ผลของโปรแกรมการป้องกันการหกล้มต่อการก้าวเดินและการทรงตัว
ของผู้สูงอายุที่อาศัยอยู่ในชุมชน

นางสาวนัยนา พิพัฒน์วณิชชา

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาพยาบาลศาสตรดุษฎีบัณฑิต
สาขาวิชาพยาบาลศาสตร์
คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย
ปีการศึกษา 2549

THE EFFECT OF A FALL PREVENTION PROGRAM ON GAIT AND BALANCE OF COMMUNITY-DWELLING ELDERS

Miss Naiyana Piphatvanitcha

A Dissertation Submitted in Partial Fulfillment of the Requirements

for the Degree of Doctor of Philosophy Program in Nursing Science

Faculty of Nursing

Chulalongkorn University

Academic year 2006

Thesis Title	THE EFFECT OF A FALL PREVENTION PROGRAM ON GAIT AND BALANCE OF COMMUNITY- DWELLING ELDERS
By	Miss Naiyana Piphatvanitcha
Field of study	Nursing Science
Thesis Advisor	Assistance Professor Jirapron Kespichayawattana Ph.D., RN.
Thesis Co-advisor	Associate Professor Pol. Capt. Yupin Aungsuroch Ph.D., RN.
Thesis Co-advisor	Professor Joan K. Magilvy Ph.D., RN., FAAN.

Accepted by the Faculty of Nursing, Chulalongkorn University in Partial Fulfillment of the Requirements for the Doctoral Degree

…… Dean of the Faculty of Nursing
(Associate Professor Pol. Capt. Yupin Aungsuroch, Ph.D., RN.)

THESIS COMMITTEE

……Chairman
(Professor Veena Jerapaet, DNSc., RN.)
……..…Thesis Advisor
(Assistant Professor Jirapron Kespichayawattana, Ph.D., RN.)
……. Thesis Co-advisor
(Associate Professor Pol. Capt. Yupin Aungsuroch, Ph.D., RN.)
……. Thesis Co-advisor
(Professor Joan K. Magilvy, Ph.D., RN., FAAN.)
…….. Member
(Assistant Professor Chanokporn Jitpunya, Ph.D., RN.)
…….. Member
(Associate Professor Siridej Sucheeva, Ph.D.)
…….. Member
(Professor Sutthichai Jitapunkul, MD., M.Sc)

นัยนา พิพัฒน์วณิชชา: ผลของโปรแกรมการป้องกันการหกล้มต่อการก้าวเดินและการทรงตัวของผู้สูงอายุที่อาศัยอยู่ในชุมชน (THE EFFECT OF A FALL PREVENTION PROGRAM ON GAIT AND BALANCE OF COMMUNITY-DWELLING ELDERS): ผู้ช่วยศาสตราจารย์ ดร. จิราพร เกศพิชญวัฒนา, รองศาสตราจารย์ ร.ต.อ.หญิง ดร.ยุพิน อังสุโรจน์, ศาสตราจารย์ ดร. โจน เค แมคกิวรี่ 200 หน้า.

การวิจัยครั้งนี้เป็นการวิจัยกึ่งทดลอง มีวัตถุประสงค์เพื่อทดสอบผลของโปรแกรมการป้องกันการหกล้มต่อการก้าวเดินและการทรงตัวของผู้สูงอายุที่อาศัยอยู่ในชุมชน โดยประยุกต์ทฤษฎีความเชื่อด้านสุขภาพ การเรียนรู้ในผู้ใหญ่ และคำนึงถึงความสามารถในการเรียนรู้จากการเปลี่ยนแปลงตามวัยของผู้สูงอายุมาเป็นแนวทางในการกำหนดกิจกรรม ซึ่งประกอบด้วยการอภิปรายกลุ่มเกี่ยวกับความรู้ในการป้องกันการหกล้มจำนวน 4 ครั้งและการฝึกออกกำลังกายแบบไทชิ 18 ท่า จำนวน 8 ครั้ง ร่วมกับการแจกคู่มือป้องกันการหกล้ม โปสเตอร์และแผ่นซีดีประกอบการออกกำลังกายแบบไทชิ เพื่อนำไปสู่การปฏิบัติการป้องกันการหกล้มของผู้สูงอายุในชีวิตประจำวัน ได้แก่การมีพฤติกรรมการป้องกันการหกล้มของผู้สูงอายุ ร่วมกับการออกกำลังกายแบบไทชิเป็นกลุ่มสัปดาห์ละ 3 ครั้ง ครั้งละ 30-45 นาที นาน 8 สัปดาห์

กลุ่มตัวอย่างเป็นผู้สูงอายุที่อาศัยอยู่ในชุมชนในเขตเมืองของ อ.เมือง จ.ชลบุรี มีประวัติเคยหกล้มมาแล้วอย่างน้อย 1 ครั้งในรอบ 12 เดือนก่อนเข้าร่วมการศึกษา ทำการคัดเลือกกลุ่มตัวอย่างตามเกณฑ์ที่กำหนด และจับคู่กลุ่มตัวอย่างทั้งสองให้มีความคล้ายคลึงกันตามตัวแปรอายุ เพศ และ จำนวนครั้งของการหกล้ม ได้กลุ่มทดลองและกลุ่มควบคุมจำนวนกลุ่มละ 23 ราย ทำการเก็บรวบรวมข้อมูล 2 ครั้ง ได้แก่ก่อนการทดลองและหลังการทดลอง โดยใช้แบบทดสอบการทรงตัว (The Berg Balance Scale) และแบบทดสอบการก้าวเดิน (The Time up and Go test)

ผลการวิเคราะห์ข้อมูลด้วยสถิติวิเคราะห์หาความแตกต่างระหว่างค่าเฉลี่ย โดยการเปรียบเทียบรายคู่ (paired *t* test) พบว่าหลังจากเข้าร่วมโปรแกรมการป้องกันการหกล้ม กลุ่มทดลองมีคะแนนการทรงตัวและคะแนนการก้าวเดินเฉลี่ยดีกว่ากลุ่มควบคุมอย่างมีนัยสำคัญทางสถิติที่ระดับ.05 นอกจากนี้ผลการศึกษายังพบว่า หลังจากเข้าร่วมโปรแกรมการป้องกันการหกล้มแล้ว กลุ่มทดลองมีคะแนนการทรงตัวและคะแนนการก้าวเดินเฉลี่ยดีกว่าก่อนเข้าร่วมโปรแกรมอย่างมีนัยสำคัญทางสถิติที่ระดับ .05

สามารถสรุปได้ว่าโปรแกรมการป้องกันการหกล้มนี้ มีประสิทธิภาพในพัฒนาการก้าวเดินและการทรงตัวของผู้สูงอายุให้ดีขึ้น และสามารถใช้เป็นแนวทางที่มีประสิทธิภาพในการส่งเสริมการก้าวเดินและการทรงตัวของผู้สูงอายุเพื่อป้องกันการหกล้มในผู้สูงอายุ โดยเฉพาะผู้สูงอายุที่มีความเสี่ยงต่อการหกล้มต่อไป

คณะ พยาบาลศาสตร์ ลายมือชื่อนิสิต.....

สาขาวิชา พยาบาลศาสตร์ ลายมือชื่ออาจารย์ที่ปรึกษา.....

ปีการศึกษา 2549 ลายมือชื่ออาจารย์ที่ปรึกษาร่วม.....

ลายมือชื่ออาจารย์ที่ปรึกษาร่วม.....

4577972336 : MAJOR Nursing Science
KEY WORD: FALLS/ FALLS PREVENTION PROGRAM/ FALLS EDUCATION/ TAI CHI EXERCISE/ GAIT/ BALANCE

NAIYANA PIPHATVANITCHA: THE EFFECT OF A FALL PREVENTION PROGRAM ON GAIT AND BALANCE OF COMMUNITY-DWELLING ELDERS. THESIS ADVISOR : ASST. PROF. JIRAPORN KESPICHAYAWATTANA, Ph.D., ASSOC. PROF. POL. CAPT. YUPIN AUNGSUROCH, Ph.D., PROF. JOAN K. MAGILVY, Ph.D., 200 pp.

The purpose of this quasi-experimental research was to examine the effect of a Fall Prevention Program on gait and balance of community-dwelling elders. The program was constructed by applying the Health Belief model, Knowles' adult learning principle, and considerations for normal aging changes. The program included 4-fall prevention education sessions and 8-Tai Chi exercise sessions. Then, the participants had practiced fall prevention behavior and practiced Tai Chi exercise in group sessions 3 days/week throughout the 8 weeks of intervention A Fall Prevention Behavior manual and a 18 form Tai Chi exercise manual, a CD in Tai Chi exercise instructional, and a poster depicting Tai Chi exercise were given to all the participants in experimental group.

The participants were the community-dwelling elders had at least 1 fall in 12 month prior to participating in the study and lived in the urban area in Amphur Maung, Chonburi province. The researcher determined whether each participant met the inclusion and exclusion criteria. The variables of age, gender, and number of falls were used to matched paired for the similarity between the experimental and control groups. Finally, the subjects were 23 in each the experimental and control groups. Data were collected once before and once after providing the intervention. Hypotheses testing were tested by the paired *t* test for the Berg Balance Scale and the Time Up and Go test mean scores.

The results indicated that after participation in a Fall Prevention Program, the experimental group had significantly higher mean score of the Berg Balance Scale and had significantly lower or better mean score of the Time up and Go test than the control group (p <.05). The analysis results also showed that after participation in a Fall Prevention Program, the experimental group had significantly increase their mean score of the Berg Balance Scale (p <.05) and had significantly lower or better mean score of the Time up and Go test than before participation the program (p <.05).

The finding indicated that a Fall Prevention Program in this study is effectively on improving gait and balance in the elders and can be an effective care for promoting gait and balance for prevention falls in elders especially who have high risk of falls.

Department Nursing Student's signature.....

Field of study Nursing Science Advisor's signature.....

Academic year 2006 Co-advisor's signature.....

Co-advisor's signature.....

ACKNOWLEDGEMENTS

I would like to acknowledge many people for helping me during my doctoral work. I would especially like to thank my advisors, Assistant Professor Jirapron Kespichayawattana, Ph.D., Associate Professor Pol. Capt. Yupin Aungsuroch, Ph.D., and Professor Joan K. Magilvy, Ph.D. for them generous time and commitment. Throughout my doctoral work they encouraged me to develop independent thinking and research skills. They continually stimulated my analytical thinking and greatly assisted me with scientific writing.

I am also very grateful to the expert members for approving the questionnaires and to the members of committee of my dissertation defense: Professor Veena Jerapaet, DNSc., RN., Associate Professor Chanokporn Jitpunya, Ph.D. Associate Professor Siridej Sucheeva, Ph.D., and Professor Sutthichai Jitapunkul, MD., M.Sc.

I am indebted to the commitment on Higher Education, Ministry of Education, the Thai Health Promotion Foundation, and the Graduated School, Chulalongkorn University for the financial support.

I am also grateful my participants and their family members who participated in this study throughout 4 months to give me their valuable data.

I wish to thank my friends as research assistances, Walaiporn Areeruk, RN. and Noppanit Reoungsang, RN for helping me since recruitment the samples process until finished intervention process.

I am also very grateful to my parents, Kimleang and Chunmeng Sae-Ngao, my sister, Nongnut Sae-Ngao and Siriluk Kreewatcharin, my nieces and their friends for their unconditional psychological and physiological support.

I owe a special note of gratitude to Mr. Surapong Jaroenboolwiwut, the Tai Chi expert who was insightful in training me, my research team, and my participants. I am also thankful to the Dean and all staffs of Faculty of Nursing, Burapha University, Chonburi: Thailand, my workplace for permitting me for free using a meeting room as a research setting throughout the intervention period.

Finally, I would like to thanks all whose direct and indirect support to complete my dissertation in time.

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE

TABLE OF FIGURE

CHAPTER I

INTRODUCTION

Background and Significance of Research Problem

In 1999, the number of older persons (aged 60 years and older) in the world was estimated at 593 millions or 10 % of the total world population. By 2049, there will be an estimated 1.9 billion, or 19 % of the total world population. The oldest old (over 80 years) will increase rapidly, particularly among women (Prasatkul, Varangrut, and Vaputavavong, 1999 cited in Intachat, 2002). In Thailand, in 1960, the number of older persons (aged 60 years and older) was 1.21 millions or 4.6 % of the total population .Twenty years later, in 1990, the population of older persons in Thailand was over 3 times that number (4.02 million or 7.36 %) and is be projected to increase to 10.78 millions (15.28%) by 2020 (Jitapunkul and Bunnag, 1999).

The major demographic trends affecting the health care system is the increasing diversity of the older adult population. For older adults, numerous age–related changes, functional impairments, and risk factors contribute to a high incidence of unintentional injuries that are a major health problem among elderly people. In other countries, falls, traffic accidents, and burns are common causes of fatal injuries in this age group. Of these categories, falls and fall-related injuries are the leading cause of deaths from injury among people aged over 75 (Nuffield Institute for Health, University of Leeds and NHS center for Reviews and Disseminations, 1996). In the period from 1992 to 1999, falls in older adults were the leading causes

of home injury death in the United States (Runyan et al, 2005). In Thailand, the number of deaths from falls in all age group of the Thai population were increased from 380:1000 in 1997 to 714:1000 in 2000 (Ministry of public health, 1997–2000).

Fall related injuries among older adults are associated with substantial economic costs that are borne by individuals, society, and the medical care system. International studies underscore the substantial economic burden caused by fall related injuries, regardless of the medical care system. A recent study reported that, in 2000, direct medical costs for fatal and non-fatal fall injuries among US adults aged >65 years totaled $0.2 billion dollars for fatal and $19 billion dollars for non-fatal injuries (Stevens et al, 2006). In 1999, Emergency Department and hospital care for fall related injuries among people aged >60 cost the United Kingdom almost £1 billion (US$1.9 billion) (Scuffham, Chaplin, and Legood, 2003). In a Western Australia study estimated Emergency Department treated and hospitalized fall injuries among people aged >65 cost the Australian healthcare system $86.4 million (US$66.1 million) (Hendrie et al, 2004).

A falling event may be the initial sign or an early indication of an underlying illness, representing the onset of new diseases or unstable existing disease (Tideiksaar, 2001), the definitions used for a fall vary between studies (Masud and Morris, 2001). Most studies required a fall to be ‘unintentional’, to have some form of contact with the ground, and excluded falls caused by road accidents and violence. Some studies excluded falls caused by syncope or an acute major intrinsic event such as a stroke.

For the purpose of this study, fall is defined as a sudden event which results in a person's change in body position in a downward direction to the ground or other lower level, coming to rest unintentionally, which may or may not result in a physical injury and that is not the result of a major intrinsic event (such as stoke, syncope) or overwhelming hazard.

Fall incidence, a measure of how often a fall occurs for a certain period of time, varies among settings, population, and time. According to one study (Rubenstein, Powers, and MacLean, 2001) 30%-50% of generally healthy elderly persons over the age of 65 living in the community report having fallen over a one-year period. One half to two thirds of nursing home residents falls annually and around half of hospitalized patients fall. Studies in Thailand have found the incidence of falls in the community varies from 18.7% within 6 months (Jitapunkul et al, 1998), 12.1% in male and 24.1% in female (Assuntachai et al., 1999), 17.03, 19-20, and 42.7% (Hanjangsit, 1994; Yompuk, 1997; Treeyawuttiwat, 1991).

In western countries, most falls take place in the bedroom (while attempting to get out of bed unassisted) or the bathroom (while attempting non-assisted toileting activities) and occur most often in those individuals 75 to 80 years of age with underlying medical conditions or medications interfering with safe gait/balance. Studies in Thailand found that 18 to 24% of falls occur in bathrooms and toilets (Treeyawuttiwat, 1991; Lausawatchaikul et al., 2000), often as a result of slipping on the floor 52.8% (Lausawatchaikul et al., 2000).

Falls generally result from an interaction of multiple, diverse risk factors, and situations, which can be modified by age, disease, and the presence of hazards in the environment (Fleming and Pendergast, 1993). Risk factors for falling can be classified

as either intrinsic (lower extremity weakness, poor grip strength, balance disorders, functional and cognitive impairment, visual deficits) or extrinsic (polypharmacy: four or more prescription medications) and environmental factors such as poor lighting, loose carpets, and lack of bathroom safety equipment. (American Geriatrics Society, British Geriatrics Society, and American Academy of Orthopedic Surgeons Panel on Falls Prevention, 2001)

Research has identified over 400 potential risk factors for falling (Nuffield Institute for Health, University of Leeds and NHS center for Reviews and Disseminations, 1996 cited in Masud and Morris, 2001). However, A summary of 16 controlled trials revealed that the most significant individual risk factors for falls in both community-dwelling and institutional-dwelling older people in western countries included weakness (11significant/ 11total), balance deficits (9/9), limitation in mobility (9/9), gait deficits (8/9), visual deficits (5/9), impaired Activity Daily Living (ADL) (5/9), cognitive impairment (4/8), and postural hypotension (2/7) (Rubenstein and Josephson, 2002).

Similar to other countries, studies in Thailand have found that the risk factors for falls in elderly vary. A study of 1,043 older people in communities, Assantachai, et al.(1997) found that risk factors most commonly associated with falls include female gender, hypertension, hearing loss, memory loss, low perceived health status, decreased activity in daily living, kyphoscoliosis, use of eye-glasses, high pulse rate in the sitting position, and malnutrition (lower lean body mass and lower serum albumin). For male elderly living in the community, the most common risk factors associated with falls include: low perceived health status, hypertension, difficulty walking in the home, difficulty sitting, and the absence of electricity in the home

(Jitapunkul, 1998). For female elderly living in the community, the most common risk factors for falls include: low perceived health status, joint disease, an illness influencing activities within the previous year, difficulty sitting, going to the market everyday, loneliness, less than 3 meals a day, absence of electricity in the home, and living in a traditional Thai style home or a hut.

In a study of 417 members of an elderly club in Bangkok (Jitmontri et al, 1998) risk factors for falls were organized under two categories: 1) basic conditioning factors, including female gender (71.2%), single status (52.4%), and improper dressed; and 2) home environment factors, including improper house ladder, lights insufficient at ladder, clutter, and ragged carpet/door mat.

Lausawatchaikul (2000) studied 130 community-dwelling elders who came to the emergency room and orthopedic out-patients department at Ramathibodi hospital in Bangkok for examination or follow up after falls. Most of the participants were female (female: male = 4:1), have more than 1 disease (most common disease was hypertension), were taking some type of sedative (42.7%), have routine medicine administration 69.9% and the most are hypertensive drugs and diuretics. The result showed that the majority of falls took place in and around the patients' homes, in which in the bathroom was the most common location of the incident. The main causes of falls were extrinsic factors, of which slipping (52.8%) was the most frequently reported. Acute leg muscle weakness (42.5%) cause of falls was intrinsic factors.

Themwong (2000) conducted the Thai Fall Risk Assessment Tool (Thai FRAT) by concluding the risk of falling from 28 studies for selection the same risk at least 5 studies and development instrument. Risk items which had lower 50% of specialists' commitment were excluded. Then she studied by case-control study and logistic regression analysis found that the significant fall risk factors, of the 144 elderly who lived in community and had more than 1 fall in 6-month period, were 6 risk factors including female, vision impairment, imbalance, medications use, previous fall, and lived in a Thai style home. The Thai FRAT had 86% specific and 89% sensitivity (Themwong, 2000).

Summarization of evidences regarding the significant fall risk factors in the community-dwelling elders both Thailand and other countries are similarly in terms of intrinsic factors; 1) impairment of gait and balance (Thailand: imbalance 1 significant/ 6 total; other countries: gait deficit 8/9, balance deficit 9/9) 2) limitation in general physical function: cognitive impairment (Thailand: memory loss 1/6; other countries: impairment cognitive 4/8), visual deficit (Thailand: glass using 2/6; other countries: visual deficit 5/9), impaired activity daily living (Thailand: decrease activity daily living 1/6; other countries: impaired activity daily living 5/9), mobility limitation (Thailand: sitting problem 1/6, difficulty walking in home 1/6; other countries: mobility limitation 9/9). On the contrary, some intrinsic factors, Thailand is different from other countries including demographic factors: gender (female 4/6) and previous fall (1/6); the presence of certain chronic condition: hypertension (3/6); and psychological problem: low perceive health status (2/6). Moreover, extrinsic factors and environmental factors between Thailand and other countries are different. In terms of extrinsic factors : medication use (more than 1 drug 2/6). Environmental

factors: home environment (3/6), in contrast, in other countries these factors are not significant.

