.70 (8.60)	35.59 (14.65)	20.27 (10.98)	20.17 (10.68)	<0.001 (Beneficial)	<0.001 (Beneficial)

Intervention effect=14.99

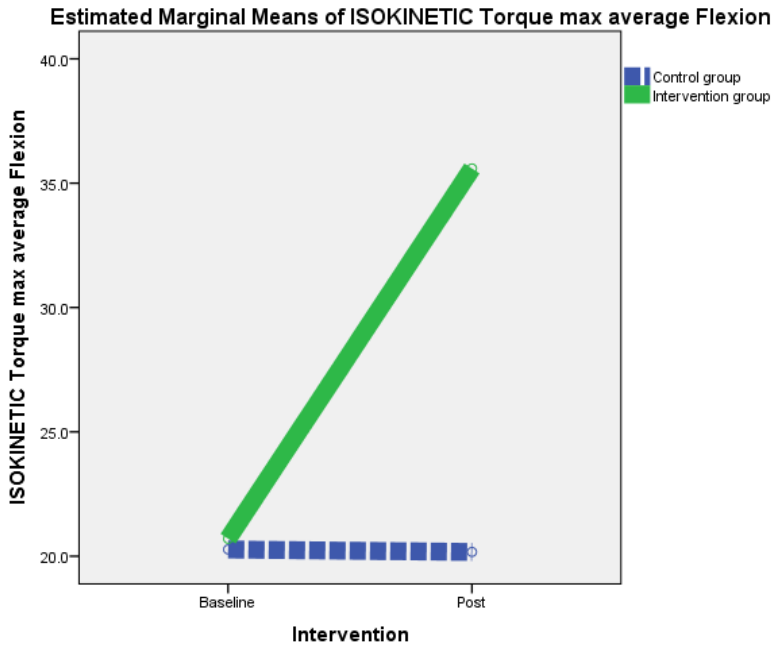

Figure 13 Isokinetic Torque Average Flexion

4.2.4. Hand grip Isometric score expressed bradykinesia level

Hand Grip Score

Table 20 explains about Isometric, Hand grip. The checking factor is bradykinesia level, the measurement score is kg, the direction for improvement is up.

Table 20 Checking factor, magnitude, direction of significant of Isometoric, Hand grip

No	Name	Checking factors	Measurement score	Direction of sig.
7	**Isometric motion** Hand Grip	Bradykinesia level	Newton Meter (kg)	up ↑

Table 21 and Figure 14 show Isometric Hand grip score expresses upper limbs extremities bradykinesia. The data which is increasing shows the better symptom. There was statistically significant difference between the two groups in upper limbs extremities bradykinesia. Repeated measures ANOVA showed p-value was <0.001, beneficial. Mann Whitney test showed p-value was <0.001, beneficial.

Table 21 Intervention effect of Isometric, Hand Grip from Repeated measures ANOVA and Mann Whitney test

	Intervention group		Control group		Repeated measures AVOVA	Mann Whitney test
Variables	Baseline	Post	Baseline	Post	p-value	p-value
Isometric, Hand Grip	21.75 (8.59)	25.00 (9.04)	20.89 (8.35)	20.18 (8.39)	<0.001 (Beneficial)	<0.001 (Beneficia)

Intervention effect=3.96

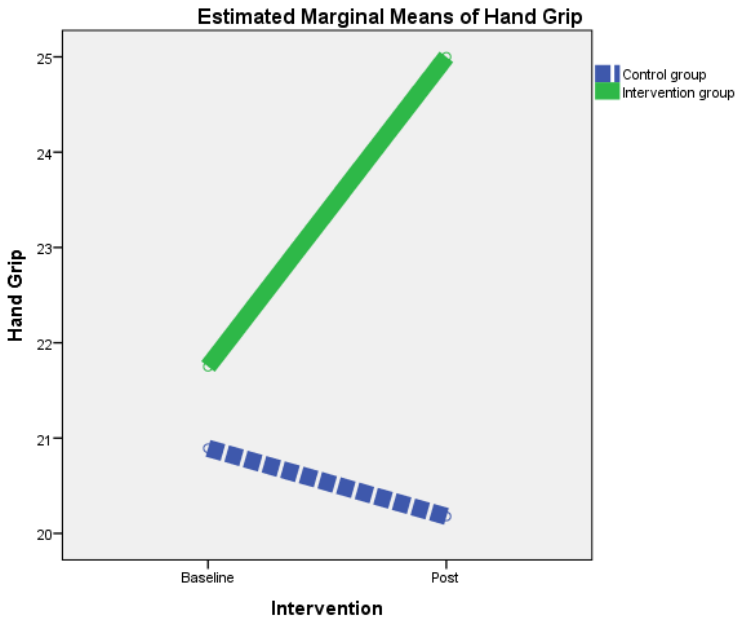

Figure 14 Hand grip

Hand grip score expresses upper limbs extremities bradykinesia. The data which is increasing shows the better symptom. There was statistically significant difference between the two groups in hand grip score. It was p=0.001.

4.2.5. UPDRS score for total expressed the scale of clinical study of PD symptoms UPDRS all total Score

Table 22 explains about UPDRS all parts. The checking factor is clinical study of PD for whole symptom, the measurement score is points, the direction for improvement is down.

Table 22 Checking factor, magnitude, direction of significant of UPDRS all parts

No	Name	Checking factors	Measurement score	Direction of significant
8	**UPDRS** all parts	Clinical study of PD for whole symptom	Points	down ↓

Table 23 and Figure 15 show total points of UPDRS all parts expresses clinical study of PD for whole symptom. The data which is decreasing shows the better symptom. Repeated measures ANOVA showed p-value was 0.062, neutral that there was no statistically significant difference between the two groups in whole symptoms. Mann Whitney test showed p-value was 0.008, beneficial that there was statistically significant difference between the two groups in whole symptoms.

Table 23 Intervention effect of UPDRS all parts from Repeated measures ANOVA and Mann Whitney test

	Intervention group		Control group		Repeated measures AVOVA	Mann Whitney test
Variables	Baseline	Post	Baseline	Post	p-value	p-value
UPDRS all parts	40.18 (15.96)	36.18 (16.5)	37.00 (16.94)	38.50 (18.3)	0.062 (Neutra)	0.008 (Beneficia)

Intervention effect= -5.5

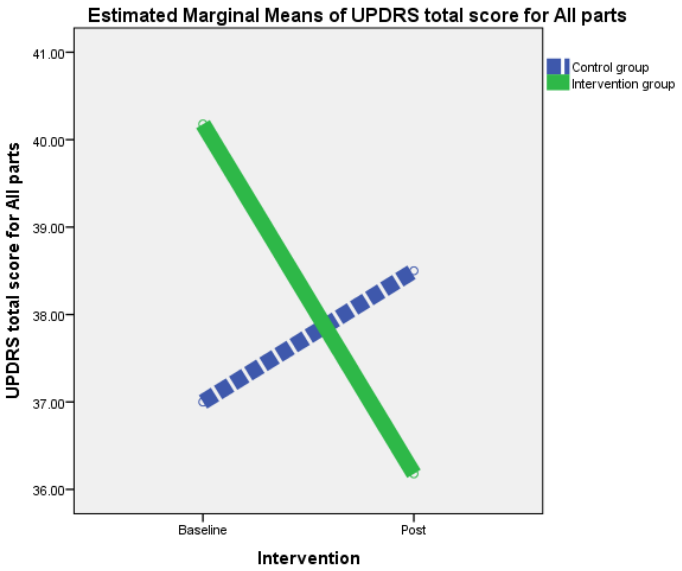

Figure 15 UPDRS total score for all parts

UPDRS upper limbs parts from Part3

Table 24 explains about UPDRS upper limbs extremities parts from part3. The checking factor is clinical study of PD for upper limbs extremities, the measurement score is points, the direction for improvement is down.

Table 24 Checking factor, magnitude, direction of significant of UPDRS upper limbs extremities parts from Part3

No	Name	Checking factors	Measurement score	Direction of significant
9	**UPDRS** Upper limbs Extremities Parts From Part3	Clinical study of PD for upper limbs extremities parts from Part3	Points	down↓

Table 25 and Figure 16 show total points of UPDRS upper limbs extremities parts from Part3 which is motor examination expresses clinical study of PD for upper limbs extremities. The data which is decreasing shows the better symptom. Repeated measures ANOVA showed p-value was 0.046, beneficial that there was statistically significant difference between the two groups in upper limbs extremities. Mann Whitney test showed p-value was 0.016, beneficial that there was statistically significant difference between the two groups in upper limbs extremities.

Table 25 Intervention effect of UPDRS Upper limbs Extremities Parts from Part3 from Repeated measures ANOVA and Mann Whitney test

	Intervention group		Control group		Repeated measures AVOVA	Mann Whitney test
Variables	Baseline	Post	Baseline	Post	p-value	p-value
UPDRS Upper limbs Extremities Parts from Part3	10.64 (4.79)	8.86 (5.60)	9.25 (5.67)	9.64 (6.01)	0.046 (Beneficia)	0.016 (Beneficial)

Intervention effect= -2.17

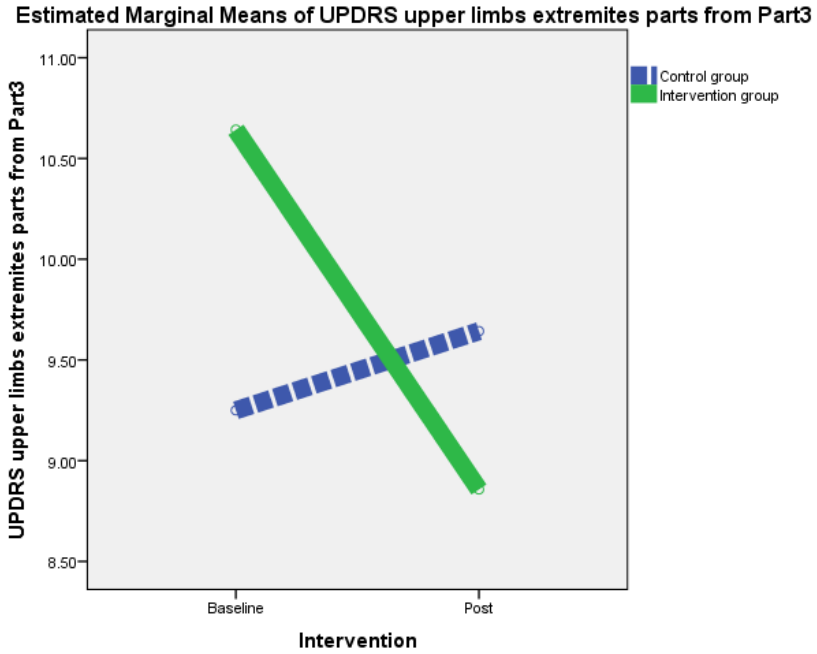

Figure 16 UPDRS upper limbs parts from Part3

UPDRS score expresses the scale of clinical study of PD symptoms which is for checking the level of 44 symptoms of PD patients. This data expresses twelve checking points for upper limbs extremities parts from all points. The data which is decreasing

shows the better symptom. There was statistically significant difference between the two groups in UPDRS upper limbs extremities parts score. It was p=0.046.

4.2.6 PDQ39 score expressed the scale of Quality of Life of PD patients

PDQ39

Table 26 explains about PDQ39. The checking factor is quality of life of PD patients, the measurement score is points, the direction for improvement is down.

Table 26 Checking factor, magnitude, direction of significant of PDQ39

No	**Name**	**Checking factors**	**Measurement score**	**Direction of significant**
10	**PDQ39**	Quality of life of PD patients	Points	down ↓

Table 27 and Figure 17 show the total score of PDQ39 expresses quality of life of PD patients. The data which is decreasing shows the better symptom. There was no statistically significant difference between the two groups in quality of life. Repeated measures ANOVA showed p-value was 0.676, neutral. Mann Whitney test showed p-value was 0.670, neutral.

Table 27 Intervention effect of PDQ39 from Repeated measures ANOVA and Mann Whitney test

	Intervention group		Control group		Repeated measures AVOVA	Mann Whitney test
Variables	Baseline	Post	Baseline	Post	p-value	p-value
PDQ39	38.04 (24.68)	32.32 (20.22)	47.18 (20.75)	43.18 (21.49)	0.676 (Neutral)	0.670 (Neutral)

Intervention effect= -1.72

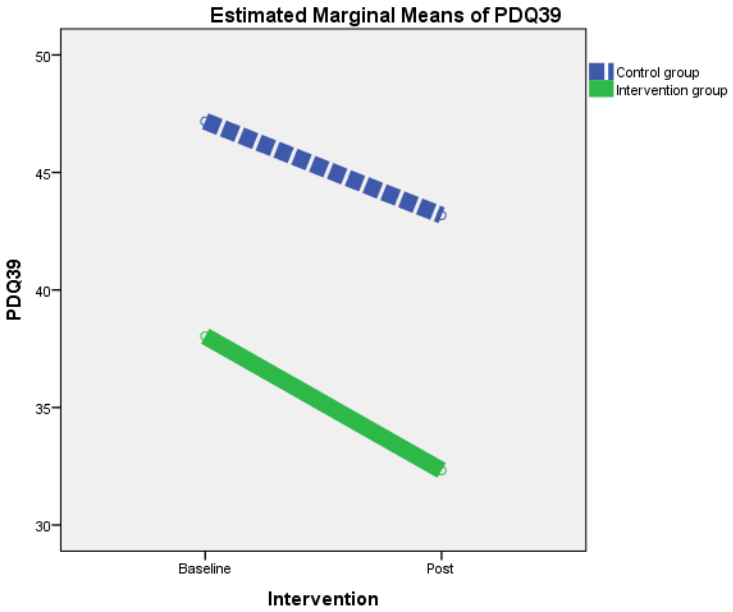

Figure 17 PDQ39

4.3 Adverse reactions

In this research, there were not any adverse reactions. TTM was conducted quite safety for all the sessions.

CHAPTER V
DISCUSSION

5.1 The Effect of TTM on bradykinesia and rigidity symptoms on upper limbs extremities on PD patients

The literature review of Thai Traditional Massage (TTM) demonstrated that TTM was effective to relieve chronic low back pain by providing pain relief, improving range of motion and disability and psychological functions including, reducing anxiety and improving mood(Kunikata et al., 2012). Other studies also indicated that TTM was able to increase surface temperature of hands as well as mobility as both immediate and short term effects.(Vananjak K, 2010a, 2010b) Some studies suggested that Complementary Alternative Medicine (CAM) like acupuncture, Japanese massage, therapeutic massage had shown good effect and possibilities for Parkinson's disease (PD) symptoms like gait, movement function and depression.(N Donoyama, Suoh, & Ohkoshi, 2014; Shinpei Fukuda, 2012)

In this study, the effect of TTM on rigidity and bradykinesia symptoms on upper limbs extremities on PD patients were analyzed by using the ten subscales which are 1) Continuous Passive Motion (CPM) Torque max aver./kg(Nm/kg), Extension for rigidity level, 2) CPM Torque max aver./kg(Nm/kg), Flexion for rigidity level, 3) Isokinetic motion Torque max, Extension for bradykinesia level, 4) Isokinetic motion Torque max, Flexion for bradykinesia level, 5) Isokinetic motion Torque max average, Extension for bradykinesia level, 6) Isokinetic motion Torque max average, Flexion for bradykinesia level, 7) Isometric motion Hand Grip for bradykinesia level, 8) UPDRS all parts for clinical study of PD for whole symptoms, 9) UPDRS Upper limbs Extremities Parts from Part3 for clinical study of PD for upper limbs extremities parts, and10) PDQ39 for quality of life of PD patients.

The results of this study showed the strong significant difference between two groups on bradykinesia symptom based on the scores of Isokinetic and Isometric. All for Isokinetic motion for torque max extension and flexion, for torque max average extension and flexion and for Isometric motion which was hand grip

showed $p<0.001$ for beneficial from both Repeated measures ANOVA and Mann Whitney test.