It can be concluded that the most salient risk factor of fall among intrinsic factors in the community-dwelling elders both Thailand and other countries is impairment of gait and balance due to combined effect of normal age-related changes and concurrent disease (Luecknotte, 2000). Balance is necessary for maintaining a position, remaining stable whilst moving from one position to another, performing activities of daily living, and moving freely in the community (Berg et al, 1992). This risk results in a loss of muscle strength and balance, and the body mechanisms responsible for compensation or stability fail (Tideiksarr, 2001). Impaired balance greatly increases the probability for falls, fractures, and functional dependency among older adults. It has been estimated that between 10% and 25% of all falls are associated with poor balance and gait abnormalities (Nelson and Amin, 1990). This requires the gerontology nurse to observe and analyze older individuals' gait and balance and determine if impairment exists (Luecknotte, 2000).

Several studies have shown that the risk of falling increases dramatically as the number of risk factors increases. Tinetti, Speechley, and Ginter (1988) surveyed community-dwelling elderly persons and reported that the percentage of persons falling increased from 27% for those with no or one risk factor to 78% for those with four or more risk factors. According to Nevitt, Cummings, and Kidd (1989) reported that the percentage of community-living persons with recurrent falls increased from 10% to 69% as the number of risk factors increased from one to four or more. Robbins, Rubenstein, & Josephson, et al (1989) used multivariate analysis to simplify

risk factors so that maximum predictive accuracy could be obtained by using only three risk factors (hip weakness, unstable balance, and taking => 4 medications) in an algorithm format. With this model, the predicted 1-year risk of falling ranged from 12% for persons with none of the three risk factors to 100% for persons with all three.

A key concern is not only the high incidence of falls in older persons but also the combination of high incidence and a high susceptibility to injury. Both rise steadily after age 60 and after 75 years of age, the rates increase markedly (Rubenstein and Josephson, 2002). Although most falls result in no serious injury, studies among older persons in the community have found that about 10% of the fallers have a serious fall-related injury, including fractures, joint dislocations, or severe head injuries (Sattin et. al., 1990; Nevitt et al., 1991; Tinetti et. al., 1995). Unfortunately, 50% of older adults who are hospitalized because of a fall die within 1 year of the hospitalization (Roach, 2001).

Fall-related injuries in older adults often reduce mobility and independence, and are often serious enough to result in a hospitalization and an increased risk of premature death (Alexander, Rivara, and Wolf, 1992). In 1994, falls were the leading cause of death for adults ages 79 and older in western countries (National Safety Council 1997 cited in Schoenfelder and Crowell, 1999). National data of The United State of America indicated that falls are the largest single cause of restricted-activity days among older adults (Kosorok et al, 1992). Moreover, fall is a leading precipitating cause of nursing home admissions (Rubenstein, Josephson, and Robbins, 1994) and account for 6% of all medical expenditures for persons 65 years of age and older (Rubenstein, Powers, and MacLean, 2001). Moreover, older adults are

hospitalized for fall-related injuries five times more often than they are for injuries from other causes (Alexander, Rivara, and Wolf, 1992).

Falls can also have significant psychological and social consequences. Fear of falling is the loss of self-confidence to ambulate safely that can result in self-imposed functional limitations (Brown, 1999; Clark, Lord, and Webster, 1993). A community-based research study of older adults found that fear of falling existed among falling and nonfalling individuals (Gray-Miceli and Elshinaway, 1997 cited in Lueckenotte, 2000). The prevalence of the fear of falling was reported by Tinetti et al. to be 40-73% for recent fallers versus 20-46% prevalence for non-recent fallers (Tinetti et al., 1994). Fear of falling has been shown to be significantly correlated with increased sway in vision-deprived stance as well as decreased single-stance balance in elders who self-report a fear of falling compared with those who do not self-report fear (Maki, Holliday, and Topper, 1991). Moreover, fear of falling is closely associated with poor functional performance and the incidence of falls (Arfken et al., 1994 cited in Hauer et al., 2001).

The fear of falling can lead to a "vicious cycle" in which apprehension of performing motor tasks leads to a decrease in the total amount of movement the individual makes. From a motor learning perspective, decreased movement does not allow postural movement errors to be made and processed in the cerebellum. As a result, postural skill is lost leading to unsteady posture. Unsteady posture in turn increases the risk of falling (Simmons and Hansen, 1996).

A qualitative study in Hong Kong showed that the elderly who had a fall fell powerlessness or lack of confidence in controlling the fall situation, fear about the

deterioration in physical mobility and thinking about the consequences after a fall, and seeking care that refers to care from relatives and active behavior in seeking care after a fall (Kong et al, 2002).

To summarize, the phenomenon of falls in community-dwelling elders is clearly a significant global health care problems because of its high potential of increasing morbidity, mortality, reduced functioning or disability. Falls can lead to premature nursing home admissions, hospitalization, psychological and social consequences, and financial burden for individual and health care systems.

The best protection against falls is prevention. One aim of fall prevention is the reduction of risk factors to promote the elderly safety. The state of knowledge about fall prevention programs for community-dwelling elders has increased. Over the past several years numerous strategies have been advocated for reducing falls including single factor interventions such as exercise, health education, home modification, or withdrawal of psychotropic medications. Multifactorial interventions has been identified using a combination of approaches such as identifying individuals at high risk, assessment causes and risk factors related to falls, reducing unnecessary medications, providing home-based exercise programs to improve muscle strength, gait/balance, and joint movement exercise. In addition, home modification has been proposed for modifying hazardous environmental surroundings, providing ambulation devices as appropriate, and instituting falls prevention education for teaching elders certain adaptive behaviors to reverse persistent risk and referral system.

To date, over 60 randomized controlled trials (Gillespie et al, 2004), at least 4 meta-analysis (Hill-Westmoreland, Soeken, and Spellbring, 2002; Robertson et al, 2002; Weatherall, 2004; Chang et al., 2004), the Cochrane Database of Systematic

Reviews that examined the evidence for strategies to reduce falls (Gillespie, 2004) among community-dwelling elders, and a meta-analysis of fear of falling treatment programs for the elderly have been published. This evidence reaches broadly similar conclusions but differs in detail.

Typically, exercise programs have been shown to improve both muscle strength and balance and thus, take role in the reduction of risk factors and the prevention of falls and injuries (Gardner et al, 2000; Skelton and Beyer, 2003). Studies have shown that physical training is effective in improving strength and functional performance in older people (Fiatarone et al, 1994; Chandler and Hadley, 1996 cited in Hauer et al, 2001). A systematic review and meta-analysis of 40 randomized clinical trials for the prevention of falls in older adults searched up to 2002, concluded that only exercise program interventions both general physical activities (such as walking, cycling, and aerobic movements) and specific physical activities (training targeted towards balance, gait, and strength such as a Tai Chi training), had a statistically significant beneficial effect on the risk of falls (Chang et al, 2004) Similarly, a meta-analysis of 4 controlled trials to investigate the effect of the home exercise programs in those aged 80 and older concluded that exercise intervention alone was most effective in reducing fall-related injury in those aged 80 and older (Robertson et al, 2002).

Although the exercise varied with respect to the type of exercise used and the intensity, frequency, and duration of the intervention, one study showed a 13% significant reduction in the risk of falling for the interventions that included exercise as a component of the intervention and further a 24% reduction if the exercise

intervention included specific balance and gait activities (Province, Hadley, and Hornbrook, 1995).

Different types of exercise have been studied and found to be effective. These have included Tai Chi (Wolf et al, 1996), balance gait training, and strength building (Lord, Caplan, and Ward, 1993; Judge et al, 1993; Campbell et al, 1999).

Recently, an Eastern form of exercise known as Tai Chi has emerged as a practical exercise intervention. Tai Chi exercise require movements of dynamic weight transition between double-stance and single stance postures, constant exchange between loading of two legs, interchange of role between stabilizers and movers, and coordination between lower-extremity and upper-body movements. The performances of well-controlled Tai Chi exercise may have enhanced to develop balance mechanisms and postural stability in the Tai Chi practitioners (Li et al, 2004). Moreover, Learning Tai Chi exercise might have enhanced the elder's self-efficacy in the ability to perform activities without falling (Taggart, 2000).

The researchers reported that group-based exercises targeting balance can actually improved balance among the elders (Day et al, 2002; Barnett et al, 2003)

In a 15-week group and home-based Tai Chi program of community residing older women at moderate risk for falls, fear of falling was reduced (Wolf et al, 1996). In addition, a study demonstrated that elders receiving a six-month Tai Chi intervention had significantly improvements in multiple measures of balance, physical performance, and fear of falling (Li et al, 2001). In contrast, Tai Chi exercise alone appears less effective in group of older adults who are frail or transitioning into frailty (Wolf et al, 2003).

Schaller (1996) studied a quasi-experimental pretest posttest design of the effect of a Tai Chi exercise program. The 22 - 24 elders from a senior center in experimental and control group were over the age of 55. The 20-Westernizes simplified forms of the Tai Chi exercises were performed 60 minutes, once a week for 10 weeks and practice at home. The average 3 to 4 times per week of Tai Chi exercises at own homes were reported by the experimental group. The results of analysis of covariance, with the pretest scores and the scores from the activity level measure entered as covariates, founded a significant different improvement in the eyes-open portion of the balance test between the groups ($p < .05$).

Robitaille et al. (2005) reported an Tai Chi exercise program consisted of biweekly group based exercise, coupled with home-based exercise at least once a week over the 12-week period, which offered by community organization in natural setting. The result of the study found significantly improved in the one-legged stance and tandem walk measurement. The effect sizes of this study were small to medium ($d = .20 - . 45$).

Cox et al. (2003) controlled comparison of retention and adherence in home VS center-initiated exercise interventions in women ages 40-65 years found that although many seniors report that they prefer to exercise alone - either walking or doing solitary chores like gardening. However, they suggested that exercise classes that offer both instruction and moral support are a good way to jump-start a more active lifestyle. Group-based exercises were more successful with the reasons that group sessions offer social and moral support; group companionship apparently helps keep individual members motivated. In addition, it's easier for the researchers or trainers to individualize an exercise routine and monitor progress when the

participants are attending a class, and it is also easier for exercisers to get immediate feedback on their progressions (Cox et al, 2003). Furthermore, the social relation which occur among the group exercise environment are determinants of subjective well-being in the elders (McAuley et al, 2000).

A systematic review of the efficacy of 7 studies Tai Chi in older adults found that the most effective intervention of Tai Chi is a modified Yang style, varying from 10 to 24 forms. The intensity of Tai Chi varies from 1 hour/ weekly for 10 weeks to 1 hour every morning for 1 year. Because various outcome measures were used, researchers concluded that limited evidence exists for the effect of Tai Chi on reducing risk of falls and improving functional status (Verhagen et al, 2004).

It can be concluded that exercise intervention alone will effective among the elders in select individuals or high risk group. However, the programs reviewed varied in the type of exercises, level of intensity, and duration of exercises. Therefore, there is insufficient evidence at this point, to recommend one particular type of exercise program for reducing risk of falling falls in the community-dwelling elders.

While other strategies, such as education strategies are the cornerstone of fall prevention and management (Lucknotte, 2000). They play an important role in risk reduction strategies to increase older persons' awareness and knowledge of fall risk factors, thereby making them more willing to adopt strategies to modify fall risk factors. Older individuals may consider falling to be a normal part of the aging process; therefore, the gerontology nurse should explore elders' beliefs and misconception about falling. The elders should be educated about the etiology of falling that can be reduced and even prevented by some interventions (Lucknotte, 2000). While, both a meta-analysis and the Cochrane reviews concluded that

education intervention alone is not beneficial in reducing falls in elders (Chang et al, 2004; Gillespie, 2004), a structured group educational program among community-dwelling older people achieved short-term benefit in attitudes and self-efficacy (Tennstedt et al, 1998). However, little evidence indicates whether education programs alone are effective in modifying fall risk factors or are effective in reducing falls or fall-related injuries.

Home modifications alone have been targeted in the several studies, including removing clutter; securing rugs and electrical cords; improving illumination; and installing handrails, grab bars, and nonskid strips. A meta-analysis reported that home modification alone does not result in an appreciable reduction in the risk of falling (Chang et al, 2004). However, the Cochrane reviews showed that home assessment may be effective for people with a history of falls in the previous year, however this intervention needs further research (Gillespie et al, 2004). The evidences suggested that including home modification as part of a fall reduction program is an effective strategy for reducing falls among elderly (Cumming et al, 1999; Hornbrook et al, 1994; Plautz et al, 1996; Thompson, 1996). Successful home modification programs include those with financial and/or manual assistance in completing the modifications. Success and cost effectiveness of environmental strategies are enhanced by targeting those who are ready for change. In addition, readiness for environmental modifications may be linked to having had a recent fall, and/or an increased understanding of the risks and prevention strategies (Pynoos et al, 2003.).

Medications such as benzodiazepine are shown to increase the risk of falling among elders (Campbell et al, 1999). The evidence appears to support psychotropic drug withdrawal as a means to reduce falls but more studies are needed on the

practical application of this strategy (Campbell et al, 1990). Compliance is an important consideration in psychotropic medication withdrawal as it appears difficult for psychotropic drug users to stop, and clinicians may need to consider alternative treatments for anxiety and sleep disorders to enhance compliance. In addition, many participants who had successfully reduced their consumption of psychotropic drugs in the trial returned later to prior medication patterns (Gillespie et al, 2004). This area remains a challenge to further study.

Many studies showed that single component interventions are less effective than combined strategies. Hill-Westmoreland, Soeken, and Spellbring (2002) showed that the 12 studies included in the meta-analysis for exercise-focus interventions had an effect size of only 0.220; meanwhile exercise and risk modification intervention had an effect size of 0.687 (Hill-Westmoreland, Soeken, and Spellbring, 2002). Furthermore, Chang et al. (2004) conducted a systematic review and meta-analysis of 40 studies to assess four categories of intervention programs to prevent falls including multifactorial fall risk assessment and management program, exercise program, environmental modification program, and educational interventions. They found that a multifactorial fall risk assessment and management program had the most statistically significant beneficial effect on both the risk of falls and monthly rate of falling while the exercise program had a statistically significant beneficial effect only on the risk of falls. In a meta-analysis of 6 studies fear of falling treatment program, found that fear of falling intervention types including exercise and education interventions had an effect size of (0.2487) more than strict exercise interventions alone (0.0236). Environmental modification program and educational interventions were not statistically significant (Chang et al, 2004). In community settings, the

combined strategies in the interventions have been shown to reduce falls (Hill-Westmoreland, Soeken, and Spellbring, 2002).

However, in Thailand the evidence about falls prevention program for community-dwelling elders included only 3 studies (Assuntachai et al., 1999; Pallit, 2001; Pootong, 2002). Assuntachai et al. (1999) conducted a 12 month prospective trial comparing study and control groups for fall prevention in the 1,043 community-dwelling elders who lived around Siriraj hospital. The hospital and community based interventions were clinician assessment, treatment risk factors, providing a fall prevention booklet at the hospital and the same interventions at the community center in the 8^{th} and 10^{th} month. Postcards alone or postcards and telephone follow up was conducted to measure fall incidence every 2 months for 1 year in both groups. The study found that on the 8^{th} and 12^{th} month, as well as the all of the study the experiment group had significantly less the incidence of falls than the control group (Assuntachai et al, 1999).

Pallit (2001) conducted a 12 weeks quasi-experimental study one group pre-test post-test design to assess the effects of the program for the prevention of falling accidents at home in the 50 community-dwelling elders who lived in Amphur Sriprachan, Suphanburi Province. The Health Belief Model was applied to develop the community based intervention consisting of a 2 hours/ 2 weeks x 3 sessions' educational intervention and provision of a handbook of falling accidents prevention. The results indicated that the participants gained in perception of susceptibility, perception of severity of falls, perception of benefits and obstacles to official suggestions on the prevention of falling accidents at home. In addition, prevention behavior, personal practices and changing posture were significantly better than prior

to the program. The researcher suggested increasing the period of study time and family member participation in the program.

Pootong (2002) conducted a 4 weeks pre-experimental study one group pre-test post-test repeated measures design to compare fall prevention behaviors before and after receiving risk reduction program in 30 community-dwelling elders in Rachaburi Province, Thailand. The Pender's Health Promotion model (2002) and The Experience Learning theory (Kolb, 1984) were applied to develop a community based intervention including a 1.5 hours/week x 3 sessions educational intervention. The results indicated that the participants gained in fall prevention behaviors significantly more than before the program. However, fall prevention behaviors after 2 weeks were significantly more visible than of 4 weeks. This researcher also suggested increasing the length of the study and family member participation in the program.

It can be summarized that the evidence for falls prevention programs for community-dwelling in Thailand was limited. All three studies were educational intervention and combined clinician assessment in one study (Assuntachai et al, 1999). In addition, they lacked strong evidence for suggesting best practice in fall prevention in elders due to lack of a control group, different implementations, and outcome assessments, short time period, and samples selection problems, and few family's member participation.

In summary, the previous rigorous evidence of falls prevention programs in community-dwelling elders in other countries conducted by randomized controlled trials, systematic reviews, and meta-analysis, as well as, the studies in Thailand found a significant gap of knowledge. The best evidence on the effectiveness of a fall prevention intervention program in community-dwelling elders is insufficient to make

recommendations for intervention practice or for leading decision-making for health care policy at all levels.

Synthesis of the evidence found that a Fall Prevention Program for community-dwelling elders should combine strategies including fall prevention education sessions and Tai-Chi exercise sessions. These interventions included physical modification, behavioral modification, and environmental safety. To enhance the effectiveness of a Falls Prevention Program, the elders need to be exposed to behavioral changing process, a very complex process. The use of health behavior theory especially the Health Belief Model in the planning and implementation of health promotion programs is recommended (Glanz, Lewis and Rimer, 1997) because it addresses the relationship between a person's belief and his or her behavior (Sapio-Longo, 1999). In addition, adults learn differently from children; therefore using adult learning principles and consideration of normal aging changes are recommended for practice (Sapio-Longo, 1999).

Applying constructs of the Health Belief Model can be valuable. The Health Belief Model (HBM) is a conceptual framework used to understand health behavior changes and possible reasons for health action (Becker and Rosenstock, 1984). It can provide guidelines for a Falls Prevention Program development allowing planners to understand and address reasons for behavior. According to the HBM, people are most likely to make health behavior changes when they perceive that the disease is serious and are less likely to practice healthy behaviors if they believe that the disease is not severe (Maddux and Rogers, 1998; Rosenstock, 1974). The HBM addresses four constructs representing the perceived threat and net benefits: perceived susceptibility of the falls, and perceived severity of the falls, perceived benefits of the recommended

fall prevention behavior, and perceived barriers of the recommended fall risk reduction behavior.

These concepts were purposed as accounting for people's "readiness to act". An added concept, cues to action, would activate that readiness and stimulate overt fall prevention behavior. A recent addition to the HBM is the concept of self-efficacy, one's confidence in the ability to successfully performance of daily activities and confidence in balance abilities (Strecher and Rosenstock, 1997).

For adult learning principles, Knowles' four principles recognize that 1) adults need to be involved in the planning and evaluation of their instruction 2) experience (including mistakes) provides the basis for learning activities 3) adults are most interested in learning about subjects that have immediate relevance to their job or personal life 4) adult learning is problem-centered rather than content-oriented (Knowles, 1970). Some general considerations for normal aging changes, such as decrease of visual and auditory acuity; decrease in musculoskeletal agility, reaction time, and support system (Sapio-Longo, 1999), which should be applied in strategies for a Falls Prevention Program.

The professional responsibility of nurses is centered on providing high quality nursing interventions to address important clinical problems and to produce positive health outcomes. This accountability requires the development of interventions to enhance understanding of individual patients and to guide decision-making in clinical practice (Sidani and Braden 1998 cited in Whittemore and Grey, 2002). Nurses are major providers of health promotion, health education, and diseases prevention program in the world today (Lee et al, 2003) and nurses play a unique and important

role in motivating and assisting patient's healthy behavior changes (Whitlock et al, 2002). Especially, in gerontological nursing practice, nurses can play a key role in the development of integrated services that promote continued independence.

Normally, the health care service for community-dwelling elders in Thailand is provided by public health nurses in community care. Community primary prevention interventions involve home visits for home health education in general and specific health practice, and short term health promotion campaignes. However, a national survey revealed that the most (64%) of the community-dwelling elders can not access the basic health service such as health promotion service for annual health check up (Office of Welfare Promotion, Protection and Empowerment of Vulnerable Groups: Ministry of Social Development and Human Security, 2004).

Therefore, research to discover effective programs for preventing falls in Thai community-dwelling elders is clearly within the independent realm of nursing practice. Nurses can help the elderly to reduce risk of falling by conducting fall risk assessments and designing targeted, a prevention program to reduce the risk of falling interventions. Furthermore, the label "unintentional injury risk: falls" clearly states the problem and is recommended to replace the NANDA diagnosis, which is further substantiated by research that identifies the risk factors, interventions, and outcomes (Schoenfelder et al, 1999).

Research about the effects of a Fall Prevention Program of Thai community-dwelling elder is aimed at improving gait and balance in community-dwelling elders. An effective falls prevention program is one critical way to enhance the quality of life for the elders in Thailand and worldwide.

Purpose of the Study

The purpose of the study was to examine the effect of a Fall Prevention Program on gait and balance in community-dwelling elders.

Research Question

The research question of this study is:

Are there significant differences of gait and balance between the intervention group of community-dwelling elders with the control group before and after the program?

Research Hypothesis and Rational

Fall in community-dwelling elder is clearly a significant impacts the health problems and health care delivery system. Fall generally results from an interaction of multiple and diverse risk factors and situations. Providing a Fall Prevention Program including falls prevention education sessions and Tai-Chi group exercise sessions which apply on the constructs of the Health Belief Model, Adult Learning Principles, and considerations of normal aging changes will increase elder's perceived susceptibility, perceived severity of the falls, perceived benefits of fall prevention behavior, perceived cue to a fall prevention behavior, perceived self-efficacy on fall prevention behavior and decrease elder's perceived barriers of practicing a falls prevention behavior and readiness to make fall prevention behavior and Tai-Chi exercise behavior for improving their gait and balance.

The hypotheses to be explored in this study were as follows:

1. The elders who participate in a Fall Prevention Program will have significantly improved gait and balance than ones who do not participate in the program.

2. The elders who participate in a Fall Prevention Program will significantly different their gait and balance before and after the program.

Scope of the Study

1. The design of this study is a Quasi-experimental design, pretest-posttest control group (Shadish, Cook and Campbell, 2002; Burns and Grove, 2001). The design is used for determine the effect of a Fall Prevention Program on gait and balance of community-dwelling elders before and the 8th week after the program.

2. Eligible populations in this study are the elders who have experiences at least one fall in the 12 months prior to participating in the study.

3. The sample in this study are the elders who have experiences at least one fall in the 12 months prior to participating in the study, willing to participate in the study, and meet the inclusion criteria.

4. Research Variables

Independent variable is a Fall Prevention Program including falls prevention education sessions and Tai-Chi group exercise sessions.

Dependent variables are scores of gait (Time up and go test) and balance scale (Berg Balance Scale).

Operational Definition

Fall means a sudden event which result in a person change in body position in a downward direction on the ground or other lower level coming to rest unintentionally, not as a result of a major intrinsic event (such as stroke or syncope) or overwhelming hazard which may or may not result in a physical injury.

A Fall Prevention Program for community-dwelling elderly means the 8-weeks systematic activities which aimed at to improve gait and balance of the elders who live their home in community by the researcher. The program is constructed by applying the Health Belief model, Knowles' adult learning principle, and considerations for normal aging changes. The program includes:

- Falls Prevention Education sessions means inform and explain knowledge about falls and a Fall Prevention Program for the elders follow "A Fall Prevention Program Manual" in a 4-day sessions, typically 1-1.30 hours in each length which including contents of risk of falling, recent statistics of fall and fall-related injury, the concept of fall, risk of fall, and fall-related injury, and invite participants to share their fall experiences. Providing the strategies for fall prevention behavior including fall risk reduction knowledge, medications use knowledge, home modification knowledge, and changing position skill practices.

- Tai Chi Group Exercise Sessions means providing Tai-Chi exercise benefit knowledge and the 18 forms Tai chi training, guidance, and positive reinforcement follow "A Tai-Chi exercise manual". Begin with group training sessions 30-45 minutes x 8 days continuously and then is expected to group exercise 30-45 minutes x 3 days per week though a 8-week of intervention.

Gait means ability of the individual to perform manner of walking or stepping while moving in daily tasks**.** Gait can be assessed by the Timed Up and Go test (Podsiadlo and Richardson, 1991). which measures the speed at which someone rises from a standard chair, walks 3 meters, turns around, walks back and sits in the chair again.

Balance means ability of the individual to perform maintains the body's center of mass over its base of support. Balance can be assessed by the Berg Balance Scale (Berg et al., 1989) which tests a patient's ability to safely perform several common daily living tasks.

Community - Dwelling elders means those with have completed 60 years of age and living in their homes in community setting.

Expected Benefits

1. Providing the evidence the effect of a Fall Prevention Program on gait and balance of community-dwelling elders.

2. To make recommendations or nursing guideline for a fall prevention intervention practice or for leading decision making health care policies for fall prevention in community-dwelling elders.

3. Providing the guideline for further studying a fall prevention program in community-dwelling elders at all level.

CHAPTER II

LITERATURE REVIEW

The study about the effect of a Fall Prevention Program on gait and balance of community-dwelling elders in this study, aims at to improve gait and balance of a community- dwelling elders by performing sessions fall prevention education and Tai Chi exercise program. The review literature provides to relate:

1. Falls in community- dwelling elders:
    - The concept of fall
    - Definition of fall
    - Effect on fall
    - Risk factors associating with falls
2. The Health Belief Model
3. Adult learning principles
4. Age–related change for older adult learning consideration
5. The effect of fall prevention programs:
    - The effect of the single factor fall prevention programs
    - The effect of the combined strategies fall prevention programs
    - Developing a Fall Prevention Program
6. The effect of a Fall Prevention Program

Falls in community - dwelling elders

Fall incidence varies among settings, population, and time. According to one study, 30% - 50% of generally healthy elderly persons over the age of 65 living in the community report having fallen over a one-year period (Rubenstein and Josephson, 1996). Studies in Thailand have found the incidence of falls in the community are very varies in 18.7% within 6 months (Jitapunkul et al., 1998), 12.1% in male and 24.1% in female (Assuntachai et al., 1999), 17.03, 19-20, and 42.7% (Hanjangsit, 1994; Yompuk, 1997; Treeyawuttiwat, 1991).

The concept of fall: Definition of fall

A fall in a broad sense is a concept that holds negative meaning, as it is associated with a decline, drop, or descent to a lower level (Lueckenotte, 2000: 234). A fall was defined as landing on the floor or the ground unintentionally (O'Loughlin et al, cited in Miller, Speechley, and Deathe, 2001) and as any involuntary (no intention) change from a position of bipedal (2 feet) support (standing, walking, bending, reaching, ect.) to a position of no longer being supported by both feet, accompanied by (partial or full) contact with the ground or floor (Means et al, 1996)

Tinetti et al. (1988) defined fall as an event which results in a person coming to rest unintentionally on the ground or other lower level, not as a result of a major intrinsic event (such as stroke) or overwhelming hazard (Tinetti et al. 1988).

Importantly, using a narrow definition which excluded stumbles can alter the main result message from research studies (Wolf et al., 1996).

One study in Thailand, Pallit (2000) defined fall as an unintentional event which results in a person's loss of body balance and coming to rest on the ground or other lower level, caused by a stumble, slip, or fall from stairs, chairs or beds. Assantachai (1997) defined a fall as a loss of body balance while standing or walking which results in a part of body excluded both feet touch on the ground. This diversity in definitions makes it difficult to compare studies. Another problem is poor recall of falls by many subjects. One review (Cummings, Nevitt, and Kidd, 1988) found that compared to prospective studies, retrospective studies underestimate the incidence of falls by 13 – 32% depending on the time period of recall.

For the purpose of this study, fall is defined as a sudden event which results in a person's change in body position in a downward direction to the ground or other lower level, coming to rest unintentionally, which may or may not result in a physical injury and that is not the result of a major intrinsic event (such as stoke, syncope) or overwhelming hazard.

Effect on fall

For elders who fall and are unable to get up on their own, the period of time spent immobile often affects health outcomes. Breakdown of muscle, dehydration, pressure sores, hypothermia and pneumonia are other complications that may occur. Approximately 5% of older people who fell require hospitalization (Rubenstein, Kenny, Eccles, Tinetti, & the AGS/BGS/AAOS Panel on Fall Prevention, 2003).

Even 2 months after a fall, up to 40 % of elders with minor injurious falls (bumps and bruises) report continued pain or activity restriction, and 40% of these individuals continue to complain of pain for up to 7 months after a fall.

Fall-related injuries in older adults often reduce mobility and independence, and are often serious enough to result in a hospitalization and an increased risk of premature death (Alexander, Rivara, and Wolf, 1992). Li et al. (2005) reported moderated injurious falls as bruises, sprains, scrapes on the hands, elbows, knees, or legs; severe injurious falls as fracture or broken ribs. Falls can also have psychological and social consequences. Individuals tend to change their poster when they are fear of falling, and this actually increases falls (Ebersole and Hess, 2001).

Fall in community-dwelling elder is clearly a significant global health care problems including Thailand because of its high potential of increasing morbidity, mortality, reduced functioning or disability, premature nursing home admissions, lead to hospitalization, psychological and social consequences, and financial burden for individual and health care systems.

Risk factors associating with fall

Falls generally result from an interaction of multiple, diverse risk factors, and situations, which can be modified by age, disease, and the presence of hazards in the environment (Fleming and Pendergast, 1993). Risk factors for falling can be classified as either intrinsic (lower extremity weakness, poor grip strength, balance disorders, functional and cognitive impairment, visual deficits) or extrinsic (polypharmacy: four or more prescription medications) and environmental factors such as poor lighting,

loose carpets, and lack of bathroom safety equipment. (American Geriatrics Society, British Geriatrics Society, and American Academy of Orthopaedic Surgeons Panel on Falls Prevention, 2001).

Research has identified over 400 potential risk factors for falling (Nuffield Institute for Health, University of Leeds and NHS center for Reviews and Disseminations, 1996 cited in Masud and Morris, 2001). However, A summary of 16 controlled trials revealed that the most significant individual risk factors for falls in both community-dwelling and institutional-dwelling older people in western countries included weakness (11significant/ 11total), balance deficits (9/9), limitation in mobility (9/9), gait deficits (8/9), visual deficits (5/9), impaired Activity Daily Living (ADL) (5/9), cognitive impairment (4/8), and postural hypotension (2/7) (Rubenstein and Josephson, 2002).

Similar to other countries, studies in Thailand have found that the risk factors for falls in elderly vary. A study of 1,043 older people in communities, Assantachai, et al.(1997) found that risk factors most commonly associated with falls include female gender, hypertension, hearing loss, memory loss, low perceived health status, decreased activity in daily living, kyphoscoliosis, use of eye-glasses, high pulse rate in the sitting position, and malnutrition (lower lean body mass and lower serum albumin). For male elderly living in the community, the most common risk factors associated with falls include: low perceived health status, hypertension, difficulty walking in the home, difficulty sitting, and the absence of electricity in the home (Jitapunkul, 1998). For female elderly living in the community, the most common risk factors for falls include: low perceived health status, joint disease, an illness influencing activities within the previous year, difficulty sitting, going to the market

everyday, loneliness, less than 3 meals a day, absence of electricity in the home, and living in a traditional Thai style home or a hut.

In a study of 417 members of an elderly club in Bangkok (Jitmontri, et al., 1998) risk factors for falls were organized under two categories: 1) basic conditioning factors, including female gender (71.2%), single status (52.4%), and improper dressed; and 2) home environment factors, including improper house ladder, lights insufficient at ladder, clutter, and ragged carpet/door mat.

Lausawatchaikul (2000) studied 130 community-dwelling elders who came to the emergency room and orthopedic out-patients department at Ramathibodi hospital in Bangkok for examination or follow up after falls. Most of the participants were female (female: male = 4:1), have more than 1 disease (most common disease was hypertension), were taking some type of sedative (42.7%), have routine medicine administration 69.9% and the most are hypertensive drugs and diuretics. The result showed that the majority of falls took place in and around the patients' homes, in which in the bathroom was the most common location of the incident. The main causes of falls were extrinsic factors, of which slipping (52.8%) was the most frequently reported. Acute leg muscle weakness (42.5%) cause of falls was intrinsic factors.

Themwong, (2000) conducted the Thai Fall Risk Assessment Tool (Thai FRAT) by concluding the risk of falling from 28 studies for selection the same risk at least 5 studies and development instrument. Risk items which had lower 50% of specialists' commitment were excluded. Then she studied by case-control study and logistic regression analysis found that the significant fall risk factors, of the 144

elderly who lived in community and had more than 1 fall in 6-month period, were 6 risk factors including female, vision impairment, imbalance, medications use, previous fall, and lived in a Thai style home. The Thai FRAT had 86% specific and 89% sensitivity (Themwong, 2000).

Furthermore, in 2003, Themwong, et al. assessed effectiveness of Thai FRAT on fall prediction in elderly in community by cohort study in 509 elders who lived in community, Ladkrabung, Bangkok. The study found that Thai FRAT had 86% specific and only 22% sensitivity. The researcher suggested improving the cutting point score and retest this tool before use screening elderly who have risk of fall for participate in fall prevention program (Themwong et al, 2003).

Summarization of evidences regarding the significant fall risk factors in the community-dwelling elders both Thailand and other countries are similarly in terms of intrinsic factors; 1) impairment of gait and balance (Thailand: imbalance 1 significant/ 6 total; other countries: gait deficit 8/9, balance deficit 9/9) 2) limitation in general physical function: cognitive impairment (Thailand: memory loss 1/6; other countries: impairment cognitive 4/8), visual deficit (Thailand: glass using 2/6; other countries: visual deficit 5/9), impaired activity daily living (Thailand: decrease activity daily living 1/6; other countries: impaired activity daily living 5/9), mobility limitation (Thailand: sitting problem 1/6, difficulty walking in home 1/6; other countries: mobility limitation 9/9). On the contrary, some intrinsic factors, Thailand is different from other countries including demographic factors: gender (female 4/6) and previous fall (1/6); the presence of certain chronic condition: hypertension (3/6); and psychological problem: low perceive health status (2/6). Moreover, extrinsic factors and environmental factors between Thailand and other countries are different. In

terms of extrinsic factors: medication use (more than 1 drug 2/6). Environmental factors: home environment (3/6), in contrast, in other countries these factors are not significant.

It can be concluded that the most salient risk factor of fall among intrinsic factors in the community-dwelling elders both Thailand and other countries is impairment of gait and balance due to combined effect of normal age-related changes and concurrent disease (Luecknotte, 2000). Balance is necessary for maintaining a position, remaining stable whilst moving from one position to another, performing activities of daily living, and moving freely in the community (Berg et al. 1992 cited in Nualnetr, 1996). This risk results in a loss of muscle strength and balance, and the body mechanisms responsible for compensation or stability fail (Tideiksarr, 2001). Impaired balance greatly increases the probability for falls, fractures, and functional dependency among older adults.

With increased age, the muscles that are required to maintain balance on one leg is lowered (Bohannon et al, 1984; Iverson et al, 1990; Steinberg, 1998). Standing on one leg induces the centre of gravity and weight line to move closer to the supporting leg (Steinberg, 1998; Mak and Ng, 2003). This causes an asymmetrical and unstable posture, which may result in awkwardness and fatigue, and become a cause of falling (Steinberg, 1998).

The great toe and the forefoot play a very important role in both cutaneous feedback and the muscle activity of the toe in maintaining balance (Tanaka et al, 1996b; Meyer et al, 2004). The tactile sense of the great toe decreases with age (de

Neeling et al, 1994), and elderly people are not able to sufficiently utilize the muscle of the great toe to maintain balance when perturbations occur (Tanaka et al, 1996b).

Impaired balance in the lateral direction is associated with a higher fall risk than impaired anterior–posterior balance (Tanaka et al, 1996b; Islam et al, 2004). Lateral falls are also more associated with hip fractures than falls in other directions (Mak and Ng, 2003; Islam et al, 2004). It has been estimated that between 10% and 25% of all falls are associated with poor balance and gait abnormalities (Nelson and Amin, 1990). This requires the gerontology nurse to observe and analyze older individuals' gait and balance and determine if impairment exists (Luecknotte, 2000).

Several studies have shown that the risk of falling increases dramatically as the number of risk factors increases. Tinetti, Speechley, and Ginter (1988) surveyed community-dwelling elderly persons and reported that the percentage of persons falling increased from 27% for those with no or one risk factor to 78% for those with four or more risk factors. According to Nevitt, Cummings, and Kidd (1989) reported that the percentage of community-living persons with recurrent falls increased from 10% to 69% as the number of risk factors increased from one to four or more. Robbins, Rubenstein, & Josephson, et al (1989) used multivariate analysis to simplify risk factors so that maximum predictive accuracy could be obtained by using only three risk factors (hip weakness, unstable balance, and taking => 4 medications) in an algorithm format. With this model, the predicted 1-year risk of falling ranged from 12% for persons with none of the three risk factors to 100% for persons with all three.

Theoretical Model of a Fall Prevention Program

The development of a Fall Prevention Program was guided by the Health Belief Model (HBM), including the concept of self-efficacy (Strecher and Rosenstock, 1997). The Health Belief model was selected as the intervention's theoretical framework because it provides a framework for identifying and understanding the multiple factors that influence an individual's health related behaviors (Rosenstock 1974). Applying constructs of the Health Belief Model into Fall Prevention Program can be valuable. The Health Belief Model (HBM) is a conceptual framework used to understand health behavior changes and possible reasons for health action (Becker and Rosenstock, 1984). It can provide guidelines for a Fall Prevention Program development allowing planners to understand and address reasons for behavior.

Health Belief Model

The Health Belief model was developed in the 1950s by a group of social psychologists in the U.S. Public Health Service officers (Clark and Becker, 1998) in an effort to explain the wide-spread failure of people to participated in program to preventor to detect disease (Rosenstock, 1960, 1966, 1974 cited in Strecher and Rosenstock, 1997). It is influential and widely used and has been applied to acceptance of preventive screenings, responses to symptoms, and adherence to prescribed medical regimens.

The Health Belief model is a 'value-expectancy' theory, which means that cognitions and perceptions (expectancy) about the value of some health outcomes drive the adoption of the behavior that might influence that outcome (Strecher and Rosenstock, 1997).

Rosenstock, Strecher, and Becker (1988) suggest the need to expand the HBM to include self-efficacy in order to increase its explanatory power. In this enhanced version of the HBM, perceived susceptibility and perceived severity define the threat of a health condition. The perceived benefit of preventive actions, the perceived barriers to taking action and cue to action result in behavioral changes, if personal efficacy is adequate (Stretcher et al, 1986).

The key components of the Health Belief Model

An important key component of the Health Belief Model is the idea of perceived threat, which is the combination of an individual's perception of the severity of a health problem and that of an individual's perceived susceptibility of being affected by a potential health risk. Another key factor affecting health beliefs and behavior is the perception of outcome expectations, which is what a person feels may be the result of some action which is considered either a perceived benefit or a perceived barrier to achieving a desired outcome.'

Details of the key components of the Health Belief Model

Perceived threat of disease

Perceived threat of disease can be defined as the anticipation of harm that is based on the cognitive appraisal of an event or cue that is capable of eliciting the individual's stress response (Carpenter, 2005). According to the HBM (Rosenstock, Strecher and Becker 1988; Horne and Weinman 1998), health behavior is a function of an individual's personal beliefs about the perceived threat of a disease and an assessment of the risks/ benefits of the recommended course of action. The HBM makes the following prediction: the likelihood of an action is increased if the perceived threat of the disease is high, and if the benefits of behavior outweigh the barriers to the desired behavior. Moreover, the HBM that decides to undertake a health-seeking behavior will take action to avoid disease if the individual is psychologically ready to take action relative to the particular threat (Rosenstock, 1974; Becker, 1974; Janz and Becker, 1984).

The perceived threat of disease is made of two components: the perceived severity and the susceptibility to an adverse outcome.

Perceived severity

Perceived severity is when the individual believes that the occurrence of the disease or condition would have at least a moderate to severe affect on some component of the individual life or on the well-being of the individuals. The outcome should be considered from the point of view of the burden that the disease or condition would create.

Perceived susceptibility

Perceived susceptibility is when the individual believes that he or she is personally susceptible (Rosenstock, 1974). It is the situation where each person perceives how likely it is that a condition or disease would negatively affect their own or their family's health. The assumption is that there is a continuum of interpersonal variation in perceptions of susceptibility. Readiness is influenced by the extent to which a person feels susceptible and that person regards the condition as having potentially serious consequences.

Perceived outcome of expectation

Perceived outcome of expectation is what persons feel will be gained benefits from behavioral changes or will feel a negative impact from the barriers of such behavioral changes. The individuals believe that the actions will reduce susceptibility to or severity from the condition should it occur. Perceived outcome of expectation is examined as perceived benefits and perceived barriers to performing a protective behavior.

Perceived benefit

Perceived benefit is when the individual believes that taking a particular action will in fact be beneficial by reducing his or her susceptibility to the condition.

Strecher and Rosenstock (1997) stated that although acceptance of personal susceptibility to a condition also believed to be serious (that is, susceptibility to a perceived threat) produces a force leading to behavior, the particular course of action taken will depend upon beliefs regarding the effectiveness of the various available

actions in reducing the disease threat, termed the perceived benefits of taking health action.