Other researchers have observed that muscle weakness on upper limbs extremities in higher movement velocities with Isokinetic dynamometer which was related to bradykinesia on PD patients. It was observed the less strength on the more severe side which PD affected. In contrast, other research observed decreasing the weakness of muscle which was not dependent on the movement of velocity. However, there was a significant difference between the PD group and the control group. The PD group showed more weakness in muscle tone. However, both of these studies also suggested that the weakness of muscle of PD patients could be assessed by Isokinetic dynamometer. It was also suggested that using Isokinetic dynamometer could be useful to evaluate muscle weakness for the assessment of PD symptoms such as clinical severity and fall risk. Therefore, further research is needed to prove the association between the velocity and the muscle weakness by checking with Isokinetic dynamometer.(Donoyama N, 2001; Durmus B, 2010)

One of the major problems of PD patient from the symptom of bradykinesia is fall which is influenced by freezing of gait. There are many symptoms related to gait in bradykinesia. There was the research reported the freezing symptoms which were related between lower limbs and upper limbs ($p=0.000$). They also recognized that PD patients who had freezing walk showed the freezing symptoms on upper limbs as well as on lower limbs. It was also found Freezing hands showed weakness of muscle tone checked by hand grip ($p=0.027$), and movement function ability was lower than PD patients without freezing hands symptom checked by Simple Test for Evaluating Hand Function (STEF). UPDRS also showed the more severe level for who had freezing hands symptoms ($p=0.000$). And it indicated that freezing symptoms were occurred more when the movement started under body weight such as movement when they stand or walk(H, 2012). Isokinetic dynamometer gives the weight bearing which is controlled to let the subjects make movements in the same velocity. This study showed the strong significant data for beneficial even on Isokinetic motion which had weight bearing.

Regarding Hand grip, the research of general elderly in Japan reported that hand

grip score was correlated to physical strength and lower limbs movement functions such as standing up from chair and zigzag gait and Activities of Daily Living (ADL), indicating that Hand grip score could be used as the barometer to evaluate the ability of daily activities. And also their result of the correlation between freezing of gait and freezing hands indicates that PD patients who has freezing of gait are suspected to have freezing hands which have less hand grip score which is isometric power and isokinetic motion score from isokinetic power. Therefore TTM could be suggested to effect the increasing of muscle strength which was influenced by bradykinesia.

Parkinson's disease is the disease that the Negril nerve cells in the midbrain of the brainstem are damaged selectively which is related to voluntary movement. This is different from disability to make power (reduction of muscle strength) such as after stroke, but it causes that each movements are not started smoothly, the velocity to move normally is not produced which are related to bradykinesia and unbalanced of the body. Thus it causes the reduction of muscle strength. Therefore TTM suggested to improve the function of movements to effect the increasing of muscle strength which was influenced by bradykinesia, then it led to improve the muscle strength.

The results of UPDRS upper limbs parts from Part3 also showed significant difference between two groups. The p-value of the repeated measures ANOVA was 0.046 and the p-value of the Mann Whitney test was 0.016. These parts were related to movement of hands and upper limbs. Therefore it suggested that TTM was effective to improve the movement function of upper limbs. Although treatments on only upper limbs parts might have limitation to effect to whole body symptoms, the results on the UPDRS all parts also showed, statistically significant difference (p=0.008) between the two groups based on the Mann Whitney test. However, the difference was not marginally significant at alpha=0.05 level (p=0.062) using Repeated measures ANOVA.

TTM is usually known as to make the muscle conditions and tone better for more smooth muscle movements and circulations and make the balance of voluntary movement and involuntary movement. TTM is conducted on SEN line which is the

principle of Thai Medicine theory. SEN is spread to whole body as 72000 lines and connected all each other, and the approaching of TTM means that one pressing stimulates and effects to whole body as well as to the brain following on SEN lines which is one of the unique theories of TTM. Therefore TTM might effect to the improvement of the function of brain as well as muscle flexibility. From increasing of isokinetic and isometric level on PD symptom after TTM, it might be considered that TTM effected to make muscle condition and tone better for more smooth movement and to make the better balance of voluntary movement even for PD symptoms which was related to the nerve in the brain as well. This research did not include analysing the effect of TTM on involuntary movement. The further research is needed for that point as well.

One of Japanese research reported acupuncture was effective for PD for increasing movement function, but not so much for increasing the muscle strength. The other reported that Japanese massage was effective for PD for muscle stiffness, movement difficulties, pain, and fatigue. Therefore this research suggested TTM also was one of the effective methods for bradykinesia as well as acupuncture and Japanese massaege as CAM.(N. Donoyama & Ohkoshi, 2012; Shinpei Fukuda, 2012)

The result of this study for rigidity by CPM was not shown for significant for both variable factors which was related to rigidity were shown as for CPM Nm/kg, extension and flexion.

The research of Japanese massage was reported to be effective for shoulder pain and the shoulder range of motion which might be related to rigidity. There were significant for reduction the shoulder pain on more severe side for flexion and for abduction by checking post-test (follow up) one week after the final session.[44] However their study term was eight weeks and conducted on whole body compared to this three weeks study only on upper limbs extremities. It suggested that the duration of the study might be influenced to the results. The longer term than three weeks and applying on the wider parts of body might be needed to improve rigidity symptom. And the severities of PD of every subject were Hoehn and Yahr 2 and 3 which they could walk somehow. Rigidity is the symptom which is appeared more clearly on the severer level. Therefore it might be not clear to recognize the

differences of symptoms.

Usually rigidity symptom makes movement more difficult. However there were some patients who had got very improved score for both isokinetic and isometric with both reduction score and improved score with CPM. Therefore the further research is needed to consider the relation between rigidity and bradykinesia. Furthermore, if the rigidity is considered to be occurred on whole body, and it usually makes physical movement more difficult, there are some possibilities that TTM affected on rigidity symptom through UPDRS upper limbs extremities from Part3. Because UPDRS upper limbs extremities from Part3 comprehensively includes the rigidity factor more or less for each parts. And there was significant between two groups and the intervention group had improved.

PD is the gradually progressive symptoms and the disorder of degenerative central nervous system affecting the whole body with various kinds of symptoms. The fundamental cause of PD has not been found yet, it is very important to provide treatments in order to keep the physical function level so that patients could spend an independent life style as much as possible. This study showed the improvement of upper limbs movement function which is critically important for spending daily life. If the function of upper limbs increases, it usually means to make the Activities of Daily Living (ADL) more comfortable. And it would improve QOL of PD patients as well. However in this study, PDQ39 did not show the significant to be better yet. Questions of PDQ39 are consisted with 8 discrete scales which are mobility (10 items), activities of daily living (6 items), emotional well-being(6 items),stigma(4items), social support(3 items), cognitions(4items), communication(3 items), bodily discomfort(3 items). It shows QOL is not consisted of only ADL factors. Therefore the further analysis is needed for PDQ39.

Some research examined the positive or negative relationship between QOL and ADL in elderly people with disease. It showed their QOL was influenced to some items of ADL and optimistic thinking. The level of ADL was quite important and necessary for QOL improvement. However not all the factors of ADL were related and decided their QOL. QOL has more comprehensive meaning in the life including

their way of thinking, relationship in social. For QOL of PD patients, it was showed that QOL scores for non-disabled patients (34.6±11.5) were significantly higher than those for disabled patients (28.4±7.7, $p<0.05$). QOL scores significantly decreased with increased in the Hoehan and Yahr scale ($p<0.05$). Because movement disables are one of the main symptoms of PD. Therefore ADL is more strongly related to QOL of PD patients(Miwa ISEZAKI, 1999).(Hiroaki TAKEUCHI, 1999; Miwa ISEZAKI, 1999)

Through the systematic review of physical therapy for PD, it was suggested that there were significant for improvement of movement functions by several physical therapy researches for PD patients during 3 to 35 weeks intervention, however no significant for QOL and depression. And it is also reported that there were significant for improvement of movement functions through physical therapy for PD during 12 weeks, however there were no significant for QOL score to be improved from PDQ39. It shows that the improvement of QOL of PD patients was not simply related to ADL and seemed to take longer term.(Cruise KE, 2010; Deane KH, 2001)

During of the treatment under this study was three weeks, which is considered to be shorter than other studies, therefore the further detail analysis depends on 8 discrete scales is also needed as well as to be continued more longer period which might be going to improve ADL. If it can help to improve ADL, it is supposed to be going to reduce the difficulties of caregivers as well. From the considering of the comparison of eight to nine years PD duration for both groups to three weeks duration of TTM approach, the longer approach is suggested to be conducted for better results.

If TTM is effective for bradykinesia which is related to freezing symptom, TTM has a possibility to improve the lower limbs movement function such as gait as well. And PD is suspected to be increasing according to the aging society. It also means that the needs for caregiver are also increasing which is one of the big social issues. This study suggested that TTM could be one of the methods of CAM.

In this study, simple and basic techniques of TTM were selected as anybody can try and easily conducted at home. It can be applied with lying position as well as

sitting position. And according to no adverse reaction from this research, it is a quite safety method. As it is important to take care constantly and continuously in dairy life for PD patients, TTM is also suggested as one of good care methods at home as CAM.

5.2 Conclusion

This research was conducted at Neurology department, KCM hospital with Randomised control trial to evaluate the effectiveness of TTM on bradykinesia and rigidity symptoms on upper limbs extremities on PD. Sample size was 28 PD patients in intervention group and control group. Six TTM sessions which took twenty minutes during three weeks were conducted for intervention group. Patients in the control group, spend normal daily life with usual standard medication during the research period. Measurement tools were Isokinetic dynamometer, hand grip, UPDRS, and PDQ39.

TTM showed the significant effectiveness for bradykinesia symptom on upper limbs extremities on PD patients through checking by Isokinetic motion level from isokinetic dynamometer and isometric level based on the hand grip score and clinical study of upper limbs extremities parts from UPDRS Part3 which is the checking for motor symptoms from both repeated measures ANOVA and Mann Whitney test. And UPDRS all parts showed the significant of the effectiveness using the Mann Whitney test.

5.3 Limitations

This study was conducted in a short time which was in one year master degree program, therefore it was limited follow up term, small sample size, and it was not categorized in similar age, PD duration, gender, the severity of PD. Furthermore, TTM was applied only on upper limbs extremities parts, not on whole body in this study.

5.4 Recommendation

It is recommended to conduct further research of TTM applying for whole body and longer term, examining both immediate and long-term effects with control variables of individual characteristics. The loss of postural reflex of PD would be able to be researched with Isokinetic dynamometer with TTM to train extension and flexion muscle strength. It is very interesting to determine the mechanism of what kind of TTM factor was most influenced to bradykinesia and rigidity, such as how to effect to dopamine level, and to find out what kinds of bradykinesia symptoms were most affected from TTM. And TTM can be considered through other therapists with same method and compared to other CAM therapy method as well.

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APPENDIX

APPENDIX A

Standard of Handgrip strength

The standard scores of handgrip strength for males and females.

	Males		Females	
Rating*	(lbs)	(kg)	(lbs)	(kg)
excellent	>141	>64	>84	>38
very good	123-141	56-64	75-84	34-38
above average	114-122	52-55	66-74	30-33
average	105-113	48-51	57-65	26-29
below average	96-104	44-47	49-56	23-25
poor	88-95	40-43	44-48	20-22
very poor	<88	<40	<44	<20

*norms for adults. Source and population group unknown

Elbow extension concentric strength age groups 45-78 years old

Dominant	Male	Female
60/sec	47	24
180/sec	33	16

Percent Loss of Use of the Arm

Percent Loss of Use of the Arm : Extension Defects of the Elbow

Range of motion	% Loss of Use of the Arm
150 degree flexion to 45 degree extension	25 %
150 degree flexion to 90 degree extension	50 %
150 degree flexion to 125 degree extension	85 %

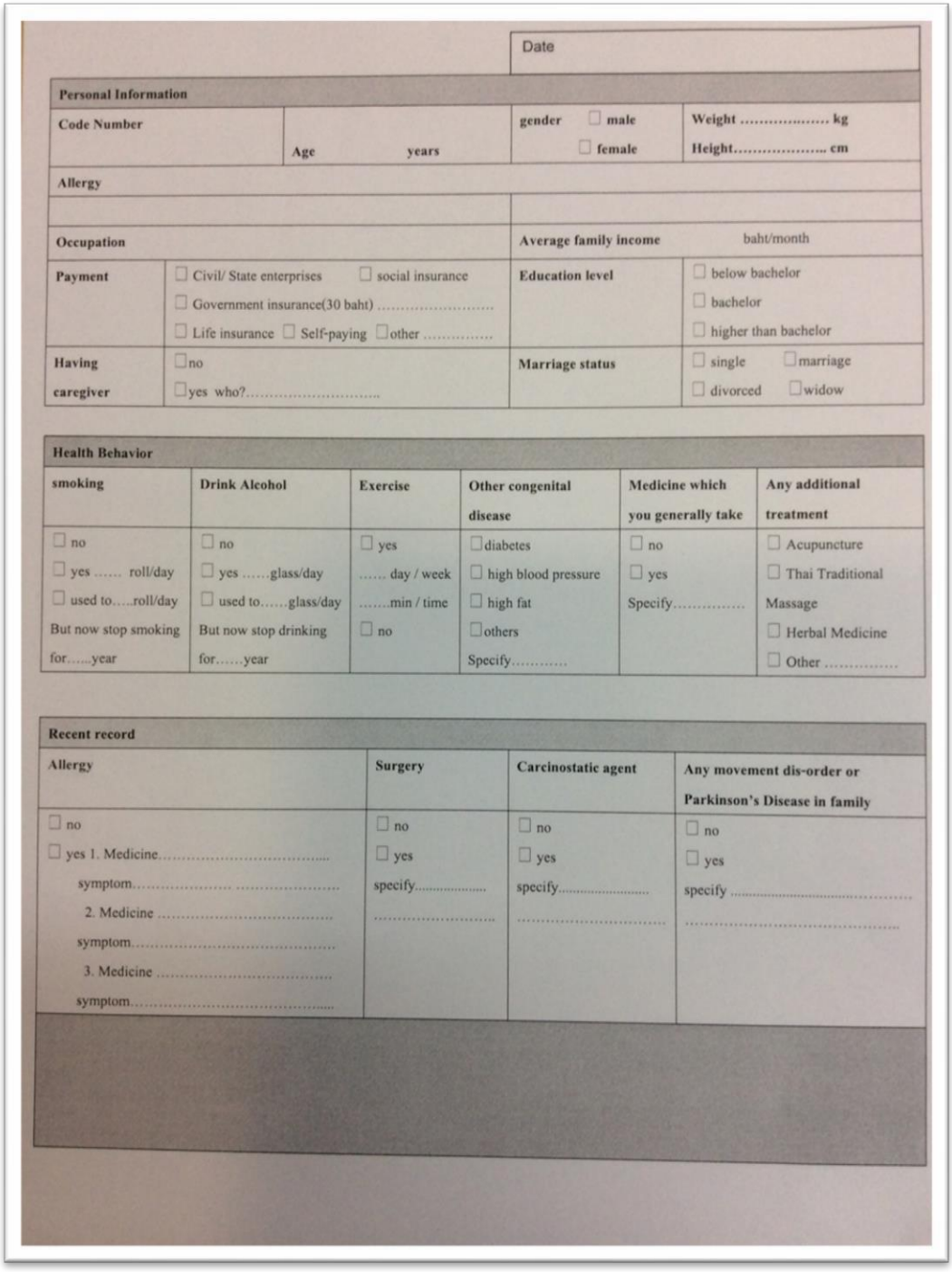
Percent Loss of Use of the Arm : Flexion Defects of the Elbow

Flexion defects of the Elbow	% Loss of Use of the Arm
To 45 degrees	66 2/3 %
To 90 degrees	33 1/3 %
To 110 degrees	20%
To 125 degrees	7 1/2 %

Socio Demographic Questionnaire (English and Thai Languages)

The social demographic questionnaire in English part 1 about personal information, health behavior, recent record.