Perceived barrier

The potentially negative aspects of a particular health action the perceived barpiers, may act as impediments to undertaking the recommended behavior. A kind of nonconscious cost-benefit analysis occurs, wherein the indiviual weights the action's expected effectiveness against perceptions that it may be expensive, dangerous (having negative side effects or iatrogenic outcomes), unpleasant (painful dificult, or upsetting), inconvenient, time consuming, and so forth. Thus, "the combined levels of susceptibility and severity the energy or force to act and the perception of benefits (less barriers) a preferred path of action" (Rosenstock, 1974 cited in Strecher and Rosenstock, 1997)

Perceived Cues to action

Perceived Cues to action are when the individual believes that a cue to appropriate action appears to be essential. These cues are prompt which influences a person to initiate step toward the completion of a recommended behavior change or action for introducing a protective behavior. In addition, cues to action found externally such as the mass media, advice from others, observed illness in others, demographic, socio-psychological variables such as personality, social class, peer and reference-group pressure, health motivation, confidence, and structural variables act as modifying factors that affect perception and indirectly influence a person's tendency to act (Pielak and Hilton, 2003).

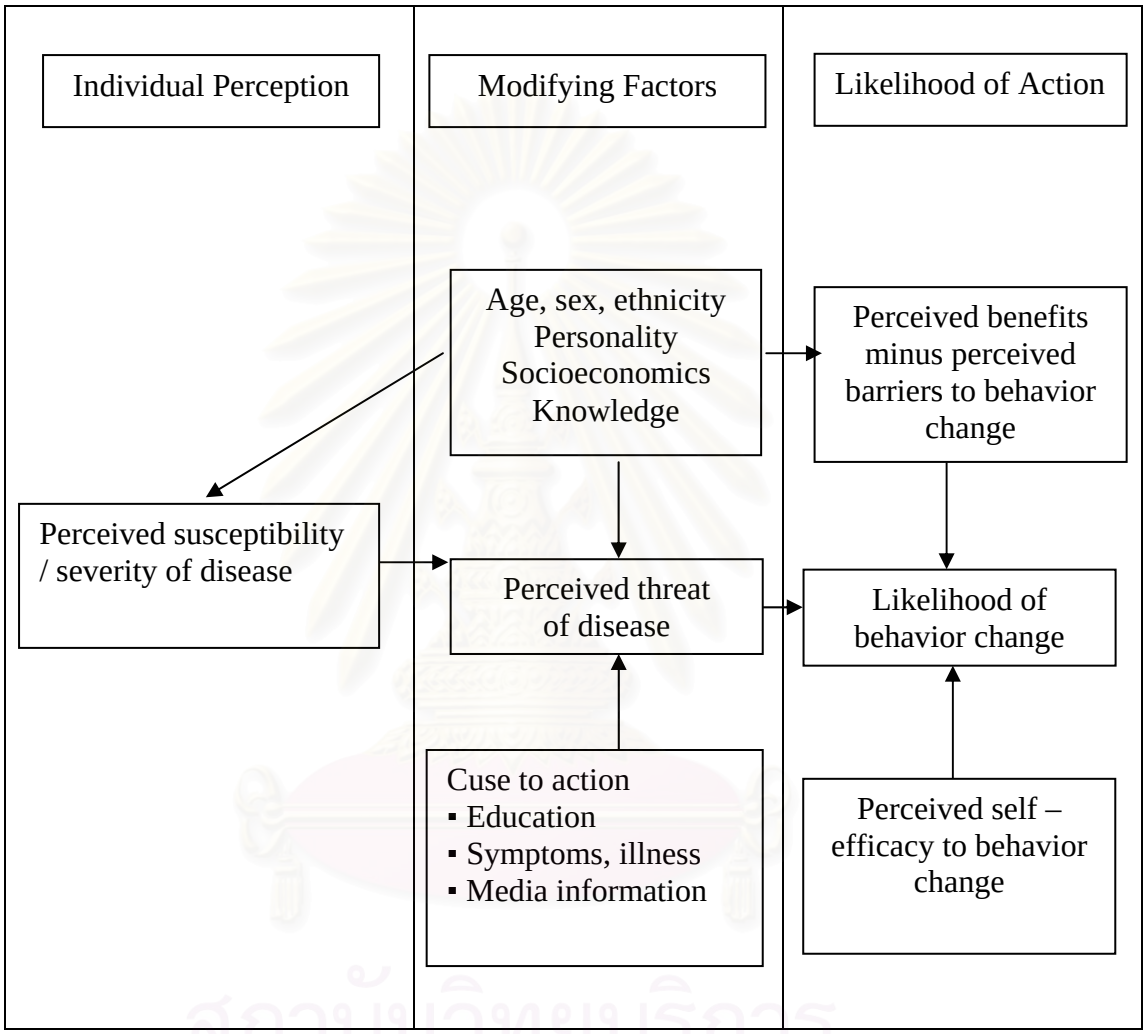
Percieved self-efficacy

Percieved self-efficacy refers to the person's belief in his or her ability to carry out an action. For a change in health behavior to take place, it is essential to regain a feeling of competence. In 1977, Bandura introduced the concept of self-efficacy, or efficacy expectation, as distinct from outcome expectation which we believe must be to the HBM in order to increase its explanatory power (Rosenstock, Strecher, and Becker, 1988). Outcome expectation, defined as a person's estimate that a given behavior will lead to certain outcomes, is quite similar to the HBM concept of perceived benefits. Self-efficacy is defined as "the conviction that one can successfully execute the behavior required to produce the outcomes" (Bandura, 1977a). We view lack of efficacy as a perceived barrier to taking a recommended health action.

Table 1 Key concepts and definitions of the Health Belief Model (Strecher and Rosenstock, 1997).

Concept	Definition	Application
Perceived susceptibility	One's opinion of chances of getting a condition.	Define population (s) at risk, risk levels. Personalize risk based on a person's characteristics or behavior. Make perceived susceptibility more consistent with individual's actual risk.
Perceived severity	One's opinion of how serious a condition and its sequelae are.	Specify consequences of the risk and the condition.
Perceived benefits	One's opinion of the efficacy of the advised action to reduce risk or seriousness of impact.	Define action to take: how, where, when; ciarify the positive effects to be expected.
Perceived barriers	One's opinion of the tangible and psychological costs of the advised action.	Identify and reduce perceived barriers through reassurance, correction of misinformation, incentives, assistance.
Cues to action	Strategies to activate one's "readiness."	Provide how-to information, promote awareness, employ reminder systems.
Self efficacy	One's confidence in one's ability to take action.	Provide training, guidance in performing action. Use progressive goal setting. Give verbal reinforcement. Demonstrate desired behaviors. Reduce anxiety.

Figure 1 The Health belief model components and their linkaged are summarized in (Appied from Strecher and Rosenstock, 1997).



Summary of Theoretical Model of a Fall Prevention Program

The Health Belief Model used for a Fall Prevention Program provides a theoretical framework for intervention which means that the likelihood of this is because the program is as a used means to promote physical balance. The reasons are that people perceive themselves as being “susceptible to a fall, they perceive the consequences of a fall as very severe, they perceive protective action as very effective, they see few costs or barriers to practice following this program, they have a cue to action, for example, a family member supporting, and they have self-efficacy in falls prevention behavioral practice and the practice of Tai-Chi exercises. The results are that, participants who participate in this program can improve their gait and balance, and are enabled to prevent themselves from falls.

Adult learning principles

For adult learning principles, Knowles' four principles recognize that 1) adults need to be involved in the planning and evaluation of their instruction 2) experience (including mistakes) provides the basis for learning activities 3) adults are most interested in learning about subjects that have immediate relevance to their job or personal life 4) adult learning is problem-centered rather than content-oriented (Knowles, 1970).

Malcolm Knowles proposed assumptions underlying andragogy describe the adult learner as someone who needs to know why they need to learn something before undertaking to learn it, need to be responsible for their own decisions and to be treated

as capable of self-direction, have a variety of experiences of life which represent the richest resource for learning. These experiences are however imbued with bias and presupposition, ready to learn those things they need to know in order to cope effectively with life situations, and motivated to learn to the extent that they perceive that it will help them perform tasks they confront in their life situations (Knowles, 1978 cited in Atherton, 2003). In focusing on the notion of informal education, Malcolm Knowles was pointing to the 'friendly and informal climate' in many adult learning situations, the flexibility of the process, the use of experience, and the enthusiasm and commitment of participants (including the teachers).

Age–related change for older adult learning consideration

As one ages chronologically, not only are physical changes taking place such as reduced vision and hearing ability, but other age related factors can impact cognitive function well. Some general considerations for normal aging changes, such as decrease of visual and auditory acuity; decrease in musculoskeletal agility, reaction time, and support system (Sapio-Longo, 1999). The decline was that of speed of learning, not intellectual power, and that even this was minimized by continual use of the intellect (Knowles, 1980). These changes in older adults should be applied in strategies for a Fall Prevention Program.

The effect of fall prevention programs

The state of knowledge about fall prevention program for community - dwelling elders have shown several of results. Numerous strategies have been advocated for reducing falls including single factor intervention and their multifactorial interventions.

The Effect of the Single Strategy Fall Prevention Programs

Home Modifications

The home environment has been identified to have a number of hazards associated with falls in older people. Home modifications targeted in the studies included removing clutter; securing rugs and electrical cords; improving illumination; and installing handrails, grab bars, and nonskid strips. The studies by Plautz et al. (1996) that used a pre-post test design, intervention strategies included individuals going into seniors' homes to conduct environmental assessments and making the necessary repair or modification. The cost of the modification was either subsidized or free-of-charge. The result found that a 60% reduction in falls from pre-intervention to post-intervention. In similarly study by Thompson (1996), reported that a 58% reduction falls after intervention.

Although the major focus of the four programs was home hazard modification, three of the programs contained additional components. Plautz et al. (1996) included counseling and information about risk factors due to home hazards. Hornbrook et al. (1994) included a safety booklet that identified common home hazards and classes to

learn about environmental, behavioral, and physical risk factors, and Cumming et al. (1999) included an occupational therapist assessment.

Thus, it can not be concluded that home assessment and modification by themselves can reduce falling. Furthermore, a meta-analysis reported that home modification alone does not result in an appreciable reduction in the risk of falling (Chang et al, 2004). However, the Cochrane reviews showed that home assessment may be effective for people with a history of falls in the previous year, but needs more research (Gillespie et al, 2004). The evidence suggests that including home modification as part of a multifactorial program is an effective strategy for reducing falls among elderly (Cumming et al, 1999; Hornbrook et al, 1994; Plautz et al, 1996; Thompson, 1996).

Medications Strategies

The literature presents perspective regarding behavioral change around medication use for reducing or eliminating the use of medication associated with an increased risk of falling. One strategy is asking the doctor to review all their medicines (both prescription and over the counter) to reduce side effects and interactions. The class of drugs linked to an increased risk of falling among seniors is benzodiazepines (Campbell et al, 1999).

A study focused on reducing psychotropic drug use as a method for reducing falls. In double-blind, randomized controlled trial by Campbell et al. (1999), patients who were taking psychotropic medication were assigned to one of four groups, psychotropic medication withdrawal plus a moderate intensity home exercise program, psychotropic medication withdrawal only, home exercise program only, or

no change in psychotropic drug medication and no exercise program. After controlling for a history of falls in the previous year and the total number of medications taken, the relative hazard for falls in the medication withdrawal group was significantly reduced (by 66%) compared to the non-withdrawal group. The evidence appears to support psychotropic drug withdrawal as a means to reduce falls but more studies are needed on the practical application of this strategy (Campbell et al, 1990).

Exercise Program

Typically, exercise programs have been shown to improve both muscle strength and balance and, thus, reduce the risk of falls in elders (Gardner et al, 2000; Skelton and Beyer, 2003). There are studies were located that utilized only exercise as an intervention strategy, showed a positive effect used a randomized control design, but differed in the type of exercise program offered. (Wolf et al, 1996; Buchner et al, 1997; Campbell et al, 1997,) and two did not (Reinsch et al, 1992; Ebrahim et al, 1997).

Murphy et al. (2005) investigated a pilot study in the United States, one group pretest –posttest design in 15 subjects with a mean age group of 68 years, who had completed an 8-week osteoporesis prevention and education program. Throughout a 12-week of Yang style 5 forms Tai Chi., subject attended two weekly Tai Chi exercise sessions (60-90 minutes each) and completed one additional practice session on their own at home. A Tai Chi instruction video was given to all participants to facilitate their home practice throughout the 12- week. The preliminary results revealed that there were significance improvement for single-limb stance time on the

right and left leg (p=.017, .000), Time up and Go test (p=.000), and repeated chair stands (p=.000). However the Activities-specific Balance Confidence (ABC) scale was not significant between the baseline and 12-week outcome.

Wolf et al. (1996) demonstrated that Tai Chi training completed two times per week for fifteen weeks served to reduce falls by 47.5% among seniors 70 years and older compared to a discussion-only group. While weekly computerized balance training over the same time period did not produce a reduction in falls.

Schaller (1996) studied a quasi-experimental pretest postest design of the effect of a Tai Chi exercise program. The 22 - 24 elders from a senior center in experimental and control group were over the age of 55. The 20-Westernizes simplified forms of the Tai Chi exercises were performed 60 minutes, once a week for 10 weeks and practice at home. The everage 3 to 4 times per week of Tai Chi exercises at own homes were reported by the experimental group. The results showed that analysis of covariance, with the pretest scores and the scores from the activity level measure entered as covarites, founded a significant different improvement in the eyes-open portion of the balance test between the groups ($p < .05$).

Buchner et al. (1997) introduced a program designed to increase seniors' strength and endurance. Their exercise program entailed having participants ride stationary bicycles and use weight machines three times per week over six months. Participants received training in either strength or endurance, or a combination of these. Compared to a non-exercising control group, participants in the three exercise groups combined were less likely to have fallen at least once over the one year follow-up (60% in the control group versus 42% in the exercise group).

Ross et al. (1999) evaluated a pilot study the effects of s short–term Tai Chi exercise program in 11 elders who aged 68-92 years. The Tai Chi classes took place three times each week for a 8-week including 18 classes of Tai Chi (unspecified style). The result of the study found that the balance (the single-leg stance test), flexibility (giniometer measurements), and sway (length of time walking a line) had no significant different in mean scores between pretest and posttest. However, when pre and posttest scores odf balance, flexibility, and sway on each individual were compared, six participants had significant improvement (p=.05). The researcher recommended increasing in the number of weeks of the Tai Chi classes to 12 weeks or longer.

Robitaille et al. (2005) reported a “Stand up: a fall prevention program developed for elders who had history of falls or were worried about their balance. The main component of intervention consisted of biweekly group based exercise sessions, coupled with home-based exercise at least once a week over the 12-week period, which offered by community organization in natural setting. The exercises included movements derived from Tai Chi and leg-strengthening exercise with elastic bands of varying thickness. The result of the study found significantly improved in the one-legged stance and tandom walk measurement. The effect sizes of this study were small to medium (d = .20 & - . 45).

In the meta-analysis seven of the FICSIT program of RCTs in the United States (Province et al, 1995), all of these trials measured the effect of the intervention on the rate of falls. Two took place in nursing homes and five were community-based. All the interventions included an exercise component for 10-36 weeks, some studies combined with other interventions, and follow up lasted 2-4 years. Although only

three of the seven individual trials showed significant reduction, pooling the results of these studies showed, overall, that people assigned to an exercise group had an estimated 10% lower risk of falling than controls and a balance training only intervention showed a reduction in the risk of falling of 25%. In one trial people offered the balancing exercise Tai Chi, had a 37% lower risk of falling than the non-intervention group. However, some of the interventions contained non-exercise components, making it difficult to separate the effects of exercise from the other activities.

The Panel of a joint UK-US clinical practice guideline for reducing falls among their older people, identified a number of key findings in exercise intervention alone: the evidence is strongest for balance training and successful programs have consistently been over ten weeks' duration. However, the Panel was unable to determine which configuration of exercise program to recommend (Rubenstein et al, 2003).

Benefit of Tai Chi Exercise

Gait improvement using Tai Chi is related to better balance, decreased pain and mental impairment, in addition to the manner in which people perform gait as a result of the slow, coordinated movements of the body and breathe while being mindfully alert. Mobility improvement probably is associated with more effective gait (Roberts, 1999) and increased awareness of the body in relation to the environment. Extra attention is paid to posture or alignment and movement, in particular the placement of the feet; the head is held upright with the eyes open while moving the body intentionally in the direction of the movement. Older adults and those with

chronic illnesses can practice this form safely (Fei 2001). The exercise intensity of performing Tai Chi is similar in intensity to brisk walking (Ainsworth et al, 2000).

Schools of nursing at the University of Arkansas for Medical Sciences, are designing innovative experiences that nursing students participate with older adults in a Tai Chi class during their clinical rotation. The class is held at the community center in a rural community. Students can use their skills, examine outcomes, provide a needed service within the community, and engage in a self-care activity. Students have found that any physical limitations observed or experienced during the class can be addressed immediately after the class, which lead them to consider what is needed to promote functional maintenance or restoration in the aging body (Schafer, 2006)

It can be concluded that exercise intervention alone will effective among the elder but only in select individuals or high risk group and varies in outcome measurements including monthly rate of falling, risk of falls, and fall-related injury. Several studies showed that Tai Chi exercise can improve gait and balance and can prevent falls in the elders. However, the programs reviewed remain unclear in the optimal type, duration, and intensity of Tai Chi exercises for falls prevention. Therefore, there is insufficient evidence at this point, to recommend one particular type of Tai Chi exercise program for reducing falls in the community-dwelling elders.

Education Strategies

Education strategies may play an important role in risk reduction strategies to increase elderly' awareness and knowledge of fall risk factors, thereby making them more willing to adopt strategies to modify fall risk factors. There were studies that tested educational strategies (Abreu et al, 1998, Alkalay, Alcalay, and Sherry, 1984, Ryan and Spellbring, 1996, Schonefelder and Van Why, 1997). Most interventions included a lecture component, time for questions and discussion, and the distribution of print materials. All four studies used group education sessions. Abreu et al. (1998) also compared conveying the information through both group and home visits. Alkalay, Alcalay and Sherry (1984) included individual sessions with family physicians and nurses that addressed the importance of reducing non-essential drug intake, especially tranquilizers and sleeping pills.

Three of the four studies delivered the information in a single session, typically 1 to 1½ hours in length (Abreu et al, 1998, Alkalay, Alcalay and Sherry, 1984, Ryan and Spellbring, 1996) and one study (Schonefelder and Van Why, 1997) delivered the information over three sessions. Alkalay, Alcalay and Sherry (1984) indicated a drop from 24.3% for falls in the six months prior to the intervention to 6.8% for falls in the six months following the intervention.

However, both a meta-analysis and the Cochrane reviews concluded that education intervention alone is not beneficial in reducing falls in elderly (Chang et al, 2004; Gillespie et al, 2004). Thus, there is little evidence whether or not education program alone is effective in modifying fall risk factors or are effective in reducing falls or fall-related injuries.

The Combined Strategies Fall Prevention Programs

The combined strategies or multifactorial falls prevention program consists of a combination of approaches such as identifying individuals at high risk, assessment causes and risk factors related to falls, reducing unnecessary medications, providing home-based exercise programs to improve muscle strength, gait/balance, and joint movement exercise, modifying hazardous environmental surroundings, providing ambulation devices as appropriate, and teaching elders certain adaptive behaviors to reverse persistent risk.

Among current randomized clinical trials of community – dwelling elders, the elements of the combined strategies intervention included medical assessment, educational programs, self–management programs, home environment modifications, advice about medication use (with or without subsequent modification of medication), exercise and management of cardiovascular disorders (such as postural hypotension and carotid sinus syndrome) (Campbell et al, 1999; Close et al, 1999; Coleman et al, 1999; Gallagher and Brunt. 1996; Hornbook et al, 1994; Steinberg, Cartwright, and Peel, 2000; Steven et al, 1992; Tinetti et al, 1994; Tinetti, Mcavay, and Claus, 1996; Vetter, lewis, and Ford, 1992; Wagner, LaCroix, and Grothaus, 1994).

The studies included reduction in the number and dosages of prescribed medications were associated with benefit (Campbell et al, 1999; Close et al, 1999; Tinetti et al, 1994) while the studies included medication review without subsequent direct effort to modify medication was of no benefit (Coleman et al, 1999; Gallagher and Brunt 1996; Vetter, lewis, and Ford, 1992)

The studies included exercise programs were associated with benefit in all the three studies (Campbell et al, 1999; Steinberg, Cartwright, and Peel, 2000; Tinetti et al, 1994). However, staff education programs (Coleman et al, 1999) and self – management programs were not benefit (Coleman et al, 1999; Gallagher and Brunt 1996; Hornbook et al, 1994; Steinberg, Cartwright, and Peel, 2000; Vetter, lewis, and Ford, 1992). Advice alone about fall risk factor modification (without measures to implement recommended changes) was of benefit in three (Close et al, 1999; Steinberg, Cartwright, and Peel, 2000; Wagner, LaCroix, and Grothaus, 1994) and of no benefit in two studies (Gallagher and Brunt. 1996; Hornbook et al, 1994).

A randomized controlled trial by Tinetti et al. (1994), nurse practitioners and a physical therapist conducted in-home baseline assessments of physical, behavioral and environmental risk factors for falling. Based on these assessments, participants received three months of interventions including recommendations to reduce hypotension, education about sedative-hypnotic agents, review of medications with a primary physician, training in transfer skills in the bathroom, alterations to bathroom equipment, removal of home hazards and installation of safety devices, gait training and use of assistive devices, and exercises for balance and strength. After the intervention phase, staff phoned participants monthly for the following three months to monitor overall, and adherence to the exercise program was monitored weekly by the physical therapist. Participants who received an intervention differed significantly in the time of their first fall, in the number of people who fell (35% of the intervention group versus 47% of the control group), and in total number of falls (94 versus 164).

In the study using assessments of individual risk factors, Bezon et al. (1999) reported on the implementation of a fall prevention project targeting low-income

patients of a nurse-managed primary care clinic. Participants were assessed for their risk of falling using a risk assessment tool. Those identified as high risk for falling received an intervention directed toward their identified risk factors including the control of chronic disease, medications, healthy lifestyle (diet and exercise), visual and hearing difficulties, physical activity prescriptions, education, removing environmental hazards, exercise programs, footwear, and teaching how to get up after a fall. There was a large reduction in falls from the year prior to the intervention, when 30 individuals (26%) had fallen, compared to the year following the intervention, during which only 4 (3%) fell.

Chang et al (2004) conducted a meta-analysis and found that a combined strategies or multifactorial falls risk assessment and management program was the most effective component of a falls prevention program.

Summary of Fall Prevention Programs

Many studies showed that single component interventions are less effective than combine or multifactorial strategies. Hill-Westmoreland, Soeken, and Spellbring (2002) showed that the 12 studies included in the meta-analysis for exercise-focus interventions only had effect size of 0.220, meanwhile exercise and risk modification intervention had effect size of 0.687 (Hill-Westmoreland, Soeken, and Spellbring, 2002). Furthermore, Chang et al (2004) conducted a systematic review and meta-analysis of 40 studies to assess four categories of intervention programs to prevent falls including multifactorial fall risk assessment and management program, exercise program, environmental modification program, and educational interventions, found that a multifactorial fall risk assessment and management program had the most

statistically significant beneficial effect on both the risk of falls and monthly rate of falling while the exercise program had a statistically significant beneficial effect only on the risk of falls. Unlikeness, the environmental modification program and educational interventions were not statistically significant (Chang et al, 2004). Among community, the multifactorial interventions have been shown to reduce falls (Hill-Westmoreland, Soeken, and Spellbring, 2002).

However, the evidences falls prevention program for the elderly in community in Thailand included only 3 studies (Assuntachai et al, 1999; Pallit, 2001; Pootong, 2002). All of limited three studies were education intervention and combine clinician assessment in one study (Assuntachai et al, 1999). It can be summarized that they were lack of the strong evidence for suggestion the best practice in fall prevention in elders due to lack of randomized controlled trial, different implementations and outcome assessments, study in a limited of time period, samples were not selected specific group who healthy aging or high risk group, and family members were not participated in the program.

Developing a Fall Prevention Program

Developing a Fall Prevention Program needs to understand the relevant contexts, Commonwealth of Australia (2000) conducted a qualitative study to investigate falls prevention strategies most likely to be accepted and the information needs and perceptions of the elders concerning falls and their prevention. The 7-group discussions and 10 - in-depth individual interviews were performed. The participants were fallers and non-fallers who aged 65 years and over. The study found that the

perception about falls prevention was low until a fall had been experienced. Moreover, a falls prevention strategy needed to be communicated as a means to staying independent for longer in order to gain the full support of the participants.

McInnes et al. (2004) conducted a systematic review of 24 quantitative and qualilative studies focus on the elders' view and experiences of falls prevention. The summary of falicitators and barriers relating to falls prevention program revealed that the falicitators included information from a variety of sources (GP, mass media, and community nurses); information that falls can be preventable rather than unpredictable; information that communicated life-enhancing aspects of falls prevention such as maintaining independence. The barriers relating to falls prevention program included perceived relevance of falls prevention low until fall or near fall experienced; inaccessible and unappealing information; social stigma attached to program targeting "the elders"; differing agendas between the elders and health professionals; and pain, effort, and age related to exercise program.

The authors also suggested the valuable key implications for developing a falls prevention program that; it should be ensure that program is flexible enough to accommodate participants' needs and interests; promote the social value of such program; prior to recommending a Falls prevention program, consulting with the participants about the changeds that are realistic for them should be done; assistance or referral to the appropriate service should be provide that may decreased barriers to their falls prevention behavioral practice; to create and maintain interest in a falls prevention program, the participants should be given writen and verbal information on: the preventable nature of some falls, how to stay motivated, and the physical and

psychological benefits of falls prevention behavioral practice such as Tai Chi exercise and of modify falls risk (McInnes et al., 2004).

To maximize the effectiveness of a Falls Prevention Program, it must be concerned about the characteristics of the participant who are cognitively normal and living in the community with high risk factors for falls. A Falls Prevention Program implementer should recognize education and belief pattern for elders about falls, impact of falls, benefit of a Falls Prevention Program are very important section of the program. Moreover, concerning about facilities associated with the effectiveness of a Falls Prevention Program such as program safety, suitable setting, free transportation, friendly environment, value of practice, quality and enough refreshment, enough encouragement, flexibility in time conflict, respective participants, and cooperation with stakeholders such as; family members, neighborhoods, local community nurses, their physicians, are included as partners in the implementation and evaluation of program strategies. However, implementation of these recommendations will have considerable resource implications for the setting.

Fall prevention education sessions in a Falls Prevention Program with adequate feedback of their Berg Balance Scale and Time and Go up test results can enhance elders' awareness and compliance. A comprehensive health education material such as Fall prevention manuals or pamphlets are beneficial to health care providers, patients and families.

A Fall Prevention Program in this study

A Fall Prevention Program to improve gait and balance of community-dwelling elders in this study is the trial involves a 8-week period. The program is constructed by applying the Health Belief model, Knowles' adult learning principle, and considerations for normal aging changes. The program includes a 4-falls prevention education sessions which informs and explains knowledge about falls and a Fall Prevention Program for the elders follow "A Fall Prevention Program Manual", typically 1-1.30 hours., and Tai Chi Group Exercise Sessions means providing Tai-Chi exercise benefit knowledge and the 18 forms Tai chi training, guidance, and positive reinforcement follow "A Tai-Chi exercise manual", a CD-Rom of the Tai Chi Master performing the 18 form taught, and a poster depicting 18 forms Tai Chi exercise. Begin with group training sessions 30-45 minutes x 8 days continuously and then is expected to group exercise 30-45 minutes x 3 days per week though a 8-week of intervention.

There are many different schools of TC and each has its own distinctive features, but the basic principles are the same (Editor, 2000 cited in Mao, Li, and Hong, 2006). The 18-form of Tai Chi was selected for this study because it was easy to learn and remember and though still contains the essential Tai Chi principles. The 18-form of Tai Chi Exercise or "The 18 Movements of Taiji Qingong" are based on some movements of the "TAIJI QUAN", coupled with the Qigong breathing. Regular practice of Tai Chi Exercise can promote healthy benefit. To achieve best results, it is of utmost importance to have correct postures, slow and lively movements and proper

breathing. Tai Chi Exercise can be practiced by the weak, the sick, the old and the young.

Tai Chi has a number of other positive features that may facilitate adherence to a program: it requires no special equipment, it is enjoyable to most participants, it can be performed either in social settings or at home, and it can be safely tailored to match the physical abilities of the individual.

Tai Chi is usually performed in a group setting, which in turn is likely to enhance exercise participation. Thus, social support adequacy or the actual connection that people have in their environment is important to assess. For new practitioners are expected to perform the movement next to a stationary support such as a strong chair or a kitchen counter that can be accessed for additional support if needed.

Fall Prevention Program sessions were conducted at the Faculty of nursing , Burapha university, Chonburi: Thailand, where were completely facilities for organization the Fall Prevention education sessions and Tai Chi exercise sessions through out the 8-week intervention. It included a natural air flow big room, the adequately stable chairs; the teaching media included a visualizer, the perfect sound system, and staffs supportive. In addition, there were suitable and enough rest room for the elders.

In view of fact that, the most participants had not enough income, therefore, to keep the drop out from the intervention as low as possible, the transportation were organized for travel supportive and the travel cost of the participant were refunded.

The effect of a Fall Prevention Program

A Fall Prevention Program to improve gait and balance of community-dwelling elders in this study was constructed by applying the Health Belief model, Knowles' adult learning principle, and considerations for normal aging changes.

As a theoretical framework for intervention, The Health Belief Model provided guidelines to intervention strategies. The outcome of the program are improve gait and balance in the elders who participated the program which included fall prevention education sessions and Tai Chi exercise sessions. After the program, the participants were expected to increase perceive in severity, susceptibility of a fall, perceive benefit of the falls prevetion behavioral practice, perceive cue to action, perceive self –efficacy and decrease perceive barrier. Finally, they should have rountinely in fall prevention behavioral practice which included fall risk reduction, safety medications use, home modification, safety changing position practices, and Tai Chi exercise. The results should be that, participants who participate in this program can improve their gait and balance in order to prevent themselves from more falls.

As a Tai Chi exercise benefit, Tai Chi has been shown to increase balance confidence and reduce risk of falling in elderly patients (Wolf et al, 1997). Although direct effects on balance control have yet to be demonstrated, it seems likely that Tai Chi may improve the ability to control balance by training the mind and body to integrate balance-related sensory information and by helping an individual to develop a greater "awareness" of both body position and limits to stability. By requiring a series of movements that involve lateral weight transfer and narrowing of the base of

support, Tai Chi may bring about specific benefits with respect to control of lateral stability and the consequent capacity to avoid lateral falls, which are the ones that are most likely to result in debilitating (and life-threatening) hip-fracture injuries. In addition, the specific therapeutic elements of Tai Chi exercise were explored by Wolf (1997) as follow:

1. Continuous, slow movement may be slightly increased once mastered.

2. Slow to larger degrees of motion are undertaken, depending on ROM and strength characteristics of the individual of body weight generally on one leg, then shifting 3. Progressive flexion of the knees is performed to varying degrees with 70% to the other leg so that the majority of lower extremity muscle strengthening would be expected during loading onto that limb.

4. Straight and extended head and trunk positioning is developed, a necessary prerequisite for promoting a less flexed posture. Consequently, rigorous attention is needed to prevent leaning of the trunk or protrusion of the sacrum.

5. Trunk, head, and extremity rotation is emphasized in all but the first and last exercise forms. Movements are done in circles, especially in the upper extremities, and require a strong rotational component.

6. Symmetrical and diagonal arm and lower extremity movements are used as a major part of the selected forms, not only to promote arm swing in gait but also to increase trunk rotation around the waist.

7. Constant shifting to and from the right and left legs emphasizes progressively more displacement of body mass develop skill at ultimately achieving unilateral weight and balance through self-awareness of limitations in postural stability.

Another useful technique to reduce the risk of fall in ambulatory older adults that potentially increases the balance and confidence in one's ability to move in the environment are 3 forms of a 18-forms Tai Chi exercise in this study, that is used in performing Tai Chi movements. The 11^{th} – 13^{th} form are slow and purposeful heel-to-toe (forward) or toe-to-heel (backward) movement of the feet while shifting the weight of the body in a rhythmic motion in coordination with breathing.

Practicing Tai Chi Exercise in the 17^{th} forms of a 18-forms Tai Chi movements which practiced standing on one leg is probably help the elderly to increase muscle contraction time and thus may enhance muscle strength and endurance. This may help manage and simulate the activities that are encountered during daily activities, such as stepping over an obstacle and pulling on long trousers when dressing (Chau and Mao 2006.).

Many forms of 18 forms Tai Chi Exercise in this study especially in the 17^{th} forms of a 18-forms Tai Chi movements which practiced standing on the toe and forefoot or plantar loading which mainly located in the anterior–medial areas of the foot are not only enhances muscle strength, but also improves the somatosensory input in the great toe region to assist in balance control to a greater extent than would be achieved with normal walking (Mao, Li, and Hong, 2006).

Conclusion

Summarization the previous rigorous evidences of falls prevention program in community-dwelling elders in other countries conducted by randomized controlled trials, systematic reviews, and meta-analysis, as well as, the studies in Thailand found a significant gap of knowledge. The best evidence on the effectiveness of a fall prevention intervention program in community-dwelling elders is insufficient to make recommendations for intervention practice or for leading decision making health care policies at all levels.

Synthesis of the evidence found that a Fall Prevention Program for community-dwelling elders should combine strategies including fall prevention education sessions and Tai-Chi exercise sessions. These interventions would include physical modification, behavioral modification, and environmental safety. To enhance the effectiveness of a Fall Prevention Program, the elders need to be exposed to behavioral changing process, a very complex process. The use of health behavior theory especially the Health Belief Model in the planning and implementation of health promotion programs is recommended (Glanz, Lewis and Rimer, 1997) because it addresses the relationship between a person's belief and his or her behavior (Sapio-Longo, 1999). In addition, adults learn differently from children; therefore using adult learning principles and consideration of normal aging changes are recommended for practice (Sapio-Longo, 1999).

Conceptual Framework

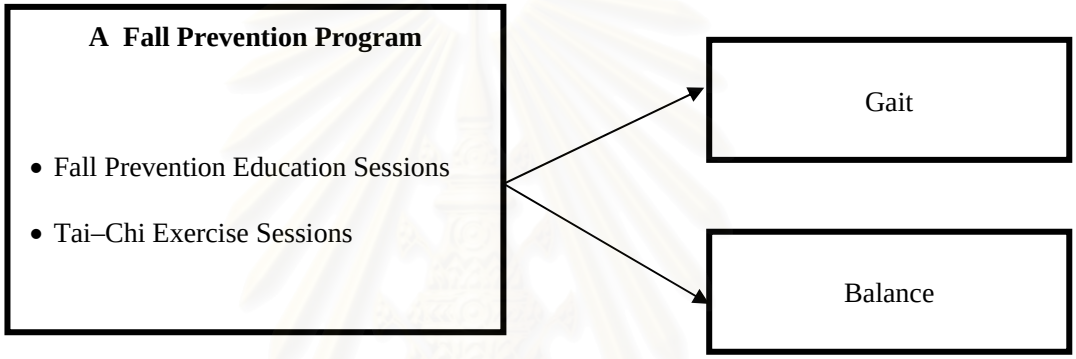


Figure 2 Conceptual Framework of this study

CHARPTER III

RESEARCH METHODOLOGY

In this chapter, the research design and methods that were used in this study are described. The description of research design, research setting, population, sample, sample size, sampling procedure, instrumentations, research assistant's preparation, data collection, protection of right of human subjects, and data analysis are explained.

Research Design

The design of this study was a quasi-experimentaldesign: nonequivalent control group pretest-posttest control group design (Polit and Beck, 2004). The design was used to determine the effect of a Fall Prevention Program on gait and balance of community-dwelling elders at the end of the 8th weeks after the program. The research design appeared as follows:

	Pretest		Posttest
Experiment group	**O1**	**X**	**O2**
Control group	**O3**		**04**

Figure 3 Research Design

Where:

O1, O3: Refers to the baseline assessment data including the Berg Balance Scale (Berg et al, 1989) and the Time Up and Go Test (Podsiadlo and Richardson, 1991) in the experimental and the control groups.

X: Refers to treatment in a Fall Prevention Program which is applied throughout the span of the 8-week intervention in the experimental group.

O2, 04: Refers to the scores of the Berg Balance Scale and the Time Up and Go Test of participants in the experimental group after the program.

Research Setting

The researcher recruited the participants who were community-dwelling elders from 3 Tambons (Tambon Bangsai, Tambon Sansuk, and Tambon Banseaun) where had the greatest numbers of fallers among the 8 Tambons in urban area of Amphur Muang, Chonburi province; the Eastern seaboard of Thailand. These 3 community settings were similar geography and the policy of the Public Health.

Fall Prevention Program sessions were conducted at the Faculty of nursing , Burapha university; Tambon Sansuk, Amphur Muang, Chonburi: Thailand, where were completely facilities for organization the Fall Prevention education sessions and Tai Chi exercise sessions through out the 8-week intervention.

Population

Eligible populations in this study were elders who had experienced at least one fall within the 12-months prior to participating in the study.

Sample

The samples in this study were elders who had experienced at least one fall within 12-months prior to participating in the study, and were willing to participate in the study and met the inclusion criteria.

Inclusion criteria

1. 60 years of age or older

2. Had experienced at least one fall in the 12-month prior to participating in the study. Meaning the subjects had high risk of fallings.

4. To ensure that fall prevention education and exercise training in class and home could be understood, all subjects were required to have

- alertness and the ability to communicate
- normal or mild cognitive function [Chula Mental Test: CMT (Jitapunkul et al, 1996) scores > 9]
- no or mild depression [Geriatric Depression Scale: GDS (Jitapunkul et al, 1996) scores < 11]
- can understand Thai.

5. To ensure that fall prevention education and exercise training in class and at home could be freely and safety participate and practiced, all subjects were required to have

- independent ambulation without a walking aid (occasional use of a cane was permitted)
- accepted physical function (Barthel ADL Index: BAI (Jitapunkul et al, 1996) scores >=12)

6. Willingness to participate in the study

The following exclusion criteria were used for the recruitment of the samples.

Exclusion criteria

1. Subjects with evidence of acute illness, neurological disorder, orthopedic or muscle problems prior to and during the period of the study affecting balance or exercise.

2. Subjects currently participating in other exercise or fitness programs, or organized activities: swimming, running, and brisk walking for exercise, more than 3 times/week.

Sample size

The sample size of this study was calculated by power-analysis, which the population *r* is of large size (effect size = *d* = .80), the *t* test of the difference between mean was to be performed with two-sides, when the power of this test is .80, an alpha of .05, the elders who had fallen were divided into 2 groups: experiment and control

groups. The sample size should be at least 26 subjects in each group, and the total number of subjects in this study was 52 (Cohen, 1992).

The previous studies reported attrition rates for a 8–15 weeks Tai Chi exercise intervention study with the healthy community-living elders was quite varied between 2.5 to 35%: 35% in USA (Taggart, 2002), 34% in USA (Kutner, 1997), 20% in USA (Wolf et al, 1996), 14.7% in Korea (Choi, 2005), and 2.5% in Canada (Yvonne et al., 2005). Therefore, in this study, the attrition rate was assumed to be at 30%, so at least 34 subjects had been recruited in each group, and the total number of subjects in the study was at least 68.

Sampling procedures

The assessable population included these elders who had experienced at least one fall in the 12-months prior to participating in the study, expressed willingness to participate in the study, and lived in the urban area in Amphur Muang, Chonburi province: Thailand.

The following sampling procedures were used for the recruitment of the samples.

1. The researcher proposed the document from the Faculty of Nursing, Chulalongkorn University about the purpose of the research and asked for permission and cooperation for the recruitment of the samples in community to the head of Amphur Muang Chonburi health center. In Chonburi province, Amphur Muang had the greatest elder population; therefore, the target areas were 8 Tambons in the urban area of Amphur Muang: Tambon Bangsai, Tambon Bankhod, Tambon Makamyong,

Tambon Bangplasoi, Tambon Bansoun, Tambon Banpeok, Tambon Angsila, and Tambon sansuk.

2. The researcher was allowed to have an opportunity to have a meeting with the head of Amphur Muang Chonburi health center, also a health professional officer who responsed in Amphur Muang Chonburi health center and the heads of the local health centers. The following agendas were explained to the heads of the local health centers:

2.1 The researcher described the purpose of the research and asked for cooperation in the recruitment of the samples in the community.

2.2 Asking to be the key contact for cooperation with the village health volunteers for community surveys, in order to find out the elders who had experienced at least 1 fall in the 12-month prior to participation in the study.

2.3 Brainstorming for find out the method to recruit the samples in the communities was conducted. The result was each of the 55 heads of village health volunteers would survey 10 elders in their respective areas. Then, a total of 550 elders were surveyed using the Fall in Community-Dwelling Elder Survey Form (Appendix A). The consensus was to finish this survey within 1 month. A health professional officer who responded in Amphur Muang Chonburi health center was pleased to collect all of them from each area.