Socio Demographic Questionnaire Part 1 in English



Date

Personal Information

Code Number	**Age** years	**gender** ☐ male ☐ female	**Weight** ..... kg **Height**..... cm
Allergy			
Occupation		**Average family income**	baht/month
Payment	☐ Civil/ State enterprises ☐ social insurance ☐ Government insurance(30 baht) ..... ☐ Life insurance ☐ Self-paying ☐ other	**Education level**	☐ below bachelor ☐ bachelor ☐ higher than bachelor
Having caregiver	☐ no ☐ yes who?.....	**Marriage status**	☐ single ☐ marriage ☐ divorced ☐ widow

Health Behavior

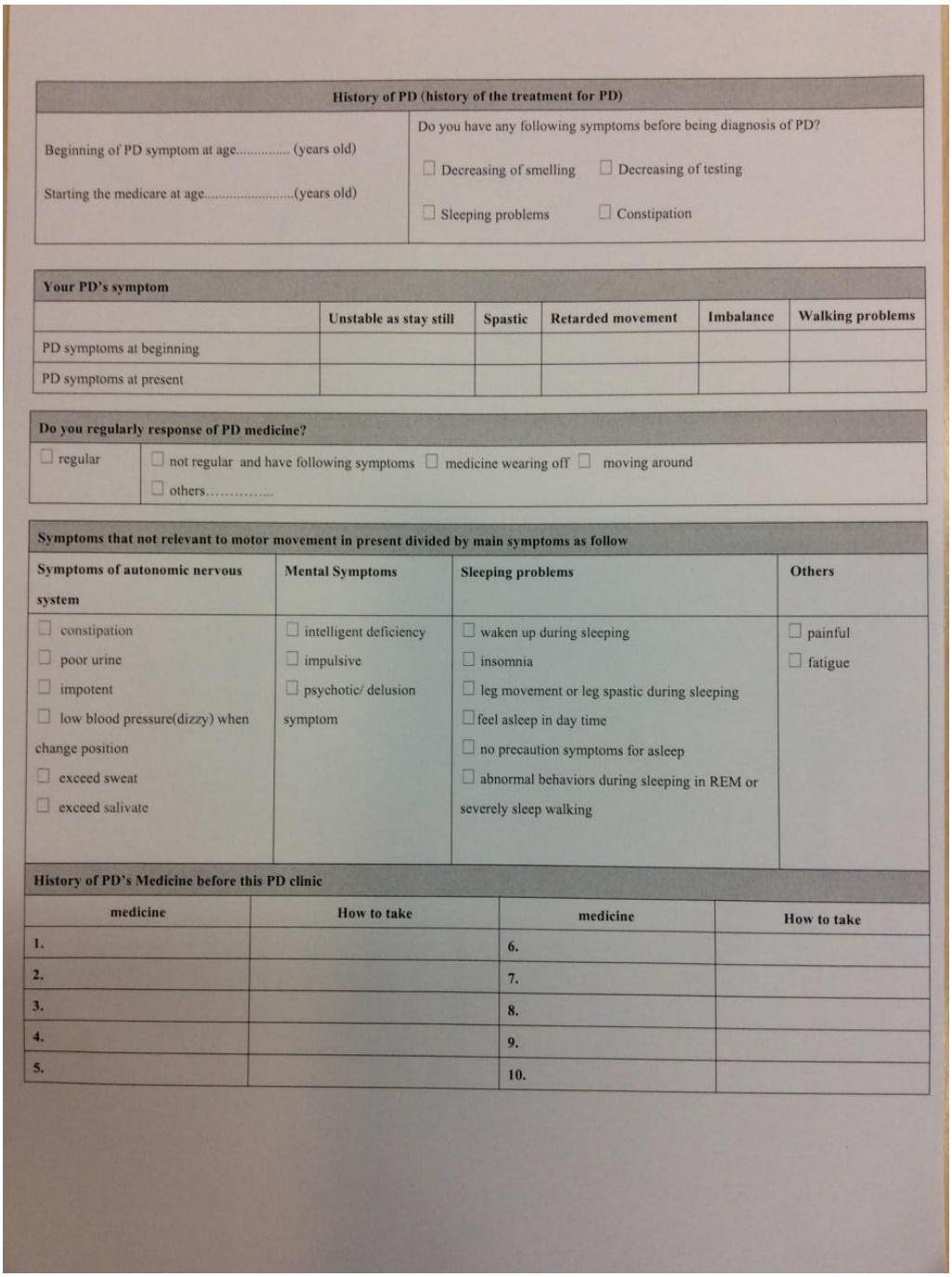
smoking	**Drink Alcohol**	**Exercise**	**Other congenital disease**	**Medicine which you generally take**	**Any additional treatment**
☐ no ☐ yes ..... roll/day ☐ used to.....roll/day But now stop smoking for.....year	☐ no ☐ yes .....glass/day ☐ used to.....glass/day But now stop drinking for.....year	☐ yes ..... day / week .....min / time ☐ no	☐ diabetes ☐ high blood pressure ☐ high fat ☐ others Specify.....	☐ no ☐ yes Specify.....	☐ Acupuncture ☐ Thai Traditional Massage ☐ Herbal Medicine ☐ Other .....

Recent record

Allergy	**Surgery**	**Carcinostatic agent**	**Any movement dis-order or Parkinson's Disease in family**
☐ no ☐ yes 1. Medicine..... symptom..... 2. Medicine ..... symptom..... 3. Medicine ..... symptom.....	☐ no ☐ yes specify.....	☐ no ☐ yes specify.....	☐ no ☐ yes specify ....

The social demographic questionnaire in English Part 2

History of the treatment for PD,PD's symptom, regular response of PD medicine history of PD's Medicine.



History of PD (history of the treatment for PD)	
Beginning of PD symptom at age..... (years old) Starting the medicare at age.....(years old)	Do you have any following symptoms before being diagnosis of PD? ☐ Decreasing of smelling ☐ Decreasing of testing ☐ Sleeping problems ☐ Constipation

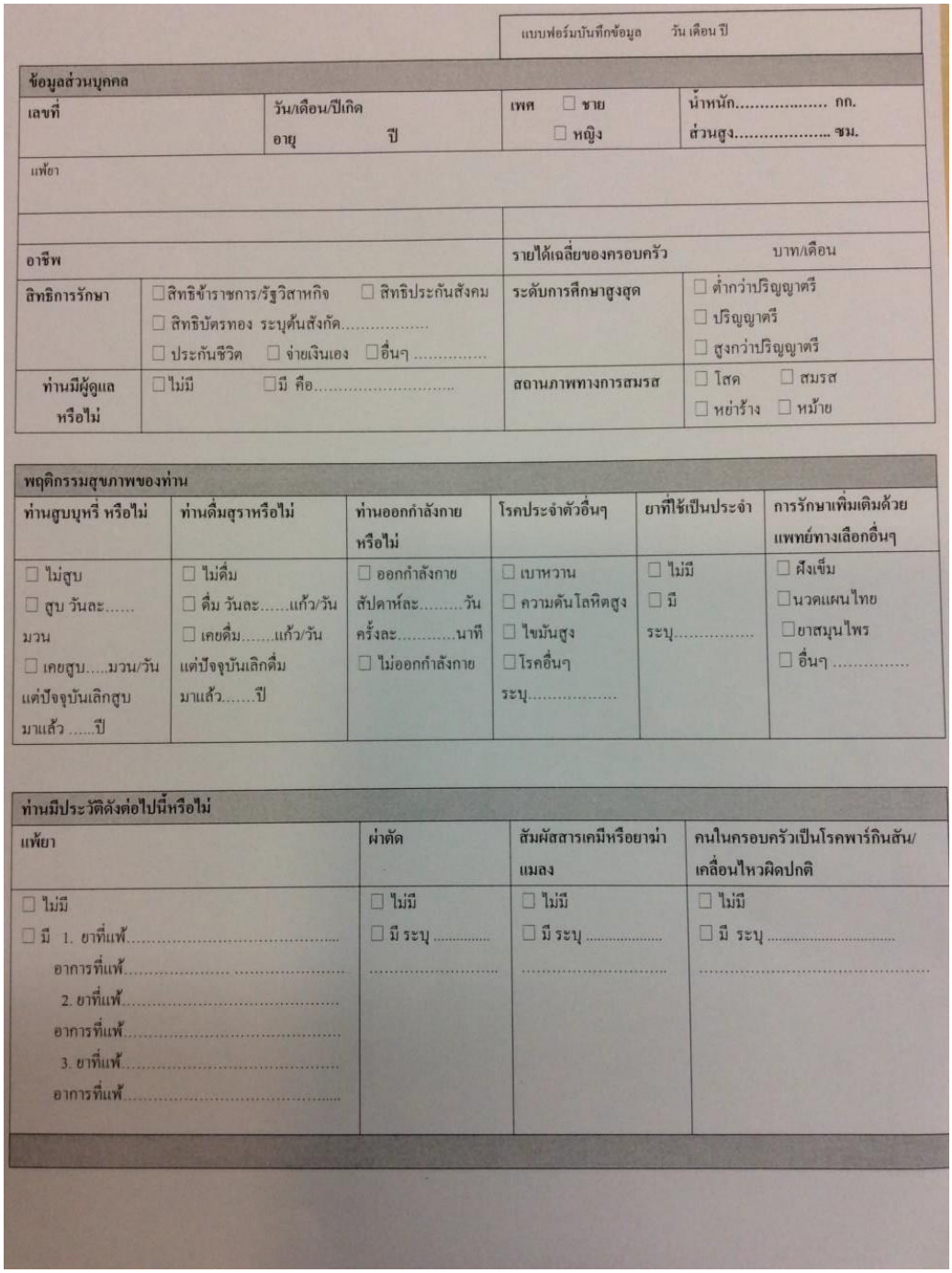
Your PD's symptom					
	Unstable as stay still	Spastic	Retarded movement	Imbalance	Walking problems
PD symptoms at beginning					
PD symptoms at present					

Do you regularly response of PD medicine?	
☐ regular	☐ not regular and have following symptoms ☐ medicine wearing off ☐ moving around ☐ others……

Symptoms that not relevant to motor movement in present divided by main symptoms as follow			
Symptoms of autonomic nervous system	Mental Symptoms	Sleeping problems	Others
☐ constipation ☐ poor urine ☐ impotent ☐ low blood pressure(dizzy) when change position ☐ exceed sweat ☐ exceed salivate	☐ intelligent deficiency ☐ impulsive ☐ psychotic/ delusion symptom	☐ waken up during sleeping ☐ insomnia ☐ leg movement or leg spastic during sleeping ☐ feel asleep in day time ☐ no precaution symptoms for asleep ☐ abnormal behaviors during sleeping in REM or severely sleep walking	☐ painful ☐ fatigue

History of PD's Medicine before this PD clinic			
medicine	How to take	medicine	How to take
1.		6.	
2.		7.	
3.		8.	
4.		9.	
5.		10.	

\The Social Demographic Questionnaire in Thai Part 1
Personal information, health behavior, recent record.



แบบฟอร์มบันทึกข้อมูล วัน เดือน ปี

ข้อมูลส่วนบุคคล

เลขที่	วัน/เดือน/ปีเกิด อายุ ปี	เพศ ☐ ชาย ☐ หญิง	น้ำหนัก..... กก. ส่วนสูง..... ซม.
แพ้ยา			
อาชีพ		รายได้เฉลี่ยของครอบครัว	บาท/เดือน
สิทธิการรักษา	☐สิทธิข้าราชการ/รัฐวิสาหกิจ ☐ สิทธิประกันสังคม ☐ สิทธิบัตรทอง ระบุต้นสังกัด..... ☐ ประกันชีวิต ☐ จ่ายเงินเอง ☐อื่นๆ	ระดับการศึกษาสูงสุด	☐ ต่ำกว่าปริญญาตรี ☐ ปริญญาตรี ☐ สูงกว่าปริญญาตรี
ท่านมีผู้ดูแลหรือไม่	☐ไม่มี ☐มี คือ.....	สถานภาพทางการสมรส	☐ โสด ☐ สมรส ☐ หย่าร้าง ☐ หม้าย

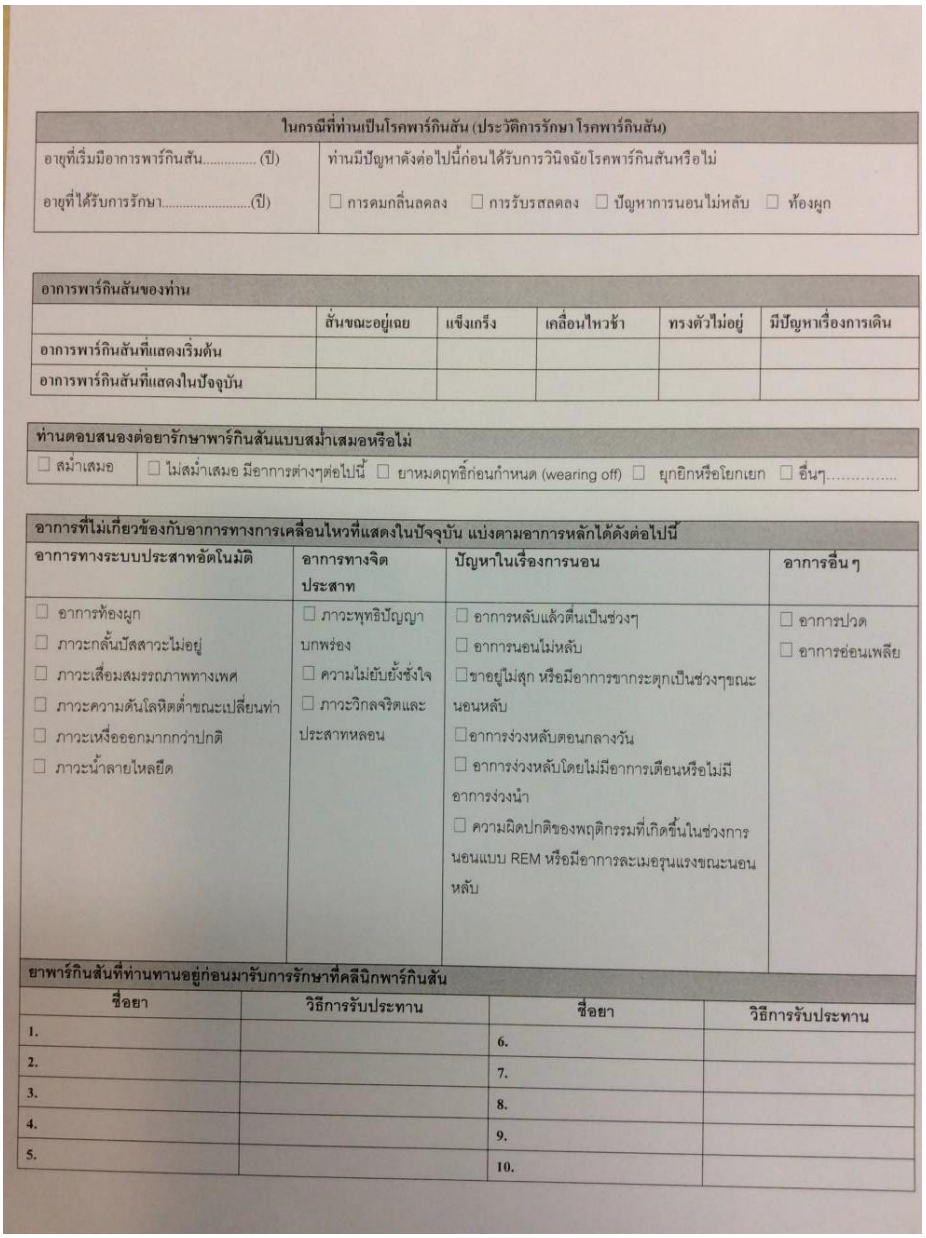
พฤติกรรมสุขภาพของท่าน

ท่านสูบบุหรี่ หรือไม่	ท่านดื่มสุราหรือไม่	ท่านออกกำลังกายหรือไม่	โรคประจำตัวอื่นๆ	ยาที่ใช้เป็นประจำ	การรักษาเพิ่มเติมด้วยแพทย์ทางเลือกอื่นๆ
☐ ไม่สูบ ☐ สูบ วันละ.....มวน ☐ เคยสูบ.....มวน/วัน แต่ปัจจุบันเลิกสูบมาแล้ว .....ปี	☐ ไม่ดื่ม ☐ ดื่ม วันละ.....แก้ว/วัน ☐ เคยดื่ม.....แก้ว/วัน แต่ปัจจุบันเลิกดื่มมาแล้ว.....ปี	☐ ออกกำลังกาย สัปดาห์ละ.....วัน ครั้งละ.....นาที ☐ ไม่ออกกำลังกาย	☐ เบาหวาน ☐ ความดันโลหิตสูง ☐ ไขมันสูง ☐ โรคอื่นๆ ระบุ.....	☐ ไม่มี ☐ มี ระบุ.....	☐ ฝังเข็ม ☐ นวดแผนไทย ☐ ยาสมุนไพร ☐ อื่นๆ .....

ท่านมีประวัติดังต่อไปนี้หรือไม่

แพ้ยา	ผ่าตัด	สัมผัสสารเคมีหรือยาฆ่าแมลง	คนในครอบครัวเป็นโรคพาร์กินสัน/เคลื่อนไหวผิดปกติ
☐ ไม่มี ☐ มี 1. ยาที่แพ้..... อาการที่แพ้..... 2. ยาที่แพ้..... อาการที่แพ้..... 3. ยาที่แพ้..... อาการที่แพ้.....	☐ ไม่มี ☐ มี ระบุ	☐ ไม่มี ☐ มี ระบุ	☐ ไม่มี ☐ มี ระบุ ....

The Social Demographic Questionnaire in English Part 2
History of the treatment for PD,PD's symptom, regular response of PD medicine history of PD's medicine



ในกรณีที่ท่านเป็นโรคพาร์กินสัน (ประวัติการรักษา โรคพาร์กินสัน)

อายุที่เริ่มมีอาการพาร์กินสัน.....(ปี) อายุที่ได้รับการรักษา.....(ปี)	ท่านมีปัญหาดังต่อไปนี้ก่อนได้รับการวินิจฉัยโรคพาร์กินสันหรือไม่ ☐ การดมกลิ่นลดลง ☐ การรับรสลดลง ☐ ปัญหาการนอนไม่หลับ ☐ ท้องผูก

อาการพาร์กินสันของท่าน

	สั่นขณะอยู่เฉย	แข็งเกร็ง	เคลื่อนไหวช้า	ทรงตัวไม่อยู่	มีปัญหาเรื่องการเดิน
อาการพาร์กินสันที่แสดงเริ่มต้น					
อาการพาร์กินสันที่แสดงในปัจจุบัน					

ท่านตอบสนองต่อยารักษาพาร์กินสันแบบสม่ำเสมอหรือไม่

☐ สม่ำเสมอ	☐ ไม่สม่ำเสมอ มีอาการต่างๆต่อไปนี้ ☐ ยาหมดฤทธิ์ก่อนกำหนด (wearing off) ☐ ยุกยิกหรือโยกเยก ☐ อื่นๆ.....

อาการที่ไม่เกี่ยวข้องกับอาการทางการเคลื่อนไหวที่แสดงในปัจจุบัน แบ่งตามอาการหลักได้ดังต่อไปนี้

อาการทางระบบประสาทอัตโนมัติ	อาการทางจิตประสาท	ปัญหาในเรื่องการนอน	อาการอื่น ๆ
☐ อาการท้องผูก ☐ ภาวะกลั้นปัสสาวะไม่อยู่ ☐ ภาวะเสื่อมสมรรถภาพทางเพศ ☐ ภาวะความดันโลหิตต่ำขณะเปลี่ยนท่า ☐ ภาวะเหงื่อออกมากกว่าปกติ ☐ ภาวะน้ำลายไหลยืด	☐ ภาวะพุทธิปัญญาบกพร่อง ☐ ความไม่ยับยั้งชั่งใจ ☐ ภาวะวิกลจริตและประสาทหลอน	☐ อาการหลับแล้วตื่นเป็นช่วงๆ ☐ อาการนอนไม่หลับ ☐ขาอยู่ไม่สุก หรือมีอาการขากระตุกเป็นช่วงๆขณะนอนหลับ ☐อาการง่วงหลับตอนกลางวัน ☐ อาการง่วงหลับโดยไม่มีอาการเตือนหรือไม่มีอาการง่วงนำ ☐ ความผิดปกติของพฤติกรรมที่เกิดขึ้นในช่วงการนอนแบบ REM หรือมีอาการละเมอรุนแรงขณะนอนหลับ	☐ อาการปวด ☐ อาการอ่อนเพลีย

ยาพาร์กินสันที่ท่านทานอยู่ก่อนมารับการรักษาที่คลินิกพาร์กินสัน

ชื่อยา	วิธีการรับประทาน	ชื่อยา	วิธีการรับประทาน
1.		6.	
2.		7.	
3.		8.	
4.		9.	
5.		10.	

Unified Parkinson's Disease Rating Scale (UPDRS)
Symptoms that are checked on UPDRS Part 1,2,3,4.

<u>UPDRS Section I</u> (No. Checking factors, Scoring content)

1.	Intellectual impairment	**0** None **1** Mild. Consistent forgetfulness with partial recollection of events and no other difficulties **2** Moderate memory loss, with disorientation and moderate difficulty handling complex problems. Mild but definite impairment of function at home with need of occasional prompting. **3** Severe memory loss with disorientation for time and often to place. Severe impairment in handling problems **4** Severe memory loss with orientation preserved to person only. Unable to make judgements or solve problems. Requires much help with personal care. Cannot be left alone at all
2.	Thought disorder (due to dementia or drugintoxication)	**0** None **1** Vivid dreaming **2** "Benign" hallucinations with insight retained **3** Occasional to frequent hallucinations or delusions; without insight; could interfere with daily activities **4** Persistent hallucinations, delusions, or florridpsychosis. Not able to care for self

3.	Depression	**0** Not present **1** Periods of sadness or guilt greater than normal, never sustained for days or weeks **2** Sustained depression (1 week or more) **3** Sustained depression with vegetative symptoms (insomnia, anorexia, weight loss, loss of interest) **4** Sustained depression with vegetative symptoms and suicidal thoughts or intent
4.	Motivation /initiative	**0** Normal **1** Less assertive than usual; more passive **2** Loss of initiative or disinterest in elective (nonroutine) activities **3** Loss of initiative or disinterest in day to day (routine) activities **4** Withdrawn, complete loss of motivation

UPDRS Section II

5	Speech	**0** Normal **1**Midly affected. No difficulty being understood **2** Moderately affected. Sometimes asked to repeat statements **3** Severely affected. Frequently asked to repeat statements **4** Unintelligible most of the time

6	Salivation	**0** Normal **1** Slight but definite excess of saliva in mouth; may have night time drooling **2** Moderately excessive saliva; may have minimal drooling **3** Marked excess of saliva with some drooling **4** Marked drooling, requires constant tissue or handkerchief
7	Swallowing	**0** Normal **1** Rare choking **2** Occasional choking **3** Requires soft food **4** Requires nasogastric tube or gastrotomy feeding
8	Handwriting	**0** Normal **1** Slightly slow or small **2** Moderately slow or small; all words are legible **3** Severely affected; not all words are legible **4** The majority of words are not legible
9	Cutting food and handling utensils	**0** Normal **1** Somewhat slow and clumsy, but no help needed **2** Can cut most foods, although clumsy and slow; some help needed **3** Food must be cut by someone, but can still feed slowly **4** Needs to be fed

10	Dressing	**0** Normal **1** Somewhat slow, but no help needed **2** Occasional assistance whit buttoning, getting arms in sleeves **3** Considerable help required, but can do some things alone **4** Helpless

11	Hygiene	**0** Normal **1** Somewhat slow, but no help needed **2** Needs help to shower or bathe; or very slow in hygienic care **3** Requires assistance for washing, brushing teeth, combing hair, going to bathroom
12	Turning in bed and adjusting bedclothes	**0** Normal **1** Somewhat slow and clumsy, but no help needed **2** Can turn alone or adjust sheets, but with great difficulty **3** Can initiate, but not turn or adjust sheets alone **4** Helpless
13	Falling (unrelated to freezing)	**0** None **1** Rare falling **2** Occasionally falls, less than once per day **3** Falls an average of once daily **4** Falls more than once daily

14	Freezing when walking	**0** None **1** Rare freezing when walking; may have start-hesitation **2** Occasional freezing when walking **3** Frequent freezing. Occasionally falls from freezing **4** Frequent falls from freezing
15.	Walking	**0** Normal **1** Mild difficulty. May not swing arms or may tend to drag leg **2** Moderate difficulty, but requires little or no assistance **3** Severe disturbance of walking, requiring assistance **4** Cannot walk at all, even with assistance
16	Tremor (symptomatic complaint of tremor in any part of the body)	**0** Absent **1** Slight and infrequently present **2** Moderate; bothersome to patient **3** Severe; interferes with many activities **4** Marked; interferes with most activities
17	Sensory complaints related to Parkinsonism	**0** None **1** Occasionally has numbness, tingling, or mild aching **2** Frequently has numbness, tingling, or aching; not distressing **3** Frequent painful sensations **4** Excruciating pain

UPDRS Section III

18	Speech	**0** Normal **1** Slight loss of expression, diction and/or volume **2** Monotone, slurred but understandable; moderately **3** Marked impairment, difficult to understand **4** Unintelligible
19	Facial expression	**0** Normal **1** Minimal hypomimia, could be normal "Poker Face" **2** Slight but definitely abnormal diminution of facial expression **3** Moderate hypomimia; lips parted some of the time **4** Masked or fixed facies with severe or complete loss of facial expression; lips parted ¼ inch (0.635

20	Tremor at rest (head, upper and lower extremities)	**Face, Lips and** **Chin**: **0** Absent **1** Slight and infrequently present **2** Mild in amplitude and persistent. Or moderate in amplitude, but only intermittently present **3** Moderate in amplitude and present most of the time **4** Marked in amplitude and present most of the time **Right Hand**: **0** Absent **1** Slight and infrequently present **2** Mild in amplitude and persistent. Or moderate in amplitude, but only intermittently present **3** Moderate in amplitude and present most of the time **4** Marked in amplitude and present most of the time **Left Hand**: **0** Absent **1** Slight and infrequently present **2** Mild in amplitude and persistent. Or moderate in amplitude, but only intermittently present

20	Tremor at rest (head, upper and lower extremities) (cont.)	**0** Absent **1** Slight and infrequently present **2** Mild in amplitude and persistent. Or moderate in amplitude, but only intermittently present **3** Moderate in amplitude and present most of the time **4** Marked in amplitude and present most of the time **Left Foot**: **0** Absent **1** Slight and infrequently present **2** Mild in amplitude and persistent. Or moderate in amplitude, but only intermittently present

21	Action or postural tremor of hands	**Righ** **t** **Han** **d: 0** Abse nt **1** Slight; present with action **2** Moderate in amplitude, present with action **3** Moderate in amplitude with posture holding as well as action **4** Marked in amplitude; interferes with feeding **Lef** **t**
22	Rigidity (judged on passive movement of major joints with patient relaxed in sitting position. Cogwheeling to be ignored)	**Neck**: **0** Absent **1** Slight or detectable only when activated by mirror or other movements **2** Mild to moderate **3** Marked, but full range of motion easily achieved **4 4** Severe, range of motion achieved with difficulty

		Left Lower Extremity: 0 Absent **1** Slight or detectable only when activated by mirror or other movements **2** Mild to moderate **3** Marked, but full range of motion easily achieved **4** Severe, range of motion achieved with difficulty
23	Finger taps (patient taps thumb with index finger in rapid succession with as large an amplitude as possible, each hand separately	**Right**: **0** Normal **1** Mild slowing and/or reduction in amplitude **2** Moderately impaired. Definitive and early fatiguing. May have occasional arrest in movement **3** Severely impaired. Frequent hesitation in initiating movements or arrests in ongoing movement **4** Can barely perform the task **Left**: **0** Normal **1** Mild slowing and/or reduction in amplitude **2** Moderately impaired. Definitive and early fatiguing. May have occasional arrest in movement **3** Severely impaired. Frequent hesitation in initiating movements or arrests in ongoing movement **4** Can barely perform the task

24	Hand movements (patient opens and closes hand in rapid succession)	**Right**: **0** Normal **1** Mild slowing and/or reduction in amplitude **2** Moderately impaired. Definite and early fatiguing. May have occasional arrests in movement **3** Severely impaired. Frequent hesitation in initiating movements or arrests in ongoing movement **Left**: **0** Normal **1** Mild slowing and/or reduction in amplitude **2** Moderately impaired. Definite and early fatiguing. May have occasional arrests in movement **3** Severely impaired. Frequent hesitation in initiating movements or arrests in ongoing movement

25	Rapidalternating movements of hands (pronation – supination movements of hands, vertically or horizontally, with as large an amplitude as possible, both hands simultaniosly)	**Right**: **0** Normal **1** Mild slowing and/or reduction in amplitude **2** Moderately impaired. Definite and early fatiguing. May have occasional arrests in movement **3** Severely impaired. Frequent hesitation in initiating movements or arrests in ongoing movements **4** Can barely perform the task **Left**: **0** Normal **1** Mild slowing and/or reduction in amplitude **2** Moderately impaired. Definite and early fatiguing. May have occasional arrests in movement
26	Leg agility (patient taps heel on the ground in rapid succession picking up entire leg. Amplitude should be at least 3 inches(7.62cm)	**Right**: **0** Normal **1** Mild slowing and/or reduction in amplitude **2** Moderately impaired. Definite and early fatiguing. May have occasional arrest in movement **3** Severely impaired. Frequent hesitation in initiating movements or arrests in ongoing

		4 Can barely perform the task **Left**: **0** Normal **1** Mild slowing and/or reduction in amplitude **2** Moderately impaired. Definite and early fatiguing. May have occasional arrest in movement **3** Severely impaired. Frequent hesitation in initiating movements or arrests in ongoing movement **4** Can barely perform the task
27	Arising from chair (patient attempts to rise from a straightbacked chair, with arms folded across chest)	**0** Normal **1** Slow; or may need more than one attempt **2** Pushes self up from arms of seat **3** Tends to fall back and may have to try more than one time, but can get up without help **4** Unable to arise without help
28	Posture	**0** Normal erect **1** Not quite erect, slightly stooped posture; could be normal for older person **2** Moderately stooped posture, definitely abnormal; can be slightly leaning to one side **3** Severely stooped posture with kyphosis; can be moderately leaning to one side **4** Marked flexion with extreme abnormality of posture

29	Gait	**0** Normal **1** Walks slowly, may shuffle with short steps, but no festination (hastening steps) or propulsion **2** Walks with difficulty, but requires little or no assistance; may have some festination, short steps, or propulsion **3** Severe disturbance of gait, requiring assistance **4** Cannot walk at all, even with assistance
30	Postural stability (response to sudden, strong posterior displacement produced by pull on shoulders while patient erect with eyes open and feet slightly apart. Patient is prepared)	**0** Normal **1**Retropulsion, but recovers unaided **2** Absence of postural response; would fall if not caught by examiner **3** Very unstable, tends to lose balance spontaneously **4** Unable to stand without assistance
31	Body Bradykinesia and hipokinesia (combining slowness, hesitancy, decreased arm swing, small amplitude and poverty of movement in general)	**0** None **1** Minimal slowness; giving movement a deliberate character; could be normal for some persons.Possibly reduce amplitude **2** Mild degree of slowness and poverty of movement which is definitely abnormal. Alternatively, some reduced amplitude **3** Moderate slowness, poverty or small amplitude of movement **4** Marked slowness, poverty or small amplitude of movement

UPDRS Section IV

32	**A. Dyskinesias** Duration: What proportion of the Waking Day are Dyskinesias Present (historical information)?	**0** None **1** 1-25% of day **2** 26-50 % of day **3** 51-75% of day
33	Disability: How Disabling are the Dyskinesias (historical information; may be modified by office examination)?	**0** Not disabling **1** Mildly disabling **2** Moderately disabling **3** Severely disabling
34	How Painful are the Dyskinesias?	**0** No painful dyskinesias **1** Slight **2** Moderate **3** Severe
35	Presence of Early Morning Dystonia (historical information)	**0** No **1** Yes
36	**B. Clinical Fluctuations** Are off periods predictable as to timing after a dose medication?	**0** No **1** Yes
37	Are off periods unpredictable as to timing after a dose medication?	**0** No **1** Yes
38	Do off periods Come on Suddenly, Within a Few Seconds?	**0** No **1** Yes

39	What proportion of the waking day is the subject off on average?	**0** None **1** 1-25% of day **2** 26-50 % of day **3** 51-75% of day
40	**C. Other Complications** Does the subject have anorexia, nausea or vomiting?	**0** No **1** Yes
41	Any sleep disturbances, such as insomnia or hypersomnolence?	**0** No **1** Yes
42	Does the subject have symptomatic orthostasis	**0** No **1** Yes

PDQ39 All questionnaire (English and Thai Version)

The questionnaire of PDQ39 in English version. The score express that 0 for never, 1for occasionally, 2 for sometimes, 3 for often, 4 for always or cannot do at all.