2.4 The researcher explained this form in detail especially about the definition of a fall which was a sudden event which resulted in a person changing in body position in a downward direction on the ground or other lower level coming to rest unintentionally, not as a result of a major intrinsic event (such as stroke or syncope) or overwhelming hazard which may or may not result in a physical injury.

The researcher's name, address, and telephone number were included in this form, in order for the surveyors to contact when they had any questions about the survey.

3. When the data for community surveys were finished. The data analysis was done for a selection of as least 2 Tambons for research settings. The criteria for research settings selection were having the greatest numbers of fallers and the area of each Tambon was not connected to each other to minimize contamination between the participants. The data analysis showed that for the total of the 416 elders that were surveyed they were 170 fallers or 40.87% of the elders who had experienced at least 1 fall in the 12-months prior to participating in the study. There were fallers in Tambon Bangsai (50 elders), Tambon Sansuk (46 elders), and Tambon Banseaun (42 elders) (Appendix B). The researcher selected these 3 Tambons for the recruiting the samples.

4. The elders of each of the settings were contacted. The elders who were interested in the study were informed of the purpose and procedure of the study and asked for their co-operation. The researcher determined whether each participant met the inclusion and exclusion criteria.

5. The number of participants who met the inclusion and exclusion criteria were 34 in Tambon Bangsai, 20 in Tambon Banseaun, and 14 in Tambon Sansuk respectively. Therefore, the researcher selected Tambon Bangsai for 1 setting, and combined Tambon Banseaun and Tambon Sansuk for another setting.

6. Then, the settings were randomly assigned into the experimental or control group by a simple random allocation.

The stages of sampling follows:

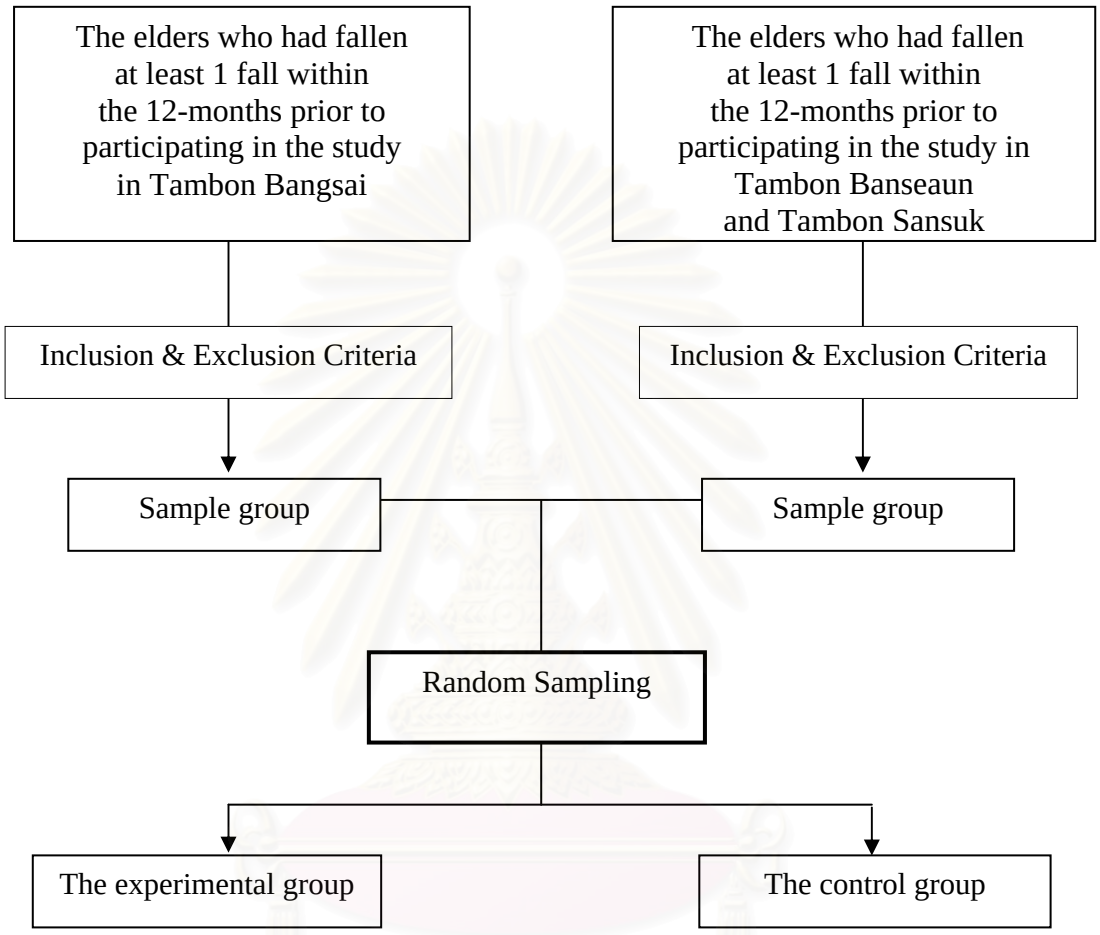


Figure 4: Stage of sampling

Instrumentation

The instruments of this study consisted of 3 kinds including:

1. Instrument for assessment inclusion and exclusion criteria

Domain name	Instrument
General Information	1.1 The General Information Questionnaire
Activities Daily Living	1.2 The Modified Barthel Activities Daily Living Index: BAI (Jitapunkul et al, 1996)
Mental status	1.3 Chula Mental Test: CMT (Jitapunkul et al, 1996) 1.4 The Geriatric Depression Scale: GDS (Jitapunkul et al, 1993)

2. Operational research instruments consisted of

: Intervention research instruments

2.1 A Fall Prevention Program for community-dwelling elders.

2.2 Manual of a Fall Prevention Program for community-dwelling elders

: Monitoring research instruments

2.3 Health Belief Pattern for Fall Prevention Behaviors in elders Questionnaire.

2.4 Change position skill in elder's evaluation

2.5 Tai Chi Exercise Skill in elders Evaluation.

2.6 Tai Chi Exercise check list.

2.7 The Fall Prevention Behavioral Scale

3. Evaluation research instrument (pre and post test)

3.1 The Berg Balance Scale (Berg et al, 1989)

3.2 The Time up and go test (Podsiadlo and Richardson, 1991)

Details of each instrumental are presented as follows:

1. Instrument for assessment inclusion and exclusion criteria

1.1 The General Information Questionnaire

The General Information Questionnaire was constructed by the researcher and consists of 2 parts: The first part includes checklists of demographic characteristics of samples. These include gender, age, marital status, educational level, religion, career, monthly income, health care cost payment, amount of chronic diseases, amount of medicines taken, people who they live with, relation to the caregivers. The second part contains items regarding information about falling included the number of falls and the severity of the fall-related injuries in the 12 months prior to participating in the study (Appendix C).

1.2 The Modified Barthel Activities Daily Living Index (BAI)

The Modified Barthel Activities Daily Living Index (BAI) was developed by Jitapunkul and colleagues (1996). The BAI is used for measuring the elder's physical disabilities or dependence through the basic skills necessary for independence. It consists of ten basic activities of daily living of which the scores of each item are not equal due to their depending on their importance in life. Possible scores of the BAI range are from 0 - 20. Scores higher than 11 indicate more physical function for the

elderly (Appendix D). Reliability and validity of the BAI were 0.79 and 0.68. In this study, the reliability testing was calculated from the data of 20 trial elders who had the same characteristics as the sample of the study and the reliability was -1.96. The reliability for all the samples in the study at pretest (n = 48) was .064.

1.3 Chula Mental Test (CMT)

The Chula Mental test (CMT) was developed by Jitapunkul and colleagues (1996) to assess cognitive function of the elder who had difficulties in reading and writing. There were 13 items of listing cognitive function. The responses to the item were coded on a dichotomous scale of 0 (incorrect) and 1 (correct) in which item 5 and item 12 had two sub-scales, and item3 and item 13 had three sub- scales. Then, the possible summation of all items to represent the cognitive function range is from 0-19. Higher scores than 15 indicate more cognitive function for the elder (Appendix E).

The result of the CMT reliability testing using test-retest kappa coefficient and an internal consistency coefficient was 0.65 and 0.81, respectively (Jitapunkul et al, 1996). In this study, the reliability testing is calculated from the data of 20 trial elders who had the same characteristics as the sample of the study and the reliability was .663. The reliability for all the samples in the study at pretest (n = 46) was .613.

1.4 The Geriatric Depression Scale (GDS)

The Geriatric Depression Scale (GDS) was modified by Jitapunkul and colleagues (1993). This scale is composed of 15 items on the self – rating a report of happiness and sadness at the time of being the elder. The items were scored on a dichotomous scale (0 - 1 score) and the score range was 0 - 15. A score lower than 6 indicates no depression (Appendix F).

The validity of the GDS was tested with factor analysis with varimax rotation, sixty percent of the total variance is attributable to the five factors which their Eigenvalue are greater than one. The reliability of the GDS was 0.86 (Kangchai, 2002). In this study, the reliability testing was calculated from the data of 20 trial elders who had the same characteristics as the sample of the study and the reliability was .889. The reliability for all the samples in the study at pretest (n = 46) was .853.

The results of inclusion and exclusion related to functional and mental status of the participants in the study

The characteristics related to functional and mental status of the experimental and control groups revealed that the all of the participants were independent (the BAI scores >= 12). The CMT scores of the samples in the experimental and control groups showed that most of them (87.0%) had normal cognition, and only 13.0% had mild cognitive function problems. The GDS scores showed that most of the participants in both groups (73.9%) were not depressed. However, 26.1% in the experimental and control group did have mild depression. The results also showed that there was no statistically significant difference between the experimental group and the control group regarding the BAI scores, the CMT scores, and the GDS scores (Appendix G).

2. Operational research instrument

2.1 A Fall Prevention Program for community-dwelling elders

Intervention in this study was a Fall Prevention Program for community-dwelling elders aimed at improving gait and balance of the community-dwelling elders. This program is based on the Health Belief Model (Strecher and Rosenstock, 1997), the knowledge of Adults Learning principles (Knowles, 1992), and the knowledge of normal aging changes (Appendix H).

A Fall Prevention Program to improve gait and balance of community-dwelling elders involved an 8-week period and consisted of 3 phases: Preparation phase, Fall prevention practice phase, and Evaluation phase.

Phase 1: Preparation Phase

This phase included the processes of the program developing as follow:

1. Review literature related to a fall such as normal age- related changes contributing to falling, fall risks, fall consequences, and fall prevention strategies. Review literature related to the Health Belief Model (Strecher and Rosenstock, 1997), the knowledge of Adults Learning principles (Knowles, 1992), and the knowledge of normal aging changes.

2. Researcher consulted with the dissertation advisors to develop and apply this knowledge for feasibility of a Fall Prevention Program.

3. A Fall Prevention Program was tested for content validity by 6 experts (4 specialists in Gerontological nursing, 1 specialist in Physiotherapist, and 1 specialist in Tai Chi exercise (Appendix J). Each expert was asked to rate individual items for relevance and clarity. Ratings were reported on a 4-point rating scale (4 = relevant

and clear; 3 = relevant but needed minor revision; 2= needed revision, cannot access relevance; 1= not relevance). They also were asked to indicate any gaps and to suggest any useful content that should be included. Revisions for the program followed suggestions of the experts and the dissertation advisors. Finally, this program was tested for reliability by being tried out by 10 elders who had similar characteristics to the elders in the study in order to study the feasibility of the program. Then, the researcher adjusted and improved the program with dissertation advisors.

4. The participants and family members in the experimental group were invited to participate in a Fall Prevention Program for community-dwelling elders which involved a 8-week period. The program is constructed by applying the Health Belief model, Knowles' adult learning principle, and considerations for normal aging changes. The program includes a 4-days fall prevention education sessions following "A Fall Prevention Program Manual", typically 1-1.30 hours, and Tai Chi group exercise sessions following "A Tai-Chi exercise manual". Begin with group training sessions 30-45 minutes x 8 days continuously and then had group exercises 30-45 minutes x 3 days per week though a 8-week of intervention.

Summarized activities in a Fall Prevention Program related to theory and theory applications were shown in table 2

Table 2 Summarized activities in a Fall Prevention Program related to theory and theory applications.

Day 1	Theory/ Theory applications
Obj 1. Increasing perceived susceptibility of the falls. **Obj 2**. Increase perceived severity of the falls	
Activity: Invited 2 participants shared their falls experiences	**Adult Learning Principles:** 1. Adults are most interested in learning about subjects that have immediate relevance to their job or personal life. 2. Experience (including mistakes) provides the basis for learning activities
Activity: Presented & Discussion about risks of fall	**HBM**: One's opinion of chanced of getting a condition. **Theory applications**: 1. Define population (s) at risk, risk levels. 2.Personalize risk based on a person's characteristics or behavior. 3. Make perceived susceptibility more consistent with individual's actual risk. **Adult Learning Principles:** Adult learning is problem-centered rather than content-oriented.
Activity: Presented & Discussion about the seriousness of the falls and its consequences.	**HBM:** One's opinion of how serious a condition and its consequences are. **Theory application**: Specify consequences of the risk and the condition. **Adult Learning Principles:** Adults learners have a variety of experiences of life which represent the richest resource for learning

Table 2 Summarized activities in a Fall Prevention Program related to theory and theory applications (Continued)

Day 2	Theory/ Theory applications
<u>Obj 3</u>. Increase perceived benefits of falls prevention behavior **<u>Activity:</u>** 1. Explain to the participants and family member for falls preventive strategies. 2. Discussion about their belief about falls preventions. 3. Mutual goal setting for fall prevention.	**HBM:** One's opinion of the efficacy of the advised action to reduce risk or seriousness of impact. **Theory application**: Define action to take: how, where, when; clarify the positive effects to be expected. **Adult Learning Principles:** 1. Adults are most interested in learning about subjects that have immediate relevance to their jobs or personal life. 2. Adult learner need to be responsible for their own decisions and to be treated as capable of self-direction.

Table 2 Summarized activities in a Fall Prevention Program related to theory and theory applications (Continued)

Day 3	Theory/ Theory applications
Obj 4. Decrease perceived barriers of the fall prevention behaviors practices. **Obj 5**. Increase perceived cue to fall prevention behaviors **Activity:** The group was invited to brainstorm all imagined barriers and ways to reduce stated barriers in the fall prevention behavioral practices.	**HBM:** One's opinion of the tangible and psychological costs of the advised action. **Theory application**: Identify and reduce perceived barriers through reassurance, correction of misinformation, incentives, assistance. **Adult Learning Principles:** 1. Adults need to be involved in the planning and evaluation of their instruction. 2. Adults are most interested in learning about subjects that have immediate relevance to their job or personal life 3. Adult learning is problem-centered rather than content-oriented
Activity: 1. Provided the elders how they can get the fall prevention behaviors information. 2. Provide reminders the elder with Tai Chi exercised poster at the participants' home.	**HBM:** Strategies to activate one's "readiness." **Theory application**: Provide how-to information, promote awareness, employ reminder systems. **Adult Learning Principles:** Adults are most interested in learning about subjects that have immediate relevance to their job or personal life**.** **Normal Aging Change considerations:** Age related factors can impact 1. Cognitive function well. 2. Decrease of visual and auditory acuity 3. Decrease in musculoskeletal agility, reaction time, and support system 4. Decline of the speed of learning

Table 2 Summarized activities in a Fall Prevention Program related to theory and theory applications (Continued)

Day 4	Theory/ Theory applications
Obj 6. Increase self-efficacies on fall prevention behaviors.	
Activity: 1. Provide the elders with postural changing skill practices. 2. Mutual goal setting for fall prevention. 3. Giving positive reinforcement: praise, feedback about evaluations.	**HBM:** One's confidence in one's ability to take action. Provide training, guidance in performing action. **Theory application**: 1. Use progressive goal setting. 2. Give verbal reinforcement. 3. Demonstrate desired behaviors. **Adult Learning Principles:** 1. Adult is ready to learn those things they need to know in order to cope effectively with life situations. 2. Adults need to be involved in the planning and evaluation of their instruction.

Phase 2: Fall prevention practice phase

After finishing an 8-day preparation phase, the participants had been oriented with the knowledge, developed beliefs for falls prevention, were promoted motivated, and had acquired Tai Chi exercise skills, it was time for real practice.

The participants were encouraged to practice fall prevention behavior and invited to practice Tai Chi exercise in group sessions 3 days/week throughout the 8 weeks of intervention or the 24-Tai Chi exercise sessions at Faculty of Nursing, Burapha University. During this phase, the participants were encouraged to practice Tai Chi exercise at own home and self-monitor their Tai Chi exercise by a Tai Chi

exercise check list. Regular practice was essential for mastering the forms and achieving lasting results.

Phase 3: Evaluation Phase

The objective of this phase was to assess the effect of a Fall Prevention Program. At the end of the 8th weeks after the program, the research assistants collected the data and compared scores for gait and balance between the experimental and the control group.

2.2 The manual of a Fall Prevention Program for community-dwelling elders

The manual for a Fall Prevention Program for community-dwelling elders included fall prevention education manual, Tai Chi exercise manual, 18 forms of Tai Chi exercise CD, and a poster depicting the 18 forms Tai Chi exercise (Appendix I).

This instrument was tested for content validity by 4 experts (3 specialists in Gerontological nursing and 1 specialist in Physiotherapy (Appendix J).

The process in constructing this manual was the same that was used for a Fall Prevention Program.

2.3 Health Belief Pattern for Fall Prevention Behaviors in elders Questionnaire (HBFPB)

Health Belief Pattern for Fall Prevention Behaviors in elders' questionnaire was constructed by the researcher through a literature review. A Blueprint was

developed and 6–items derived that reflected each theoretical dimension of Health Belief Model for Falls Prevention Behaviors in elders.

The Likert–type scale is commonly used when one is measuring beliefs or attitudes (Beery et al., 2005). Therefore, a 4- response scale was elected as the format for measurement. Each item's response is scored from 4 (very congruent) to 1 (very incongruent). Several of the items require reverse scoring, prior to calculation of the arithmetic total of all items (items 2; 4 and 8; 4; 2, 3, 6, 7, 8 - 14; 4, 8, 10 in component 1, 2, 3, 4, and 5 respectively). Once the initial pool of 98 items were assembled, 3 specialists in gerontological nursing (Appendix J) were provided with conceptual definitions and relevant constructs so that they had a clear understanding of the content domain the scale was designed to measure (Grant and Davis, 1997).

Each expert was asked to rate individual items for relevance and clarity. Rating were reported on a 4-point rating scale (4 = relevant and clear; 3 = relevant but need minor revision; 2= need revision, cannot access relevance; 1= not relevant). They also were asked to indicate any gaps and to suggest useful items that should be included. Revisions based on the majority of the expert panel were made. One item about a kind of a rug was eliminated, therefore 97 items remained.

Prior to examining content validity, interrater agreement (IR) was ascertained. IR was defined as the number of items rated 1 or 2 by the expert panel and those rated 3 or 4 divided by the total of items on the instrument. Acceptable IR was set at 0. 70. If IR was less than 0.70 conceptual definitions and the use of the scale were reviewed with the panel members (Grant and Davis, 1997). In this measurement, the IR was calculated at 0.92.

A content validity index (CVI) was calculated to evaluate individual items on the scale (Baas 1992 cited in Beery et al, 2005). The mean score for each item was computed and divided by the highest possible score (4) to provide a decimal score between 1 and 1.00 (Waltz, Strickland, and Lensz, 1991). Any item that scored less than 0.70 was revised or eliminated (Lynn, 1986). In this measurement, The CVI was calculated at 0.83.

Finally, the HBFPB questionnaire includes 6 components: 1) susceptibility of a fall, 19 items; 2) perceived severity of a fall, 8 items; 3) perceived benefits of fall prevention behavioral practice, 28 items; 4) perceived barriers of fall prevention behavioral practice, 14 items; 5) perceived cue to actions of fall prevention behavioral practice, 14 items; and 6) perceived self-efficacy of fall prevention behavioral practice, 14 items. The total are 97 items which have the IR = 0.92 and the CVI =0.83 (Appendix K).

A positive HBFPB questionnaire is equivalent to a higher score. The raw scale score is translated into a 388 point scale where 97 represents the lowest possible the perception of an individual about falls and falls prevention behavioral practice, and 388 represents the highest possible perception of an individual about falls and falls prevention behavioral practice.

The HBFPB questionnaire was tested with 15 elders who have the same characteristics as the sample in the study. The Cronbach's alpha coefficient method showed that the reliability of this questionnaire was .982, .942, and .904 when tested on 15 elders, 46 elders at pretest and posttest respectively.