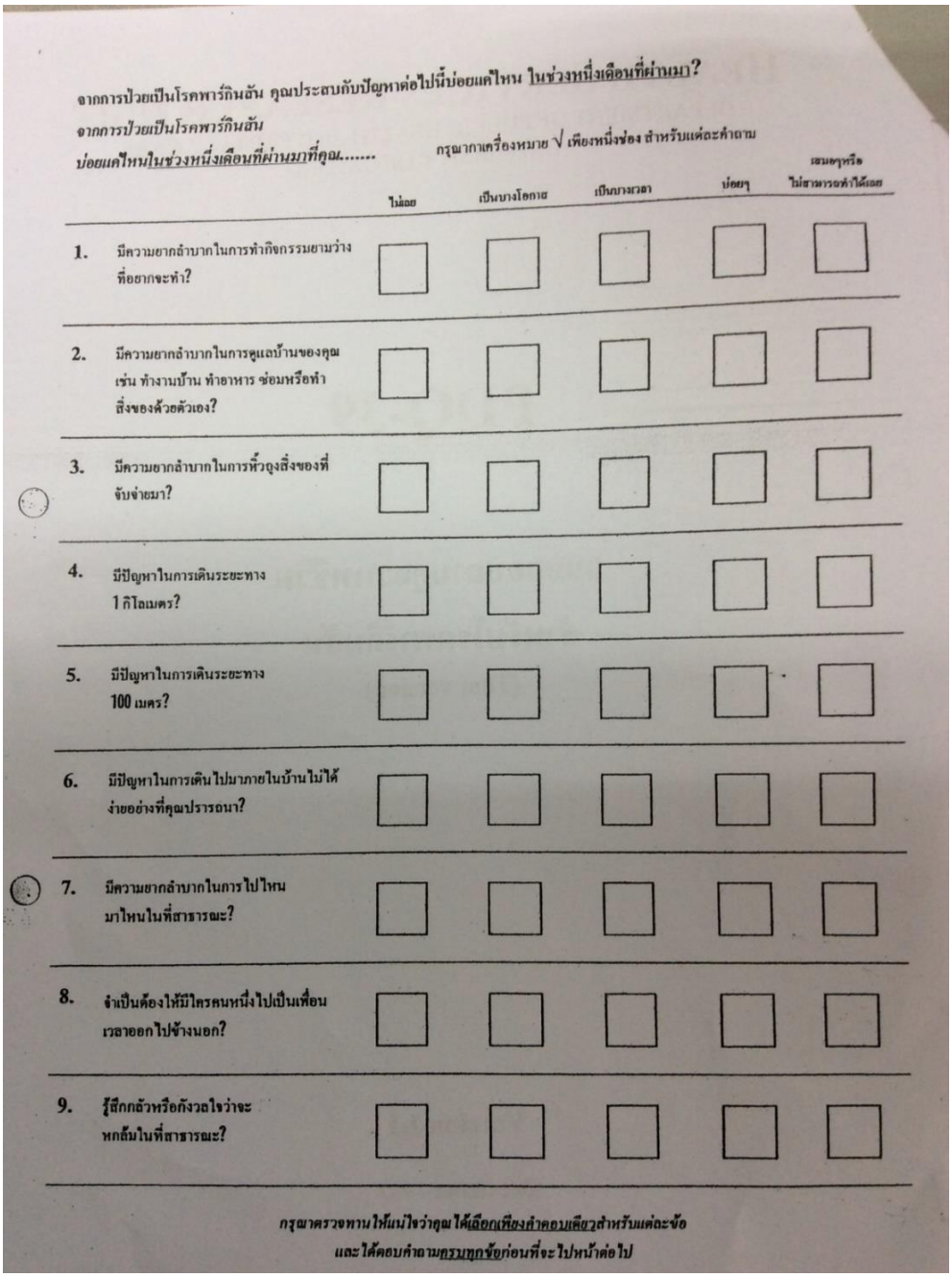
PDQ39 in English Version

No	Questions	0	1	2	3	4
1	Had difficulty doing the leisure activities which you would like to do?					
2	Had difficulty looking after your home, e.g. DIY, housework, cooking?					
3	Had difficulty carrying bags of shopping?					
4	Had problems walking half a mile?					
5	Had problems walking 100 yards?					
6	Had problems getting around the house as easily as you would like?					
7	Had difficulty getting around in public?					
8	Needed someone else to accompany you when you went out?					
9	Felt frightened or worried about falling over in public?					
10	Been confined to the house more than you would like?					
11	Had difficulty washing yourself?					
12	Had difficulty dressing yourself?					
13	Had problems doing up your shoe laces?					
14	Had problems writing clearly?					
15	Had difficulty cutting up your food?					
16	Had difficulty holding a drink without spilling it?					
17	Felt depressed?					
18	Felt isolated and lonely?					
19	Felt weepy or tearful?					
20	Felt angry or bitter?					
21	Felt anxious?					
22	Felt worried about your future?					
23	Felt you had to conceal your Parkinson’s from people?					
24	Avoided situations which involve eating or drinking in public?					
25	Felt embarrassed in public due to having Parkinson’s disease?					
26	Felt worried by other people’s reaction to you?					
27	Had problems with your close personal relationship?					

28	Lacked support in the ways you need from your spouse or partner? (If you do not have a spouse or partner tick here( ))					
29	Lacked support in the ways you need from your family or close friends?					
30	Unexpectedly fallen asleep during the day?					
31	Had problems with your concentration, e.g. when reading or watching TV?					
32	Felt your memory was bad?					
33	Had distressing dreams or hallucinations?					
34	Had difficulty with your speech?					
35	Felt unable to communicate with people properly?					
36	Felt ignored by people?					
37	Had painful muscle cramps or spasms?					
38	Had aches and pains in your joints or body?					
39	Felt unpleasantly hot or cold?					

PDQ39 Questions

No 1to9 in Thai version. The score express that 0 for never, 1for occasionally, 2 for sometimes, 3 for often, 4 for always or cannot do at all.



จากการป่วยเป็นโรคพาร์กินสัน คุณประสบกับปัญหาต่อไปนี้บ่อยแค่ไหน ในช่วงหนึ่งเดือนที่ผ่านมา?

จากการป่วยเป็นโรคพาร์กินสัน
บ่อยแค่ไหนในช่วงหนึ่งเดือนที่ผ่านมาที่คุณ.....

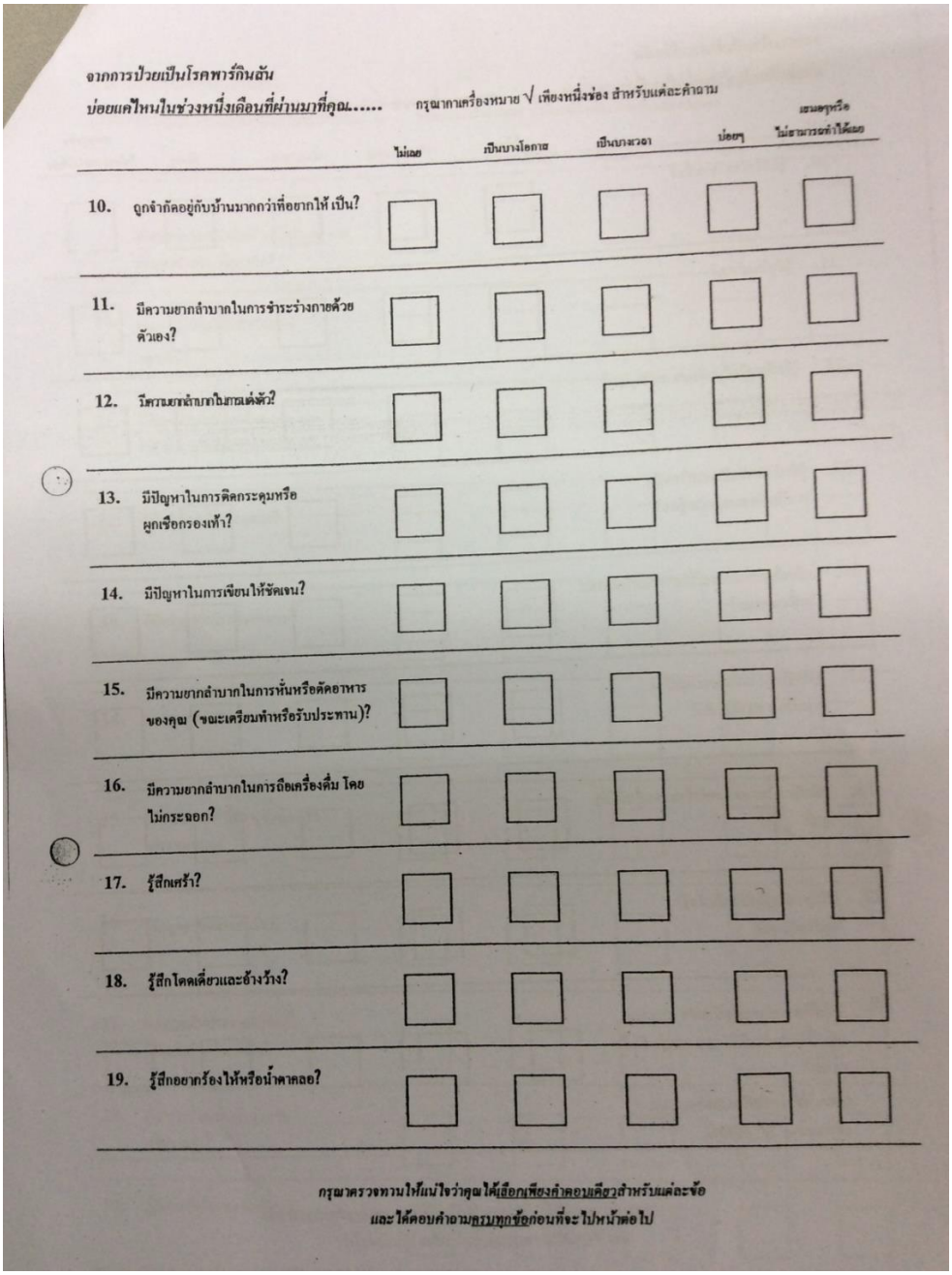
กรุณากาเครื่องหมาย √ เพียงหนึ่งช่อง สำหรับแต่ละคำถาม

	ไม่เลย	เป็นบางโอกาส	เป็นบางเวลา	บ่อยๆ	เสมอๆหรือไม่สามารถทำได้เลย
1. มีความยากลำบากในการทำกิจกรรมยามว่างที่อยากจะทำ?	☐	☐	☐	☐	☐
2. มีความยากลำบากในการดูแลบ้านของคุณ เช่น ทำงานบ้าน ทำอาหาร ซ่อมหรือทำสิ่งของด้วยตัวเอง?	☐	☐	☐	☐	☐
3. มีความยากลำบากในการหิ้วถุงสิ่งของที่จับจ่ายมา?	☐	☐	☐	☐	☐
4. มีปัญหาในการเดินระยะทาง 1 กิโลเมตร?	☐	☐	☐	☐	☐
5. มีปัญหาในการเดินระยะทาง 100 เมตร?	☐	☐	☐	☐	☐
6. มีปัญหาในการเดินไปมาภายในบ้านไม่ได้ง่ายอย่างที่คุณปรารถนา?	☐	☐	☐	☐	☐
7. มีความยากลำบากในการไปไหนมาไหนในที่สาธารณะ?	☐	☐	☐	☐	☐
8. จำเป็นต้องให้มีใครคนหนึ่งไปเป็นเพื่อนเวลาออกไปข้างนอก?	☐	☐	☐	☐	☐
9. รู้สึกกลัวหรือกังวลใจว่าจะหกล้มในที่สาธารณะ?	☐	☐	☐	☐	☐

กรุณาตรวจทานให้แน่ใจว่าคุณได้เลือกเพียงคำตอบเดียวสำหรับแต่ละข้อ และได้ตอบคำถามครบทุกข้อก่อนที่จะไปหน้าต่อไป

PDQ39 Questions (Cont.)

No 10to19 in Thai Version. The score express that 0 for never, 1for occasionally, 2 for sometimes, 3 for often, 4 for always or cannot do at all.



จากการป่วยเป็นโรคพาร์กินสัน

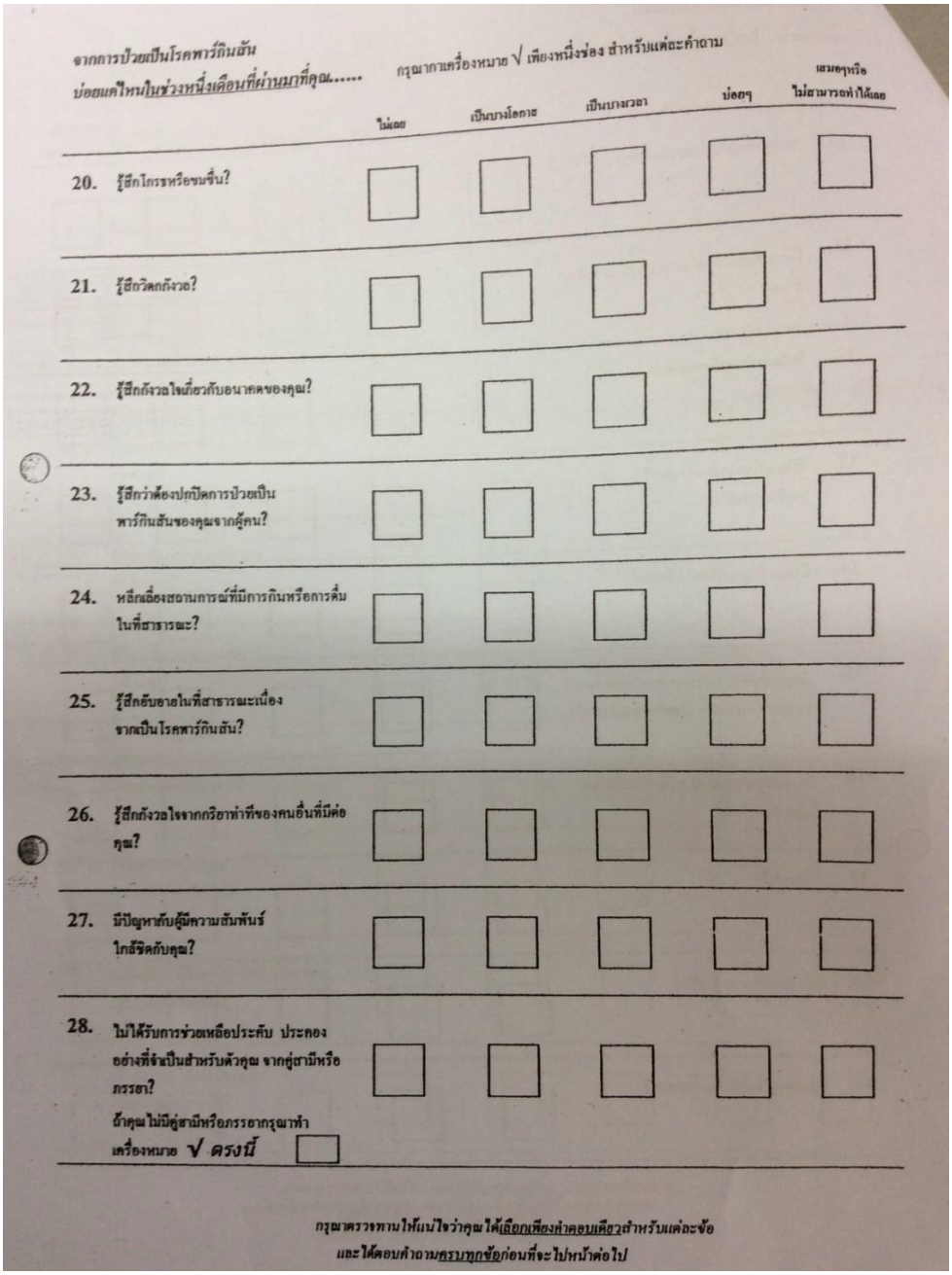
บ่อยแค่ไหน*ในช่วงหนึ่งเดือนที่ผ่านมา*ที่คุณ..... กรุณากาเครื่องหมาย √ เพียงหนึ่งช่อง สำหรับแต่ละคำถาม

	ไม่เลย	เป็นบางโอกาส	เป็นบางเวลา	บ่อยๆ	เสมอๆหรือไม่สามารถทำได้เลย
10. ถูกจำกัดอยู่กับบ้านมากกว่าที่อยากให้เป็น?	☐	☐	☐	☐	☐
11. มีความยากลำบากในการชำระร่างกายด้วยตัวเอง?	☐	☐	☐	☐	☐
12. มีความยากลำบากในการแต่งตัว?	☐	☐	☐	☐	☐
13. มีปัญหาในการติดกระดุมหรือผูกเชือกรองเท้า?	☐	☐	☐	☐	☐
14. มีปัญหาในการเขียนให้ชัดเจน?	☐	☐	☐	☐	☐
15. มีความยากลำบากในการหั่นหรือตัดอาหารของคุณ (ขณะเตรียมทำหรือรับประทาน)?	☐	☐	☐	☐	☐
16. มีความยากลำบากในการถือเครื่องดื่ม โดยไม่กระฉอก?	☐	☐	☐	☐	☐
17. รู้สึกเศร้า?	☐	☐	☐	☐	☐
18. รู้สึกโดดเดี่ยวและอ้างว้าง?	☐	☐	☐	☐	☐
19. รู้สึกอยากร้องไห้หรือน้ำตาคลอ?	☐	☐	☐	☐	☐

กรุณาตรวจทานให้แน่ใจว่าคุณได้<u>เลือกเพียงคำตอบเดียว</u>สำหรับแต่ละข้อ
และได้ตอบคำถาม<u>ครบทุกข้อ</u>ก่อนที่จะไปหน้าต่อไป

PDQ39 Questions (Cont.)

No 20to28 in Thai version. The score express that 0 for never, 1for occasionally, 2 for sometimes, 3 for often, 4 for always or cannot do at all.



จากการป่วยเป็นโรคพาร์กินสัน
บ่อยแค่ไหนในช่วงหนึ่งเดือนที่ผ่านมาที่คุณ.....

กรุณากาเครื่องหมาย √ เพียงหนึ่งช่อง สำหรับแต่ละคำถาม

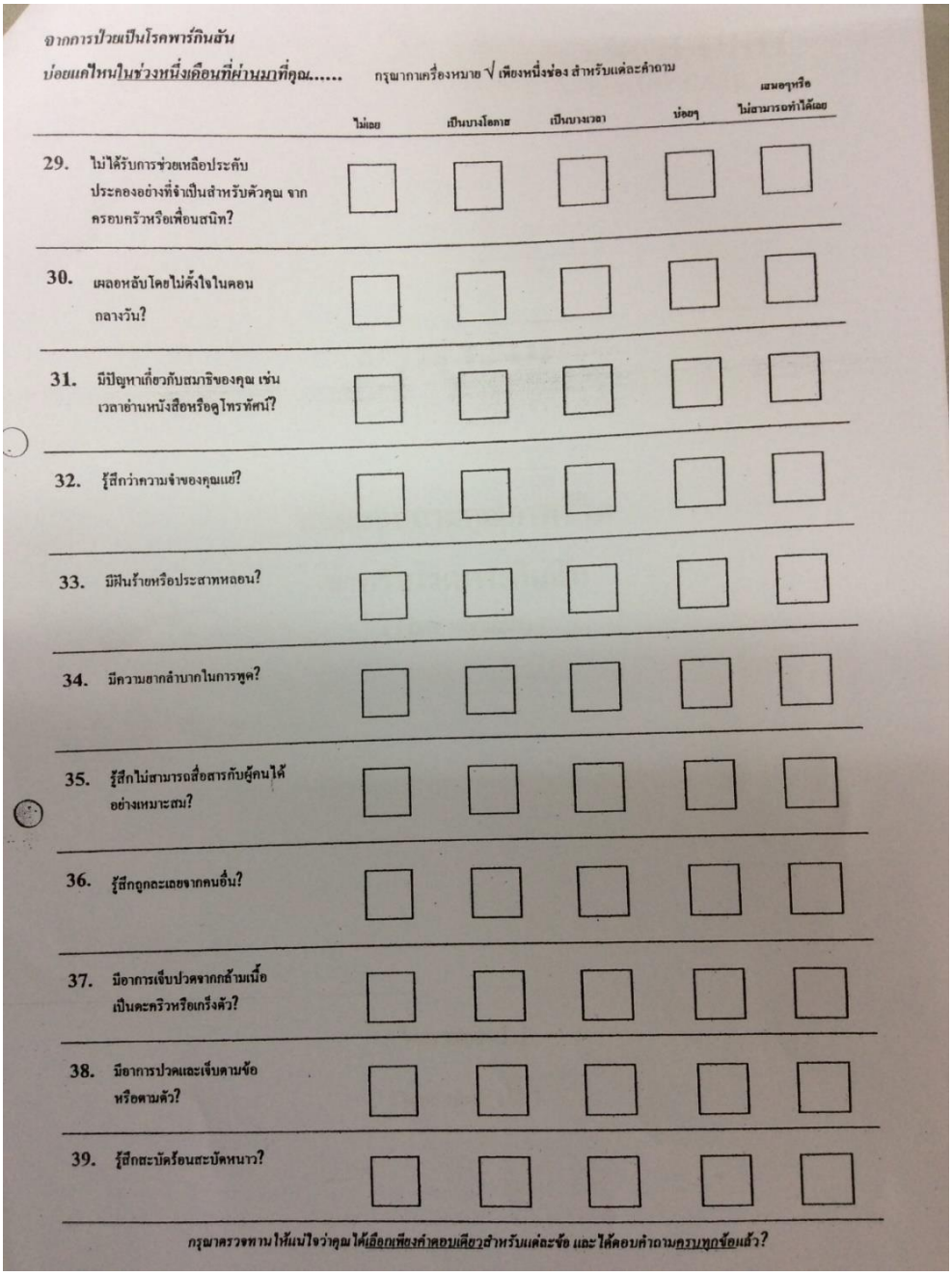
	ไม่เลย	เป็นบางโอกาส	เป็นบางเวลา	บ่อยๆ	เสมอๆหรือไม่สามารถทำได้เลย
20. รู้สึกโกรธหรือขมขื่น?	☐	☐	☐	☐	☐
21. รู้สึกวิตกกังวล?	☐	☐	☐	☐	☐
22. รู้สึกกังวลใจเกี่ยวกับอนาคตของคุณ?	☐	☐	☐	☐	☐
23. รู้สึกว่าต้องปกปิดการป่วยเป็นพาร์กินสันของคุณจากผู้คน?	☐	☐	☐	☐	☐
24. หลีกเลี่ยงสถานการณ์ที่มีการกินหรือการดื่มในที่สาธารณะ?	☐	☐	☐	☐	☐
25. รู้สึกอับอายในที่สาธารณะเนื่องจากเป็นโรคพาร์กินสัน?	☐	☐	☐	☐	☐
26. รู้สึกกังวลใจจากกริยาท่าทีของคนอื่นที่มีต่อคุณ?	☐	☐	☐	☐	☐
27. มีปัญหากับผู้มีความสัมพันธ์ใกล้ชิดกับคุณ?	☐	☐	☐	☐	☐
28. ไม่ได้รับการช่วยเหลือประคับ ประคองอย่างที่จำเป็นสำหรับตัวคุณ จากคู่สามีหรือภรรยา?	☐	☐	☐	☐	☐

ถ้าคุณไม่มีคู่สามีหรือภรรยากรุณาทำเครื่องหมาย √ ตรงนี้ ☐

กรุณาตรวจทานให้แน่ใจว่าคุณได้เลือกเพียงคำตอบเดียวสำหรับแต่ละข้อ และได้ตอบคำถามครบทุกข้อก่อนที่จะไปหน้าต่อไป

PDQ39 Questions

No 29to39 in Thai version. The score express that 0 for never, 1for occasionally, 2 for sometimes, 3 for often, 4 for always or cannot do at all.



จากการป่วยเป็นโรคพาร์กินสัน

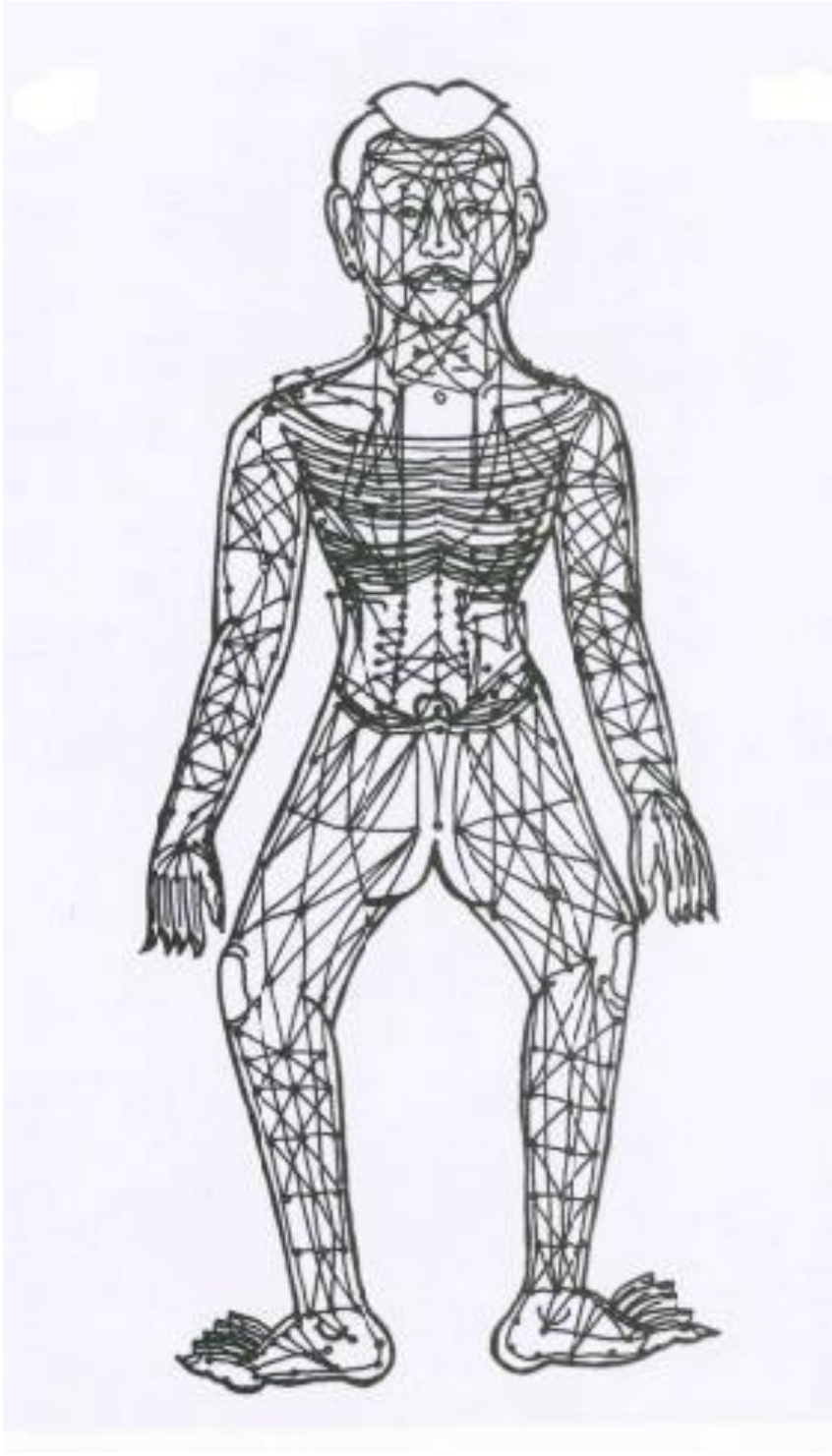
บ่อยแค่ไหนในช่วงหนึ่งเดือนที่ผ่านมาที่คุณ..... กรุณากาเครื่องหมาย √ เพียงหนึ่งช่อง สำหรับแต่ละคำถาม

	ไม่เลย	เป็นบางโอกาส	เป็นบางเวลา	บ่อยๆ	เสมอๆหรือไม่สามารถทำได้เลย
29. ไม่ได้รับการช่วยเหลือประคับประคองอย่างที่จำเป็นสำหรับตัวคุณ จากครอบครัวหรือเพื่อนสนิท?	☐	☐	☐	☐	☐
30. เผลอหลับโดยไม่ตั้งใจในตอนกลางวัน?	☐	☐	☐	☐	☐
31. มีปัญหาเกี่ยวกับสมาธิของคุณ เช่น เวลาอ่านหนังสือหรือดูโทรทัศน์?	☐	☐	☐	☐	☐
32. รู้สึกว่าความจำของคุณแย่?	☐	☐	☐	☐	☐
33. มีฝันร้ายหรือประสาทหลอน?	☐	☐	☐	☐	☐
34. มีความยากลำบากในการพูด?	☐	☐	☐	☐	☐
35. รู้สึกไม่สามารถสื่อสารกับผู้คนได้อย่างเหมาะสม?	☐	☐	☐	☐	☐
36. รู้สึกถูกละเลยจากคนอื่น?	☐	☐	☐	☐	☐
37. มีอาการเจ็บปวดจากกล้ามเนื้อเป็นตะคริวหรือเกร็งตัว?	☐	☐	☐	☐	☐
38. มีอาการปวดและเจ็บตามข้อหรือตามตัว?	☐	☐	☐	☐	☐
39. รู้สึกสะบักสะบอมหนาว?	☐	☐	☐	☐	☐

กรุณาตรวจทานให้แน่ใจว่าคุณได้เลือกเพียงคำตอบเดียวสำหรับแต่ละข้อ และได้ตอบคำถามครบทุกข้อแล้ว?

SEN lines where Thai Traditional Massage is applied

The map of SEN lines where Thai Traditional Massage is applied.



TTM Massage area Inner Arm

Little Finger Line

This line runs through three landmarks:

1) The meeting point of the little and ring fingers
2) The medial epicondyle of the elbow
3) The center of the axilla

- The line starts at the wrist below the head of ulna, between the pisiform and lunate bones in the depression between the two tendons of the flexor digitarumsuperficialis and flexor carpi ulnaris.
- It continues up the anteriomedial aspect of the forearm in the shallow depression between the two muscles flexor carpi ulnaris and palmarislongus and then cross over the medial epicondyle of the humerus.
- The line continues along the medial aspect of the humerus on the belly of the medial head of the triceps until the axillary crease.

Middle Inner Arm Line

This line runs through five landmarks

1) The middle finger
2) The medial end of the transverse cubital (elbow) crease when it's fully flexed
3) The brachialis muscle, between the biceps and triceps
4) The distal end of the biceps in its center
5) The lateral edge of the coracoid process of the scapula

- The line starts at the midpoint of the transverse wrist crease just inferior to the meeting point of the ulna and radius, in the depression between the tendons of the palmaris longus and flexor carpi radialis.
- It continues up the midline of the forearm and crosses the elbow halfway between the medial epicondyle and the

biceps brachii tendon when the elbow is flexed.

- It then follows the medial brachialis muscle and climbs onto the midline of the biceps branchii
- It then continues I finger lateral to the borderline of the chest and the arm, when the arm hangs in the adducted position, on the tendon of the biceps and ending at the lateral edge of the coracoid process of scapula.

Thumb Line

This line runs through three landmarks

1) The meeting point of index and middle fingers at the palm of the hand
2) The "eye of the elbow" (major depression of the crease of the elbow)
3) Below the anterior acromion in a groove at the medial border of the median deltoid
   - The line starts in a depression at the wrist crease, inferior to the distal end of the radius between the tendons of flexor carpi radialis and adductor pollicis longus.
   - It continues ulnar to the radius between the brachoradialis and flexor carpi radialis.
   - It crosses the major depression of the elbow, follows the lateral belly of the biceps brachii, and falls into the groove at the medical border of the median deltoid.
   - The line ends below the anterior aspect of the acromion approximately 2 fingers lateral to the borderline between the chest and the arm when it hangs in the adducted position.

Outer Arm

Index Finger Line

This line runs through three landmarks

1) The index finger
2) The crease of the elbow I finger lateral to the major depression
3) Below the lateral tip of the acromion
   - The line begins at the dorsal aspect of the wrist in a depression between the tendons extensor pollicislongus and extensor digitarum inferior to the distal end of the radius, in line with the index finger.
   - It runs up the radius bone on extensor pollicisbrevis, abductor pollicislongus, extensor carpi radialis and then over the center of the brachioradialis.
   - It arrives at the crease of the elbow I finger lateral to the major depression on the brachioradialis.
   - It travels up the lateral side of the arm bone
   - It continues on the lateral deltoid
   - It ends inferior to the lateral tip of the acromion

Middle Finger Line

This line runs through four landmarks

1) The middle finger
2) The lateral end of the elbow crease
3) At the posterolateral aspect of the arm bone 3 fingers above the olecranon
4) The depression inferior and posterior to the tip of the acromion when the arm is raised sidewards
   - The line starts at the midpoint of the dorsal csease of the arist, in line with the middle finger in a depression inferior to the meeting point of the head of the ulna and the distal (far) end of the eadius on the lunate bone
   - It suns up the outer forearm in a depression between the

ulna and the radius.