2.4 Change position skills in elders' evaluation

The changing of positions skills in elders' evaluation was used for determining changing of position abilities after finishing a 8-days of training. It was constructed by the researcher through a review. This questionnaire is tested for content validity by 3 experts in fall prevention in elderly and gerontology: 2 nursing instructors and 1 specialist in Physiotherapy . The reliability testing is calculated from the trial data of 10 elders who have the same characteristics as the sample in the study (Appendix L)

2.5 Tai Chi Exercise Skills Evaluation

Tai Chi Exercise Skills Evaluation was used for determining the Tai Chi exercise skill ability after finishing an 8-day Tai Chi exercise training session. It was constructed by the researcher through a literature review and Tai Chi exercise practice. The process in constructing this evaluation was the same that is used for the HBFPB questionnaire.

A 3- response scale was elected as the format for measurement. Each item's response was scored from 3 (correct), 2 (partial correct), and 1 (incorrect). There weren't any items requiring reverse scoring. There were 18 items, 5 specialists: 1 specialist in Tai Chi Exercise, 1 specialist in sport sciences, 2 specialist in gerontological nursing, and 1 specialist in physiology (Appendix J) were provided. All of the experts on the panel agreed with this Tai Chi Exercise Skill Evaluation, therefore the items still remained at 18. The IR and the CVI = 1.000 (Appendix M).

A positive Tai Chi Exercise Skill Evaluation is equivalent to a higher score. The raw scale score is a 54 point scale where 18 represents the lowest possible the Tai

Chi Exercise Skill of an individual, and 54 represents the highest possible the Tai Chi Exercise Skill.

The Tai Chi Exercise Skills Evaluation was tested in 15 elders who practiced Tai Chi Exercise in a community. The interrater reliability between 2 investigators was 1.000**.**

2.6 Tai Chi Exercise check list.

This Tai Chi Exercise check list was developed by the researcher. This instrument was used to monitor Tai Chi exercise of the participants at their homes during the 8–week period of the program. The Tai Chi Exercise check list was provided to 5 specialists: 1 specialist in Tai Chi Exercise, 1 specialist in sport sciences, 2 specialist in gerontological nursing, and 1 specialist in physiology (Appendix J). All of the experts on panel agreed with this Tai Chi Exercise check list. The IR and the CVI = 1.000 (Appendix N).

Falls Prevention Program Sessions Compliance Rate in this study

Falls Prevention Education Sessions compliance rate had crossed the 8-Fall Prevention Education Sessions and the 24-Tai Chi exercise sessions (total 32 sessions) and was calculated for all classes-attending participants (N=23). During the 8-Fall Prevention Education Sessions, of the 20 participants in experimental group 75% compliance (6 sessions) was achieved, ranging from 5 to 8 sessions. During 24-Tai Chi exercise sessions, 75% compliance (18 sessions) of 20 participants in experimental group had attended, ranging from 12 to 24 sessions.

A Tai Chi exercise manual, a Tai Chi exercise instructional CD, and a poster depicting Tai Chi exercises were given to all participants in the experimental group to facilitate and encourage Tai Chi exercise at their own at homes. Regarding self-reported home exercise compliance, 100% of participants in experimental group indicated they had Tai Chi exercised at home at least once a week, 37.9% had Tai Chi exercised at home more than 4 days per week, and 79.3% had exercised at group sessions and home more than 5 days per week. Interestingly, 44.8% of participants in experimental group indicated they had Tai Chi exercised at group sessions and home 7 days per week.

2.7 The Fall Prevention Behaviors for Elders Questionnaire.

The Fall Prevention Behaviors for Elders Questionnaire was used for monitoring fall prevention behaviors during the past 2-weeks in the experimental group elders during the intervention period that they had the presence or absence of falls protective behaviors. The researcher constructed by the Fall Prevention Behaviors for Elders Questionnaire through a literature review. The process constructing this Questionnaire was the same that used for The HBFPB questionnaire.

A 3- response scale was elected as the format for measurement. Each item's response was scored from 3 (practiced everyday/ week), 2 (practiced 3-4 days/ week), and 1 (never practiced). There weren't any items require reverse scoring. There were 20 items, 2 specialists in gerontological nursing were provided (Appendix J). Revisions based on the majority of the expert panel were made. All of the expert panels agreed with this Fall Prevention Behaviors for Elders Questionnaire, therefore 20 items still remained 20. The IR = 0.90 and the CVI = 0.93.

A positive Fall Prevention Behaviors for Elders Questionnaire was equivalent to a higher score. The raw scale score is 60 point scales where 20 represents the lowest possible fall prevention behaviors for elders of an individual and 60 represents the highest (Appendix O).

The Fall Prevention Behaviors for Elders Questionnaire was tested in 15 elders who have the same characteristics as the sample in study. The Cronbach's alpha coefficient method showed that the reliability of this questionnaire was 0.754 and 0. 779 when tested on the 15 elders and 23 elders at the pretest period respectively.

3. Evaluation research instrument

3.1 The Berg Balance Scale

The Berg Balance Scale (Berg, et al., 1989) was developed from Thai version of Berg Functional Mobility Test by Chewwasung (2003) and Pichaya (2005) by the researcher. This test was used for measuring gait and balance. This test was intended to objectively assess a patient's ability to safely perform several common daily living tasks. The activities varied from simple tasks, like maintaining one's stability in standing, to dynamic tasks which involve changing the base of support or performing movements with increasing speed. The test consisted of 14 activities. The rating of each item ranges from "0" for inability to perform to "4" for ability to perform the task safely, and was dependent on the quality of the performance or the time taken to complete the task. The maximum possible score on this test is 56. The Berg Balance Test has a good test-retest and interrater reliability (Shumway-Cook & Woollacott,

2001). A high score indicates a very low risk of falling and a low score indicates a high risk of falling. As the Berg Functional Mobility Test declines, fall risk increases non-linearly with scores below 36/56 showing a fall risk of almost 100%. The score was 46 below indicating an impairment of balance leading to a higher risk for falls. The period of testing took approximately 15-20 minutes (Chewwasung, 2003).

The Berg Balance Scale was the most powerful functional test among the four mobility and balance tests (Berg Functional Mobility Test, Tinetti Mobility Score (TMS), Elderly Mobility Scale (EMS), and Timed Up and Go test (TUG) in discriminating fallers from non-fallers. Upon the proven high discrimination power of Berg Functional Mobility Test, 2 items, namely, picking up an object from the floor and standing on one leg can discriminate fallers from non-fallers. In discriminating single fallers from multiple fallers, picking up an object from the floor and placing an alternate foot on a stool were items that were identified (Chiu, Au-Yeung, and Lo, 2003) (Appendix P).

The Berg Balance Scale was provided to 3 specialists: 2 specialist in gerontological nursing, and 1 specialist in physiology (Appendix J). Revisions based on the majority of the expert panel were made.

The Berg Balance Scale was tested in 7 elders who had the same characteristics as the samples in of the study. The Interrater reliability between 2 investigators was 0.995

3.2 The Time up and go test

This test was developed from the Thai version of the Time up and go test by the author Somnok Kulsatidporn (2006). This test was developed from original version of the TUG test (Podsiadlo and Richardson, 1991). This test was used for measuring elder's gait which measures the speed at which someone rises from a standard chair, walks 3 metre, turns around, walks back and sits in the chair again. A normal adult should complete the test in less than 10 seconds. The TUG test was also sensitive (87%) and specific (87%) for identifying adults who are prone to falls. This scale was tested for content validity by 5 experts in fall prevention in elderly and gerontology: 4 nursing instructors, a gerontologist, and 2 experts in Tai Chi exercise. The reliability testing is calculated from the trial data of 7 elders who had the same characteristics as the samples in the study (Appendix Q).

The Time up and go test was provided to 3 specialists: 2 specialist in gerontological nursing, and 1 specialist in physiology (Appendix J). Revisions based on the majority of the expert panel were made.

The Time up and go test was tested in 7 elders who had the same characteristics as the samples in the study. The Interrater reliability between 2 investigators was 1.000.

Steps in delivering a Fall Prevention Program were as follows:

Day1. This day covered the assessment of the Health Belief pattern for fall prevention behavior and fall prevention behavior practices as the baseline data before the start the program. The researcher started the Fall prevention education session following the "Falls Prevention Education Plan". The first objective was increasing perceived susceptibility of the falls by inviting 2 participants to share their fall experiences and about the details of the fall events, the injuries levels, and feelings about their fall experiences. Then, the recent statistics of fall in the elders in Thailand and the concept of falling were presented. Discussion about risks of falls of their fallings. This session took about 40 minutes.

For the next 20 minutes, the next objective was to increase the perceived severity of the falls. Discussion about the seriousness of the falls and their consequences were conducted. The researcher also invited 1-2 participants to shared their experiences and the difficult consequences of the fall and explain what he/she had to do in order to cope with consequences of the fall.

After the educational session, the participants were invited to a 45- minute Tai Chi exercise session that was taught by a Tai Chi expert. The introduction, warm-up position and form 1 and 2 of Tai Chi exercise were trained. A Tai Chi exercise manual, a CD in Tai Chi exercise instructional, and a poster depicting Tai Chi exercise were all given to all the participants in experimental group to facilitate and encourage Tai Chi exercise at their own at homes.

Day 2. On this day, the researcher repeated the risks of falling and severity of falls, then presented a Fall Prevention Program. The objective was to increase the perceived benefits of falls prevention behavior. The researcher explained falls prevention strategies to the participants and family members. Next, the researcher collaborated with the elders and their family members to prevent future falls by providing the health education including risk reduction, safer use of medications, Tai Chi exercise method and benefit knowledge, appropriate posture, and environment modification. The researcher then clarified the positive effects and described the evidence of effectiveness. In this session, the researcher demonstrated Tai Chi exercise self-monitoring by using a Tai Chi exercise check list. This session took about 1.30 hours.

After the educational session, the participants were invited to a 45- minute Tai Chi exercise session that was taught by a Tai Chi expert. Warm-up position and form 1-2 of Tai Chi exercise were repeated and form 3-5 were trained.

Day 3. On this day, the objective was to decrease the perceived barriers of the fall prevention behaviors practices. The group was invited to brainstorm all imagined barriers and find ways to reduce those barriers in the fall prevention behavioral practices. The researcher gave the participants a list of common barriers in the fall prevention behavioral practices and supported them in reducing or eliminating barriers. Informed family member to provide a consultant to the elderly when they perceived barriers in performing fall prevention behaviors and other problems during the stages of the program. This session took about 30 minutes.

For the next 30 minutes, the next objective was to increase the perceived cue to fall prevention behaviors. The researcher provided the elders on how they can get the fall prevention behavior information. Reminders were provided to the elder with Tai Chi exercised poster at the participants' home. The researcher then encouraged the family members to discuss the recommended fall prevention program with the participants and encourage them to perform the falls prevention behaviors.

After the educational session, the participants were invited to a 45- minutes Tai Chi exercise session that was taught by a Tai Chi expert. Warm-up position and form 1-5 of Tai Chi exercise were repeated and form 6-9 were trained.

Day 4. This day, the objective was to increase self-efficacy on fall prevention behaviors by providing the elders with postural changing skills practice. Then, the researcher and research assistants approached each participant for an evaluation of postural changing skills until each participant could practice them correctly. Finally, a summary of the fall prevention education was done. This session took about 1.30 hours. The result of this form was shown in table 3.

Table 3 Comparison of the Fall Prevention Behavioral Scale mean scores in the experimental group between before and after participation in a Fall prevention Program for 4 weeks by the independent samples *t* test

Variables	**n (23)**	***t***	***p* value**
	Mean (SD)		
Pre Behavior	55.04 (4.19)	-2.172	.037*
Post Behavior	57.22 (2.36)		

* Significance at $p<.05$

The results in table 3 showed that, after participation in a Fall Prevention Program for 4 weeks, the experimental group had significantly higher their mean score of the Fall Prevention Behavioral Scale than before participated in the program (p = .037).

After the educational session, the participants were invited to a 45- minutes Tai Chi exercise session that was taught by a Tai Chi expert. Warm-up position and form 1-9 of Tai Chi exercise were repeated and form 10-12 were trained.

Day 5. The participants were invited to a 45- minutes Tai Chi exercise session which was taught by a Tai Chi expert. Warm-up position and form 1-12 of Tai Chi exercise were repeated and form 13-15 were trained. Then, the researcher and research assistants approached each participant to monitor the Health belief pattern for falls prevention behaviors by using the Health Belief Pattern for Fall Prevention Behaviors in elders' questionnaire. The result of this form was shown in table 4.

Table 4 Comparison of the Health Belief Pattern for Fall Prevention Behavior in Elders Questionnaire (HBFPB) mean scores between the experimental and the control groups before and after participation in a Fall Prevention Program by the independent samples *t* test.

Items	**Experiment Group n (23) Mean (SD)**	**Control Group n (23) Mean (SD)**	**Independent *t* test**	
			t	***p* value**
Pretest HBFPB	275.67 (25.31)	293.78 (23.07)	-2.536	.015*
Posttest HBFPB	313.90 (24.20)	293.35 (22.174)	3.005	.004*

* Significance at $p<.05$

The results in the table 4 showed that, before participation in a Fall Prevention Program, the experimental group had significantly lower mean scores than the control group (p = .015) for the Health Belief Pattern for Fall Prevention Behavior in Elders Questionnaire. After participation in a Fall prevention Program, the experimental group had significantly higher mean scores than the control group (p = .004) for the Health Belief Pattern for Fall Prevention Behavior in Elders Questionnaire.

Comparison of the each domain of the Health Belief Pattern for Fall Prevention Behaviors in Elders Questionnaire mean scores between the experimental and the control group before and after participation in a Fall Prevention Program by the independent samples *t* test found that after participation in a Fall Prevention Program, the experimental group had significantly less mean score of the perceived barrier than the control group (p = .000), had significantly higher mean score of the

perceived risk of falls, the perceived cue to action and the perceived self-efficacy of fall prevention behavior practice than the control group (p = .004, .042, and .011 respectively). However, the experimental group had mean score of the perceived severity of falls and the perceived benefit of fall prevention behavior practice not significantly different from the control group (p = .657 and .745 respectively) (Appendix R).

Day 6. The participants were invited to a 45- minute Tai Chi exercise session that was taught by a Tai Chi expertise. Warm-up position and form 1-15 of Tai Chi exercise were repeated and form 16-18 were trained. Data analysis of the Health Belief Pattern for Falls Prevention Behaviors in elders' questionnaire was done. The researcher and research assistants approached each participant until they could ensure that the participants had gained the fall prevention behavior knowledge correctly.

Day 7. The participants were invited to a 45- minutes Tai Chi exercise session that was taught by a Tai Chi expert. Warm-up position and form 1-18 of Tai Chi exercise were repeated.

Day 8. The participants were invited to a 45- minute Tai Chi exercise session that was taught by a Tai Chi expert. Warm-up position and form 1-18 of Tai Chi exercise were repeated. Then, the researcher and research assistants approached each participant for evaluation of the Tai Chi Exercise Skills until each participant could correctly practices to ensure that the participants had gained the skills needed for Tai Chi exercise.

Research assistants' preparation

For the purpose of the study, five research assistants are needed for assessment inclusion and exclusion criteria, pre-test and post-test outcome assessments, a fall prevention program including a fall prevention education sessions, Tai-Chi exercise sessions, and monitoring the elder's Tai-Chi exercise and fall prevention behavioral practice. They were trained to correct assessment inclusion and exclusion criteria, pre-test, post-test, and other details through out the program.

The research assistants in this study were 2 registered nurses who have experiences in caring for the elders in the hospital, and 5 health volunteers who have experience in caring for the elders in the community. The researcher spent a total 36 hours for orientating and training the 7 research assistants: the purposes, the methods, and details of the study processes; and concerning and safety awareness during taking care for the participants; protection of the participant rights; and the role of one another. Moreover, they were trained for data collection in real situations and demonstrated understandings of the instructions until the agreement of every test were accepted to be one hundred percent. The training curriculum for research assistants is shown in Table 5.

Table 5 Training curriculum for the researcher assistances

The training curriculum for Research Assistances (RA)

The RNs RA	Time (Hrs.)	Health volunteers RA	Time (Hrs.)
Assessment Inclusion & Exclusion criteria and outcome assessment		**Assessment Inclusion & Exclusion criteria and outcome assessment**	
1. Learning all forms	1	1. Learning Inclusion & Exclusion criteria forms	0.50
		2. Learning to assist in outcome assessment process	0.50
2. Practice in the laboratory	2	3. Practice in the laboratory	2
3. Practice in the Community	16	4. Practice in the Community	16
Falls Prevention Education Sessions		**Fall Prevention Education Sessions**	
1. Learning and understanding	1	1. Learning and understanding	1
2. Practice in the Community	1	2. Practice in the Community	1
Tai Chi exercise Sessions		**Tai Chi exercise Sessions**	
1. Learning and understanding	1	1. Learning and understanding	1
2. Practice with the expert	10	2. Practice with the expert	10
Monitoring the Intervention		**Monitoring the Intervention**	
1. Learning all forms	1	1. Learning all forms	1
2. Practice in the laboratory	1	2. Practice in the laboratory	1
3. Practice in the Community	2	3. Practice in the Community	2
Total	**36**	**Total**	**36**

Data collection

After obtaining the permission to conduct a study from the Ethical Review Committee for Research Involving Human Subjects and/ or Use of Animals in Research, Health Science Group Faculties, Colleges and Institutes, Chulalongkorn University, Thailand and the Ministry of Public Health. The data collection procedures were facilitated step by step as follows:

1. The researcher conducts phase1 (Preparation phase) as follows:

1.1 The elders who had experienced at least 1 fall within a 12-month period prior to participation in the study in each setting were contacted. The researcher informed the elders about the purpose, risk, and benefits of the study. Furthermore, to minimize potential harm to the participants, the participants were informed that they can withdraw from the study at any point of time without jeopardizing their care. Also during participating in the study, they could ask questions or refuse to answer some questions. Then, the researcher requested permission to include the elders in the study. Each elder signed or thumb printed the consent form if he/she agreed to participate in the study.

1.2 The researcher assessed information for the baseline or pre-test data in the experimental group including the Berg Balance Scale, the Time up and Go Test, Health belief pattern for fall prevention behavior in elder questionnaire, and Fall prevention behavior practice. The participants in the control group were assessed by the Berg Balance Scale, the Time up and Go Test, Health belief pattern for falls prevention behavior in elder questionnaire. Then, it is the time period the researcher prepared the elders for the fall prevention knowledge and skills.

1.3 In this phase, the participants and family members in the experimental group were invited for 4 falls prevention education sessions and 8 Tai Chi exercise training sessions. The sessions were to ensure that the participants in experimental group had already belief about fall prevention behavior, and to gain knowledge and skills for fall prevention behaviors. At the end of the fall prevention education, the participants were re-assessed for the health belief pattern for fall prevention behaviors. Moreover, at the end of Tai Chi exercise training sessions, the participants were evaluated for Tai Chi exercise skill evaluation development.

2. The researcher conducted phase 2 (Fall prevention practice phase) as follows:

After finishing an 8-days preparation phase, the participants had been oriented to the knowledge, developed belief for fall prevention, were motivated, and had acquired Tai Chi exercise skills; it was time for real practice.

The participants were encouraged to practice fall prevention behavior and invited to practice Tai Chi exercise in group sessions 3 days/week throughout 8-weeks of intervention or they attended the 24-Tai Chi exercise sessions at the Faculty of Nursing, Burapha University. During this phase, the participants were encouraged to practice Tai Chi exercise at home and self-monitor their Tai Chi exercise through a Tai Chi exercise check list. The researcher provided consultation over the phone or visits when there was an immediate problem.

3. In order to evaluate the effect of the program, the research assistants re-assessed the Berg balance Scale and the Time Up and Go Test's participants in both the experimental and the control groups at the end of 8th week after the program.

Protection of human subjects

The research proposal, research instruments, and participant consent form were submitted for review and approval to the Ethical Review Committee for Research Involving Human Subjects and/ or Use of Animal in Research, Health Science Group Faculties, Colleges and Institutes, Chulalongkorn University, Thailand (Appendix S). Potential participants were given an information sheet (Appendix T) describing the study and an opportunity to ask and express concerns prior to giving informed consent (Appendix U). All participants were informed of their ability to decline participation or withdrawal from the study at any time. Participants' names will be replaced by code numbers. No participant names will be linked to the research publication.

Exercise related-injuries in this study

Because of the high risk of falls for participants, during the 8-day Tai Chi exercise training and through the 8-week intervention, the participants were closely monitored by the research staff. The researcher prepared the strong chairs for everyone; the participants could hold their or had a seat during the exercise when he/she felt unstable. In addition, the researcher and staff had encouraged the participants to report any negative signs or symptom resulting from exercise in their classes and homes. No exercise related-injuries occurred among study participants during the 8-week trial.