- It continues on the radius on extensor digitorum and then between the muscles extensor digitorum and extensor carpi radialis
- It reaches the elbow crease at its lateral end when the elbow is flexed, radial to the lateral epicondyle (head of the radius)
- It starts again at the posterolateral edge of the arm bone 3 fingers above the olecration
- It runs upwards on the posterolateral edge of the humerus
- It runs upwards on the posterolateral edge of the humerus
- It continues in a groove between the median and posterior deltoids
- It then ends posterior and inferior to the lateral tip of the acromion in a depression formed when the arm is raised sidewards

Ring Finger Line

This line runs through four landmarks

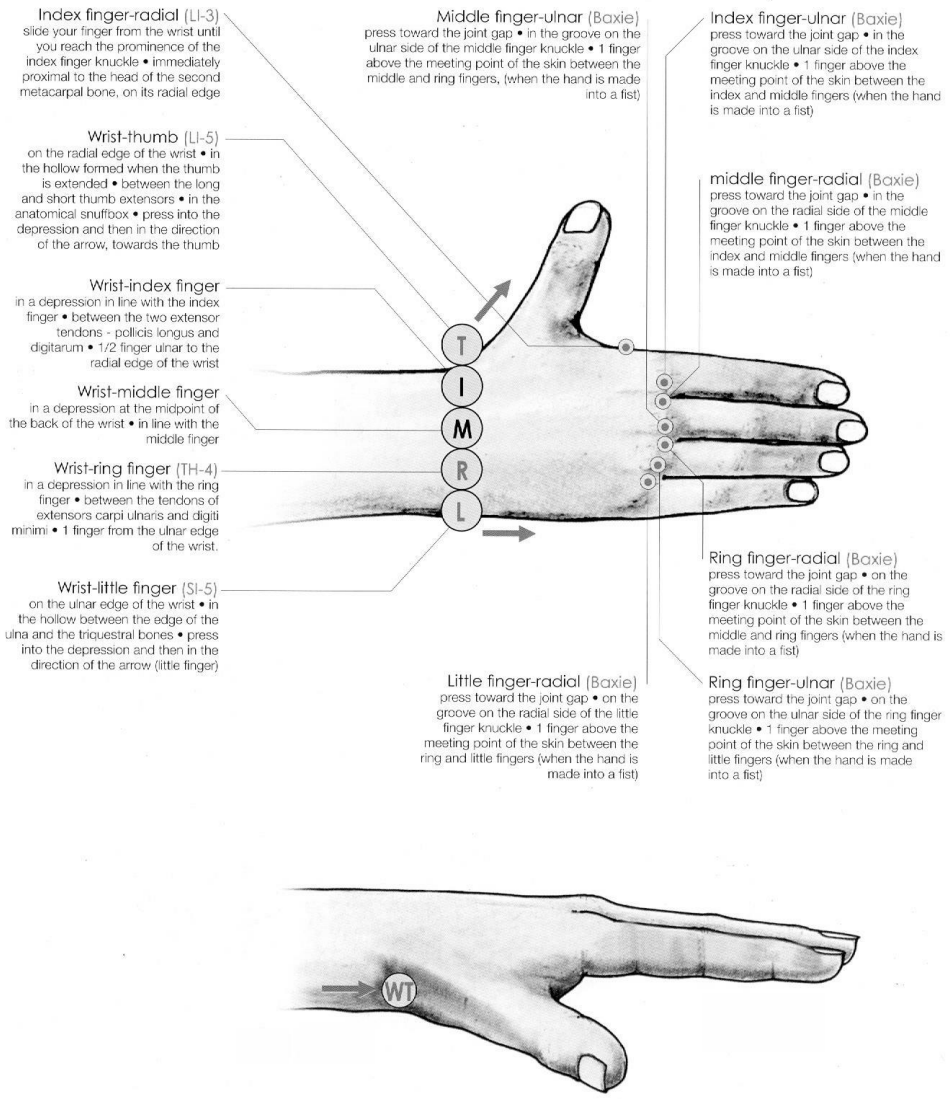
1) The ring finger
2) The lateral epicondyle (head of the radius)
3) The depression superior to the olecranon
4) The superior end of the axillary crease when the arm hangs in the adducted position

- This line begins at the dorsal crease of the wrist in a depression inferior to the head of the ulna, in line with the ring finger between the tendons of carpi ulnaris and digitiminimi.
- It travels on extensor carpi ulnaris up to the neck of the head of the radius
- It starts again in the depression superior to the olecranon
- It runs up the midline of the triceps to the superior end of the axillary csease when the arm hangs in the adducted position[77]

Around the scapula area and shoulder line and neck line

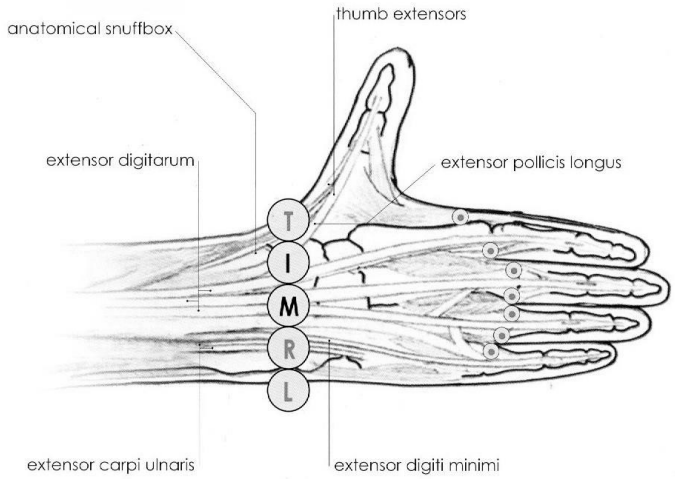
Thai Traditional Massage Figure

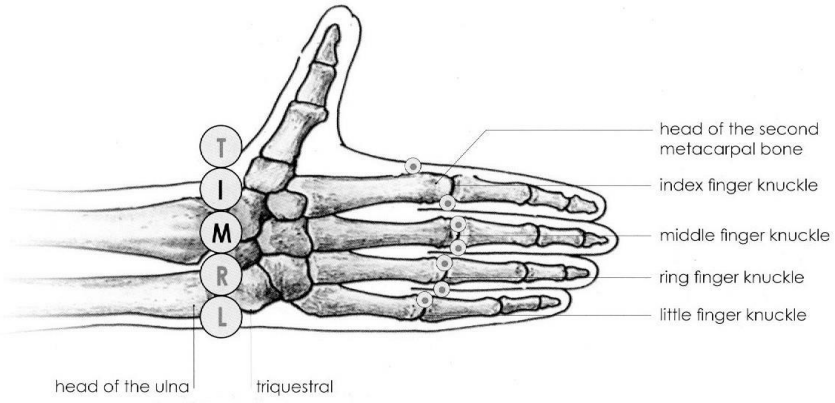
HANDS AND FINGURES 1 (Tyroler, 2008)



HANDS AND FINGERS 2 (Tyroler, 2008)

The anatomy where TTM is applied, HANDS AND FINGERS Part 2.



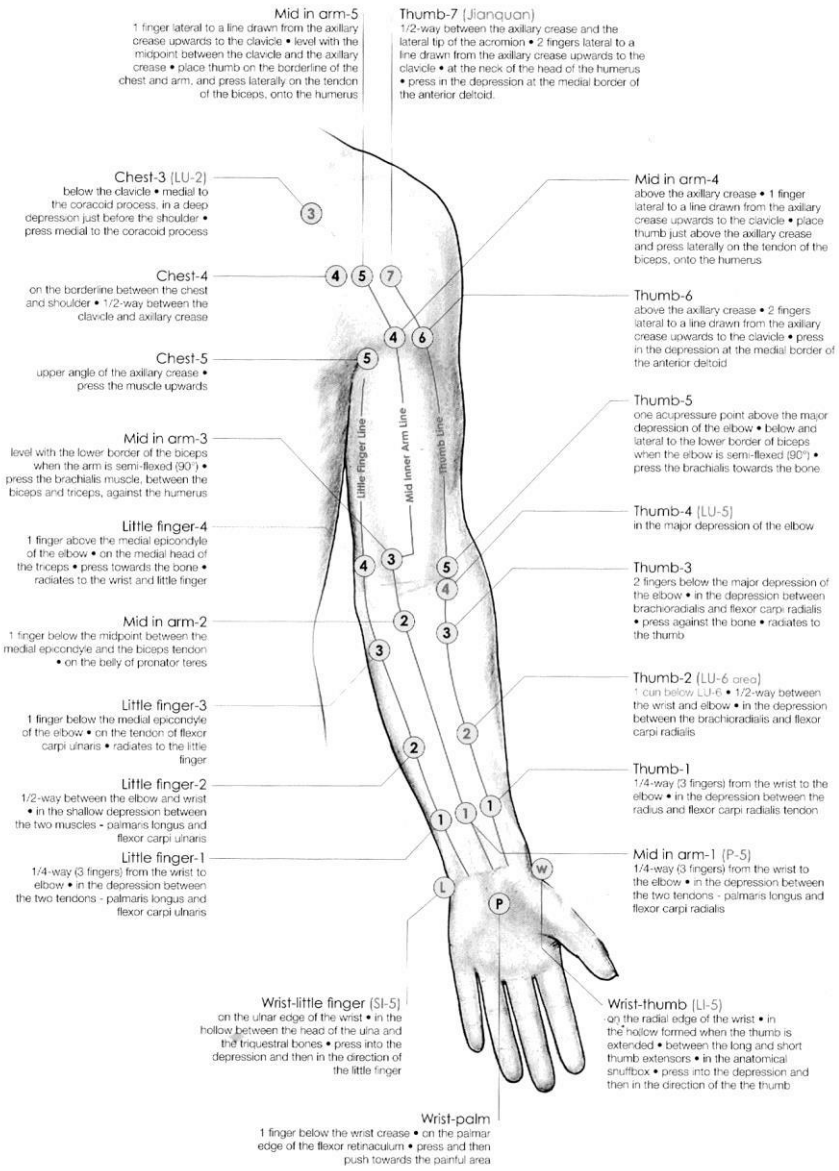


HANDS AND FINGERS 3

The expresses the flow where TTM is applied, HANDS AND FINGERS Part 3.

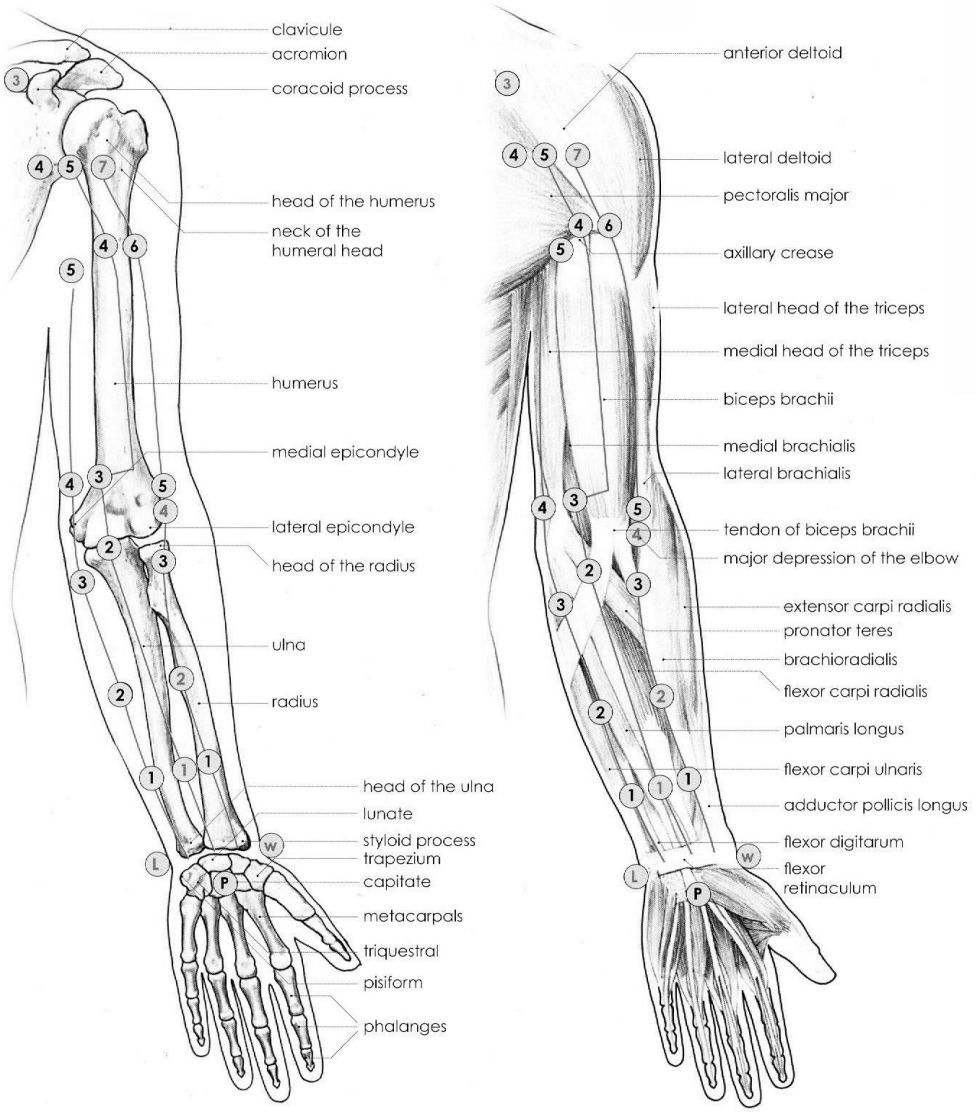
INNER ARM 1

The expresses the area where TTM is applied, INNER ARM Part 1. **(Tyroler, 2008)**



INNER ARM 2

The expresses the anatomy where TTM is applied, INNER ARM Part 2



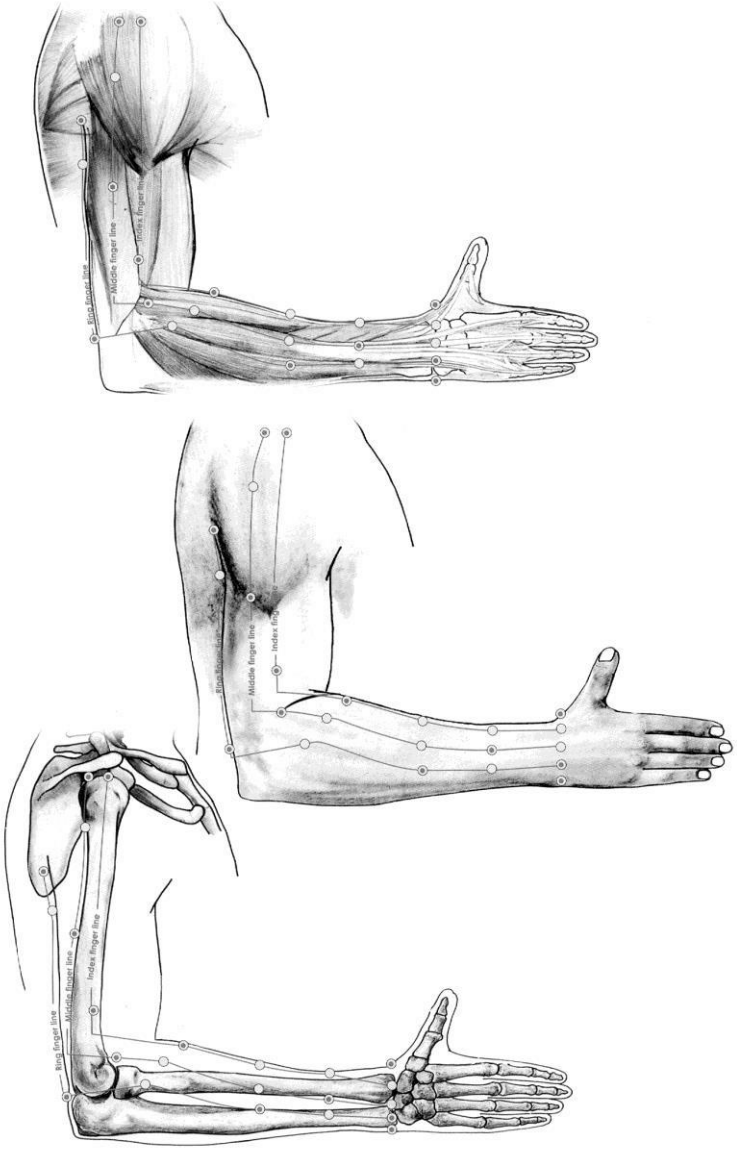
(Tyroler, 2008)

INNER ARM 3

The expresses the flow where TTM is applied, INNER ARMS Part 3.

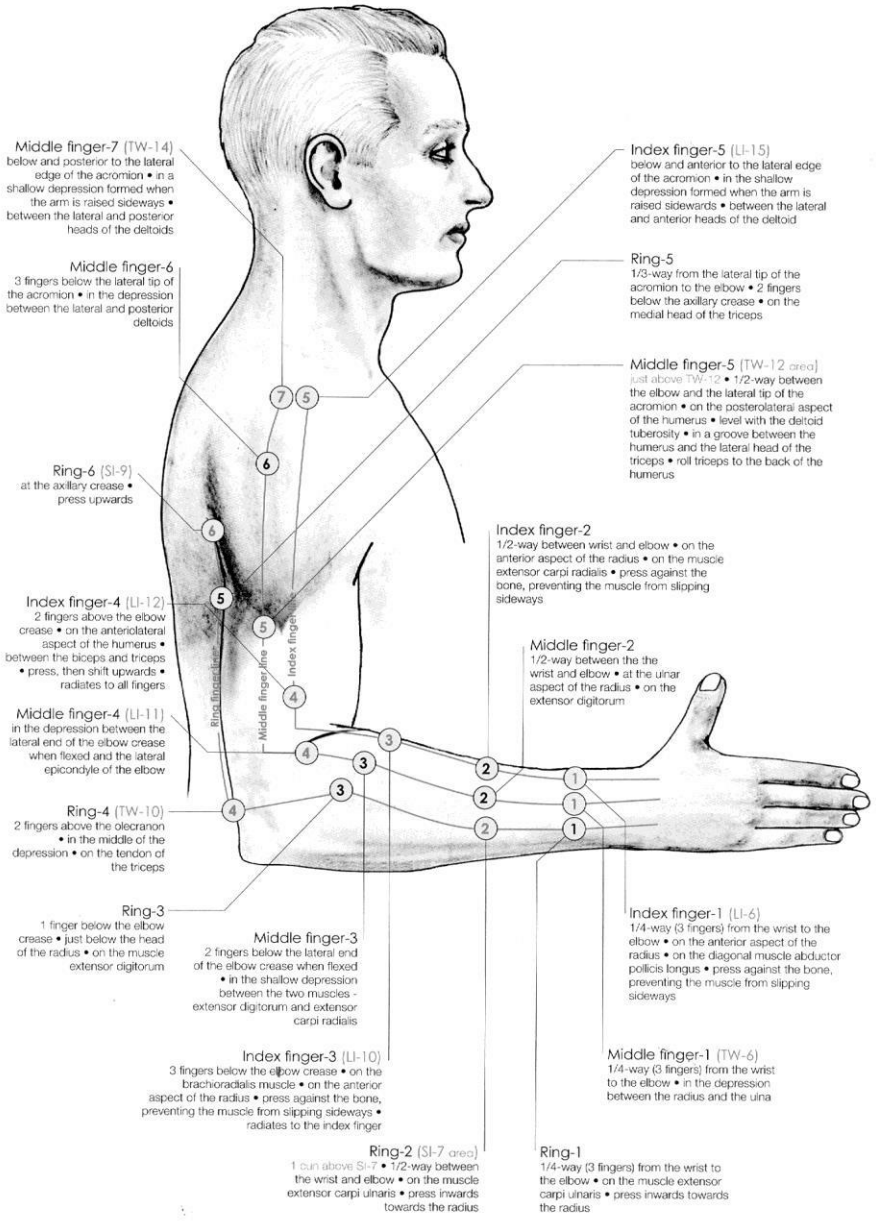
OUTER ARM 1

The expresses the area where TTM is applied, OUTER ARM Part 1. **(Tyroler, 2008)**



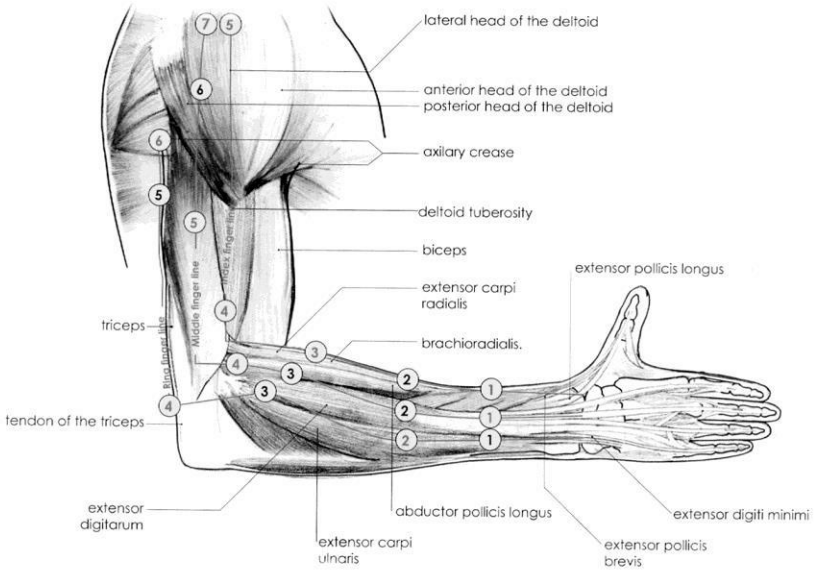
OUTER ARM 2

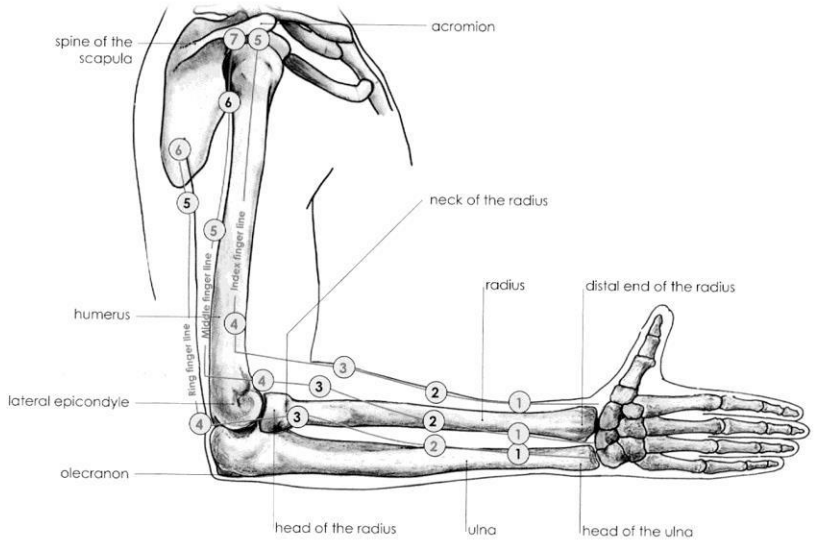
The expresses the anatomy where TTM is applied, OUTER ARM Part 2. **(Tyroler, 2008)**



OUTER ARM 3

The expresses the anatomy where TTM is applied, OUTER ARM part 3. **(Tyroler, 2008)**



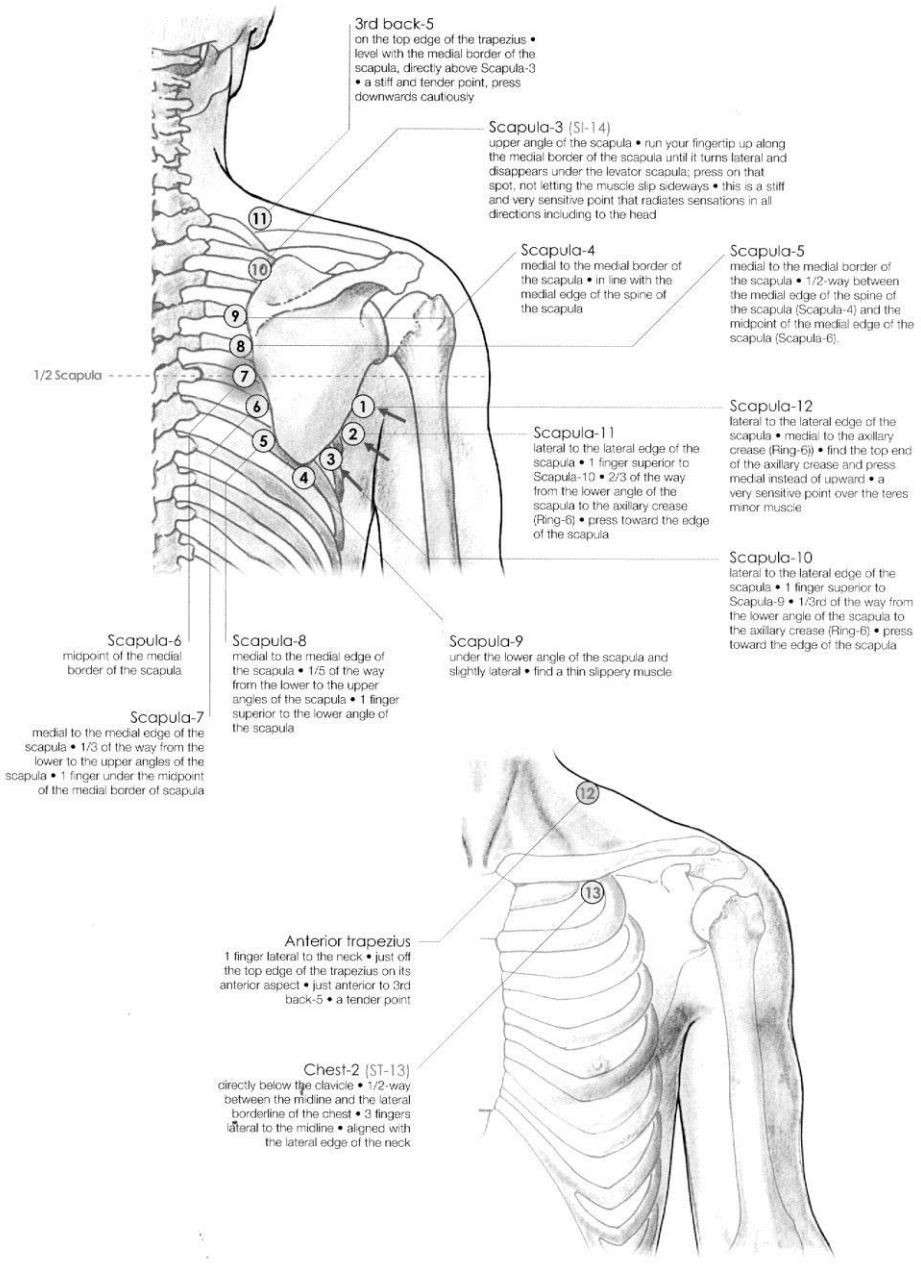


OUTER ARM 4

The expresses the flow where TTM is applied, OUTER ARM Part 4.

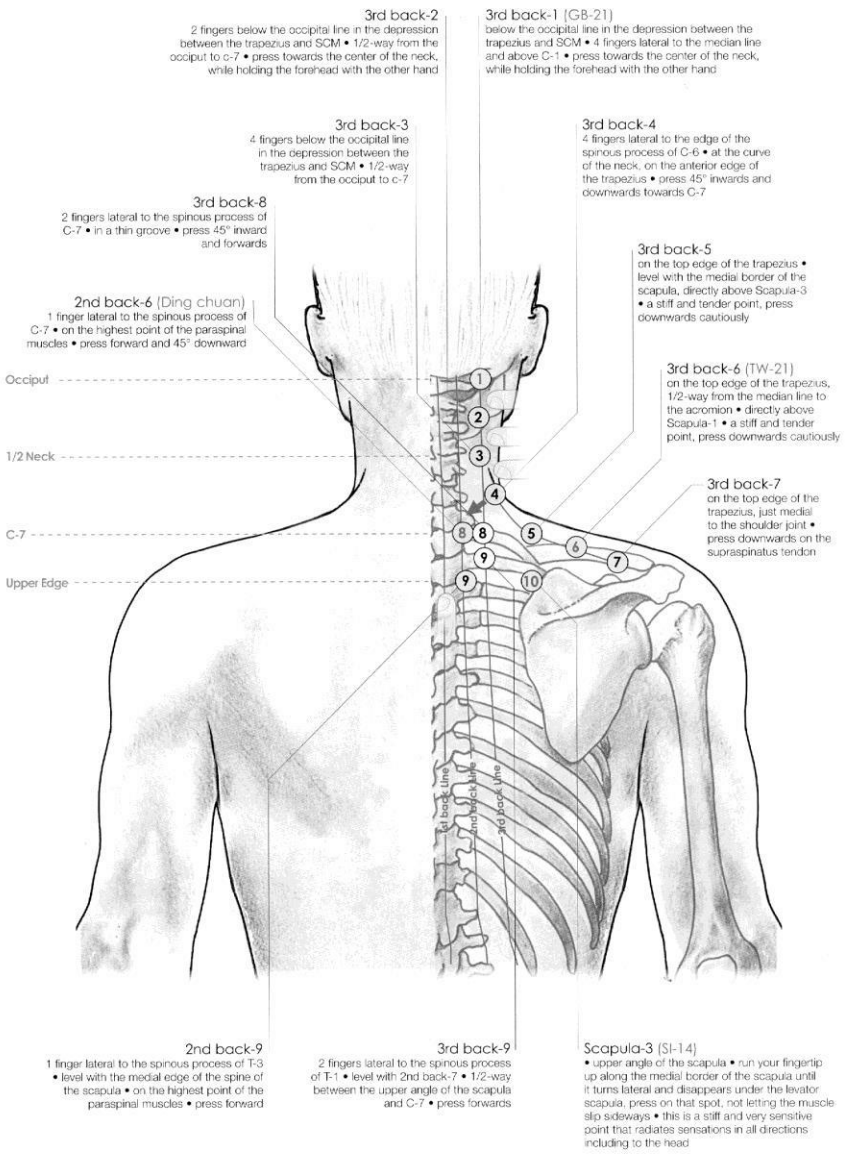
SHOULDER AND NECK 1

The expresses the area where TTM is applied, INNER ARM Part 1.
(Tyroler, 2008)



SHOULDER AND NECK 2

The expresses the anatomy where TTM is applied, SHOULDER AND NECK Part 2. **(Tyroler, 2008)**



SHOULDER AND NECK 3

The expresses the anatomy where TTM is applied, SHOULDER AND NECK Part 3.

APPENDIX B

Ethical consideration

(Beneficence/Non-maleficence)

This trial was intended to improve the condition of Parkinson's disease patients. At all times, the welfare of this study patients were parliament and well not be compromised in any shape of all form.

- The potential benefit of this research was for improvement in the condition of the outcome variables in the intervention group, compared to the control group.
- There was slight risk of minor pain after sessions.

(Justice)

- The scope and objectives of the proposed research, the selection, exclusion and inclusion of categories of research participants was fair, and was accurately described in the results of the research.
- The process of recruiting participants was fair.
- There was no unfair burden of participation in research on particular groups.
- There was fair distribution of the benefits of participation in research.

There was no exploitation of participants in the conduct of research

VITA

Ms. YUKA MIYAHARA was born on January 13,1973 in Saitama prefecture, Japan. She received a Bachelor of Education in 1996 from Saitama University, Japan.After graduated she worked as a teacher at primary school in Saitama prefecture and a Japanese language instructor at Faculty of liberal arts and science,Kasetsart University, Thailand. During her life in Thailand, she started her severe training as a Thai Traditional Medical Therapist at Watpo Thai Traditional Medical School, Bangkok in 2001, and became the first instructor as a foreigner there in 2006. Since 2009, she moved to Japan to work for a Neurological Clinic at Saitama city and for managing her own Yutika Thai Traditional Therapy School in Tokyo. In 2014, she entered Master of Public Health course, College of Public Health Science, Chulalongkorn University to learn further more about complementary and Alternative medicine through Thai Medicine.