However, during the first 3 days of Tai Chi exercise training, 5 participants (20%) reported their mild muscle pains in their shoulders and thighs. The nurse researchers performed and reported a normal physical examination of them. All of the

participants were psychologically supported and encouraged to keep attending the Tai Chi classes and permitted to stop and sit a while during the training period if they wanted. After 5-days of Tai Chi exercise training, no report muscle pain occurred.

Data Analysis

Statistical procedures were performed on SPSS (Statistical Package for the Social Sciences) versions 13 for Windows.

Part 1 Comparison of the demographic characteristics and the characteristics related to functional and mental status of the samples by using Mann-Whitney U test.

Part 3 Comparison the mean score of the Health Belief Pattern for Fall Prevention Behaviors in Elders Questionnaire and the Fall Prevention Behaviors for Elders Questionnaire by using the independent *t* test.

Part 3 Comparison of the extraneous variables between the experimental and the control groups by using the paired *t* test.

Part 4 Comparison of the Berg Balance Scale and the Time up and Go test mean scores between and within groups by using the paired *t* test.

CHARPTER IV

RESULTS

The results of the research findings are presented in two sections. The first section describes and compares characteristics of participants in the experiment and control groups. The second section presents findings congruent with the hypotheses.

Demographic Characteristics of the Samples

Seventy-Seven elders who met the criteria were approached to participate in the study, and 64 subjects agreed to join. 13 potential subjects (16.88%) refused participation.

There were 32 elders in the experimental group and 32 elders in the control group. Twelve elders (17.39%) dropped from the study: six elders (18.75%) from the experimental group, and six elders (18.75%) from the control group. The reasons for withdrawal from the experimental group were: 4 elders (66.67%) were to time conflict (busy with their works), 1 elder (16.67%) due to health-related causes, and 1 elder (16.67%) elder feel didn't have any friends. The reasons for withdrawal from the control group were 3 elders (50%) transfer to other facility (they made changed in their doctor to private providers and they didn't want to participate the study any further) (they lived in the same house), 1 elder (16.67%) was time conflict (busy with her work), 1 elder (16.67%) was traveling to another city, and 1 elder (16.67%) had

practiced the Tai chi exercise everyday after participate the study. There are 52 subjects, 26 in the experimental group and 26 in the control group. However, 3 subjects in experimental group and 3 in control group were cut off because they can not being a match paired. Finally, there are 46 subjects, 23 in the experimental group and 23 in the control group were matched pairs and further analyzed.

For minimized the extraneous variables confounded to outcome variables, the following variables were used to matched paired for the experimental and control groups.

1. Age: no different more than 5 years
2. Gender: same gender
3. Falls experience in the 12-month prior to participating in the study consisted of 1 fall, 2-3 falls, and >3 falls.

The data of matched paired between the experimental and the control groups are shown in Table 6.

Table 6 The matched paired between the experimental and the control groups.

Number	Experimental group			Control group		
of pairs	Age	Gender	Falls	Age	Gender	Falls
1	69	Female	6	66	Female	10
2	67	Female	1	67	Female	1
3	68	Female	2	64	Female	2
4	67	Female	3	67	Female	3
5	70	Female	2	70	Female	2
6	80	Female	3	78	Female	2
7	69	Female	3	71	Female	3
8	66	Female	1	72	Female	1
9	68	Female	1	67	Female	1
10	72	Female	1	74	Female	1
11	66	Female	1	65	Female	1
12	64	Female	3	60	Female	3
13	67	Female	2	62	Female	2
14	77	Female	2	72	Female	2
15	67	Female	1	66	Female	1
16	72	Male	1	75	Male	1
17	63	Female	3	63	Female	2
18	70	Female	1	73	Female	1
19	73	Male	1	76	Male	1
20	65	Female	6	66	Female	5
21	67	Male	10	69	Male	5
22	74	Female	2	73	Female	3
23	76	Female	3	72	Female	3

Table 7 Comparison of the extraneous variables between the experimental and the control group before and after participation in a Fall Prevention Program by the paired *t* test.

Variables	**Total**	**Experiment Group**	**Control Group**	**Paired *t* test**	
	N (46)	**n (23)**	**n (23)**		
	Mean (SD)	**Mean (SD)**	**Mean (SD)**	***t***	***p* value**
Age	69.24 (4.50)	69.43 (4.31)	69.04 (4.77)	.643	.527
Falls experience in the 12-month prior to participating in the study	2.57 (2.15)	2.57 (2.17)	2.57 (2.17)	.000	1.000

* Significance at $p<.05$

The results in table 6 and 7 showed that the experimental group had age, gender, and falls experience in the 12-month prior to participating in the study no significantly different from the control group (p = .527 and 1.000 respectively).

The detail demographic characteristics of the subjects in the experimental and the control group are shown in Table 8.

Table 8 Demographic Characteristic of the Experimental and Control Groups.

Items	Experimental Group n (23) N (%)	Control Group n (23) N (%)	Total N (46) N (%)	Mann-Whitney U Z	Mann-Whitney U $p < .05$
Gender				.000	1.000
Female	20 (87.0)	20 (87.0)	40 (87.0)		
Male	3 (13.0)	3 (13.0)	6 (13.0)		
Age				-1.218	.223
60 – 65 years old	6 (26.1)	1 (4.3)	7 (15.2)		
66 – 70 years old	8 (34.8)	12 (52.2)	20 (43.5)		
71 – 75 years old	8 (34.8)	7 (30.4)	15 (32.6)		
76 – 80 years old	1 (4.3)	3 (13.0)	4 (8.7)		
Marital Status				-.376	.707
Single	0	3 (13.0)	3 (6.5)		
Marry	10 (43.5)	7 (30.4)	17 (37.0)		
Widowed/ Divorced/ Separated	13 (56.5)	13 (56.5)	26 (56.5)		
Education				-.215	.829
No study	7 (30.4)	7 (30.4)	14 (30.4)		
Primary school	15 (65.2)	16 (69.6)	31 (67.4)		
Bachelor	1 (4.3)	0	1 (2.2)		
Religion				.000	1.000
Buddhist	23 (100)	23 (100)	46 (100)		

Table 8 Demographic Characteristic of the Experimental and Control Groups (Continued).

Items	Experimental Group n (23) N (%)	Control Group n (23) N (%)	Total N (46) N (%)	Mann-Whitney U Z	p < .05
Career				-.792	.428
House workers	18 (78.3)	15 (65.2)	33 (71.7)		
Laborers	1 (4.3)	4 (17.4)	5 (10.9)		
Trades person	4 (17.4)	4 (17.4)	8 (17.4)		
Income				-.751	.453
≤ 500	9 (39.1)	8 (34.8)	17 (37.0)		
501 – 1000	2 (8.7)	4 (17.4)	6 (13.0)		
1001 - 2000	1 (4.3)	6 (26.1)	7 (15.2)		
2001 - 3000	4 (17.4)	2 (8.7)	6 (13.0)		
> 3000	7 (30.4)	3 (13.0)	10 (21.7)		
Payment				-1.089	.276
Government services	8 (34.8)	5 (21.7)	13 (28.3)		
Universal Health Care Coverage Scheme	14 (60.9)	16 (69.6)	30 (65.2)		
Social security	1 (4.3)	0	1 (2.2)		
Self - pay	0	2 (8.7)	2 (4.3)		

Table 8 Demographic Characteristic of the Experimental and Control Groups (Continued).

Items	Experimental Group n (23) N (%)	Control Group n (23) N (%)	Total N (46) N (%)	Mann-Whitney U Z	p < .05
Live with				-1.188	.235
Live alone	0	3 (13.0)	3 (6.5)		
Live with spouse	1 (4.3)	2 (8.7)	3 (6.5)		
Live with children	13 (56.5)	12 (52.2)	25 (54.3)		
Live with spouse & children	9 (39.1)	3 (13.0)	12 (26.1)		
Live with relative	0	3 (13.0)	3 (6.5)		
Relation with Caregivers				--1.014	.310
Don't have	0	2 (8.7)	2 (4.3)		
Daughter/ Son	17 (73.9)	17 (73.9)	34 (73.9)		
Daughter/ Son in-law	1 (4.3)	0	1 (2.2)		
Grandchild	5 (21.7)	3 (13.0)	8 (17.4)		
Relatives	0	1 (4.3)	1 (2.2)		

Table 8 Demographic Characteristic of the Experimental and Control Groups (Continued).

Items	Experimental Group n (23) N (%)	Control Group n (23) N (%)	Total N (46) N (%)	Mann-Whitney U Z	p < .05
Amount of chronic Diseases				-.474	.636
Healthy	3 (13.0)	4 (17.4)	7 (15.2)		
Have 1 disease	12 (52.2)	13 (56.5)	25 (54.3)		
Have 2 diseases or more	8 (34.8)	6 (26.1)	14 (30.4)		

Table 8 showed the demographic characteristics of the experimental and control group and revealed that the most of them (87.0%) were female. The majority of the experimental group was 66-75 years old and 66-70 years old in the control group. Most in both groups were widowed/divorced/separated (56.5%) and graduated from primary school (67.4%). All of the samples were Buddhists. For their careers, the majority in both groups were house workers (71.7%). Interestingly, most of the participant in the both groups (37.0%) had an income below 500 Baht per month. 65.2% of the subjects had health insurance which was paid by the Universal Health Care Coverage Scheme. Most of the participants in both groups took the amount of medications 1-3 kinds and 15.2% took more than 4 kinds. Most of the participants in both groups (54.3%) lived with their children and most of their caregivers (73.9%)

were their daughters or sons. The majority of the samples in both groups (54.3%) had only one chronic disease. In addition, all these variables between the experimental and control groups were compared by Mann-Whitney U test and showed that there was no significant differences of these variables.

The hypotheses testing

Mean score differences of the Berg Balance Scale and the Time Up and Go Test between the experimental and the control group were examined at pretest and posttest.

The results answered the hypotheses as follow:

1. The elders who participate in a Fall Prevention Program had significantly improved gait and balance than ones who do not participate in the program.

2. The elders who participate in a Fall Prevention Program had significantly different their gait and balance before and after the program.

Table 9 Comparison of the Berg Balance Scale (BBS) scores between the experimental and the control group before and after participation in a Fall Prevention Program by the paired *t* test.

Items	**Experiment Group n (23) Mean (SD)**	**Control Group n (23) Mean (SD)**	**Paired *t* test**	
			t	***p* value**
Pretest BBS	47.83 (5.18)	48.26 (5.96)	.298	.769
Posttest BBS	52.52 (2.64)	45.00 (7.80)	-5.237	.000*

* Significance at $p<.05$

The results in table 9 showed that, before participation in a Fall Prevention Program, the experimental group had no significantly the Berg Balance Scale mean scores lower than the control group (p = .769). After participation in a Fall Prevention Program, the experimental group had significantly the Berg Balance Scale mean scores higher than the control group (p = .000).

Table 10 Comparison of the Time Up and Go Test mean scores between the experimental and the control group before and after participation in a Fall Prevention Program by the paired *t* test.

Items	**Experiment Group n (23) Mean (SD)**	**Control Group n (23) Mean (SD)**	**Paired *t* test**	
			t	***p* value**
Pretest TUGT	16.04 (6.13)	14.04 (3.44)	-1.370	.184
Posttest TUGT	11.35 (2.33)	15.09 (3.91)	4.142	.000*

* Significance at $p<.05$

The results in table 10 showed that, before participation in a Fall Prevention Program, the experimental group had no significantly the Time Up and Go Test mean scores higher than the control group (p = .769). After participation in a Fall Prevention Program, the experimental group had significantly the Time Up and Go Test mean scores lower than the control group (p = .000).

Table 11 Comparison of the Berg Balance Scale and the Time Up and Go Test mean scores in the experimental and the control group before and after participation in a Fall Prevention Program by the paired *t* test.

Variables	n	Pretest Mean(*SD*)	Posttest Mean(*SD*)	Paired *t* test *t*	*p* value
Berg Balance Scale					
Experiment group	23	47.83 (5.18)	52.52 (2.64)	6.642	.000*
Control group	23	48.26 (5.96)	45.00 (7.80)	-2.319	.030*
Time Up and Go Test					
Experiment group	23	16.04 (6.13)	11.35 (2.33)	-3.728	.001*
Control group	23	14.04 (3.44)	15.09 (3.91)	1.910	.069

* Significance at $p<.05$

The results in table 11 showed that after participation in a Fall Prevention Program, the Berg Balance Scale mean scores in the experimental group were significantly higher than before participation in a Fall Prevention Program (p = .000), while the control group had significantly the Berg Balance Scale mean scores lower than before the program (p = .030).

In addition, after participation in a Fall Prevention Program, the Time Up and Go Test mean scores in the experimental group were significantly lower or better than before participation in a Fall Prevention Program (p = .001), while the control group had no significantly Time Up and Go Test mean scores higher or worse than before the program (p = .069).

Summary

The data of 23 match paired subjects in a Falls Prevention Program experimental and control group were analyzed for answering the hypotheses. Hypotheses testing were tested by paired *t* test for the Berg Balance Scale and the Time up and Go test mean scores.

The characteristics of the subjects in the experimental and the control group were not significantly different at the pretest. The analysis results showed that before begin a Falls Prevention Program, the Berg Balance Scale and the Time up and Go test mean scores were no difference.

After a Fall Prevention Program, the Berg Balance Scale in the experimental group were significantly higher than the control group (p = .000) and, the Time up and Go test mean scores in the experimental group were significantly lower or better than the control group (p = .000). It can be concluded that the elders who participate in a Fall Prevention Program had significantly improved their gaits and balances than ones who do not participate in the program. These study results were congruent with the first hypotheses.

The analysis results also showed that after participation in a Fall Prevention Program, the experimental group had significantly increase the Berg Balance Scale mean scores (p =.000) and had significantly decreased the Time up and Go test mean scores than before participated the program (p = .001). It can be concluded that the elders who participate in a Fall Prevention Program had significantly improved their gaits and balances. These study results were congruent with the second hypotheses.

In addition, the results also showed that at the end of the program, the control group had significantly decrease the Berg Balance Scale mean scores (p =.030) and had no significantly increased the Time up and Go test mean scores than before the program (p = .069).

CHARPTER V

DISCUSSION

This charter presents the summary of the study, a discussion of the research findings. It explores the effect of a Fall Prevention Program on the Berg Balance Scale, the Time Up and Go test, and the Health Belief Pattern for Fall Prevention behavior in Elders; Theoretical aspects of a Fall Prevention Program. In addition, the implications for nursing practice, nursing education, national health policy, and recommendations for future research are described.

Summary of the Study

A Fall Prevention Program to improve gait and balance of community-dwelling elders in this study was the trial involved an 8-week period. The program was constructed by applying the Health Belief model, Knowles' adult learning principle, and considerations for normal aging changes. The program included a 4-days fall prevention education sessions which informs and explains knowledge about falls and a Fall Prevention Program for the elders followed "A Fall Prevention Program Manual", typically 1-1.30 hours., and Tai Chi Group Exercise Sessions meant providing Tai-Chi exercise benefit knowledge and the 18 forms Tai chi training, guidance, and positive reinforcement followed "A Tai-Chi exercise manual",

a CD-Rom of the Tai Chi Master performing the 18 form taught, and a poster depicting 18 forms Tai Chi exercise. Begin with group training sessions 30-45 minutes x 8 days continuously and then had group exercises 30-45 minutes x 3 days per week though a 8-week of intervention.

The results of the study found that the elders who participated in a Fall Prevention Program had significantly higher mean scores of the Berg Balance Scale and significantly lower mean scores or better scores of the Time up and Go test, than ones who did not participate in the program ($p < .05$).

Furthermore, the analysis results also showed that after participation in a Fall Prevention Program, the mean scores of the Berg Balance Scale in the experimental group were significantly higher and the means scores of the time up and Go test were significantly lower or better than before the program ($p < .05$). In contrary, the control group had significantly lower mean score of the Berg Balance Scale ($p < .05$) and had no significantly higher or worse mean scores of the Time Up and Go Test than before the program ($p = .069$).

It can be concluded that the elders who participated in a Fall Prevention Program had significantly improved their gaits and balances and had significantly different their gait and balance before and after the program. The following finding discussion is presented.

Discussion

The effect of a Fall Prevention Program

The Berg Balance Scale

The results of the study found that the elders who participated in a Fall Prevention Program had significantly higher mean scores of the Berg Balance Scale than ones who did not participate in the program. In addition, the elders who participate in a Fall Prevention Program had significantly improved their gait and balance.

The elders who participated in a Fall Prevention Program included a 4-day fall prevention education sessions, an 8-day exercise training sessions, and then had group exercises 30-45 minutes x 3 days per week though an 8-week of intervention.

In the preparation phase in the program (an 8-day session) was very importance time to develop the participants in the experimental group about the health belief pattern for fall prevention behaviors. A 4-education fall prevention behaviors session and an 8-Tai Chi exercise session which were guided by the constructed of the Health Belief Model, Adult learning principles, and considerations about normal aging changes related learning ability in the elders, could significantly improve the health belief pattern about fall prevention behaviors in the experimental group.

After a 4-education fall prevention behaviors session, the participants in the experimental group had significantly higher mean score of the Health Belief Pattern for Fall Prevention Behavior in Elders Questionnaire than the control group ($p < .05$). In addition, after participation in a Fall Prevention Program for 4 weeks, the

experimental group had significantly higher their mean score of the Fall Prevention Behavioral Scale than before participated in the program (p = .037).

Health Belief about fall prevention behaviors in elders was the individual belief that the consequences of a fall as very severe, there was a susceptibility to a fall, that there was perceive protective action that was very effective. These individuals saw few costs or barriers to have falls prevention behavioral practices for prevent falls, they had cue to actions and had self-efficacy in fall prevention behavioral practices and exercise by Tai-Chi exercise. Finally, they had have routinely in fall prevention behavioral practices which included fall risk reduction, safety medications use, home modification, safety changing position practices, and Tai Chi exercise 30-45 minutes x 3 days per week though an 8-week of intervention.

The results of the study found that, after participation in a Fall Prevention Program for 4 weeks, the experimental group had significantly higher their mean score of the Fall Prevention Behavioral Scale than before participated in the program (p = .037). The results of routinely fall prevention behavioral practices of the participants were that, participants who participated in this program could improve their gaits and balances and had significantly improve their Berg Balance Scale scores than ones who did not participate in the program.

The results of the study confirmed that Tai Chi exercise benefited to increase balance in the elders. The specific therapeutic elements of Tai Chi exercise which were explored by Wolf (1997) included continuous and slow movement could increased once mastered, during loading onto that limb 70% of body weight shifting to the other leg was the majority of lower extremity muscle strengthening; straight and extended head and trunk positioning promote flexibility; trunk, head, and

extremity rotation in circles create a strong rotational component; symmetrical and diagonal arm and lower extremity movements promoted arm swing in gait and increased trunk rotation around the waist; constant shifting to and from the right and left legs emphasized progressively more displacement of body mass developed skill at ultimately achieving unilateral weight and balance through self-awareness of limitations in postural stability in elders.

In addition, Tai Chi might improve the ability to control balance by training the mind and body to integrate balance-related sensory information and by helping an individual to develop a greater "awareness" of both body position and limits to stability.

The useful techniques to potentially increase the balance and confidence in one's ability to move in the environment were at least 3 forms of a 18-forms Tai Chi exercise in this study. The 11^{th} – 13^{th} form were slow and purposeful heel-to-toe (forward) or toe-to-heel (backward) movement of the feet while shifting the weight of the body in a rhythmic motion in coordination with breathing (11 Scooping from the sea and looking at the sky, 12 Undulating waves, 13 The flying dove spread its wings).

In the 15^{th} forms of a 18-forms Tai Chi movements (The wild goose flying) which practiced standing on the toe and forefoot or plantar loading which mainly located in the anterior–medial areas of the foot were not only enhanced muscle strength, but also improved the somatosensory input in the great toe region to assist in balance control to a greater extent than would be achieved with normal walking (Mao, Li, and Hong, 2006).

Practicing Tai Chi Exercise in the 17th forms of an 8-form Tai Chi movements (Bouncing a ball with steps) which practiced standing on one leg was probably help the elderly to increase muscle contraction time and thus may enhance muscle strength and endurance. This might help manage and simulate the activities that were encountered during daily activities, such as stepping over an obstacle and pulling on long trousers when dressing (Chau and Mao 2006).

This finding was consistent with a previous research reported that a 3-time-weekly (18 sessions) exposure to Tai Chi in a 1 hour x 8 weeks trial involving the 11 elders with 68-92 years old who live in a public housing facility in USA, could improve balance (a single stance balance test) in the elders in within group (Ross et al, 1999). In addition, this study result was congruent with Zhang et al (2005) who investigated the effect of a 24-form Tai Chi exercise program in 1 hour x 7 times/week for 8 weeks in community-dwelling elder in China, and found that short term Tai Chi exercise program can improve balance (a single stance balance test). Both studies revealed that the frequency of tai Chi exercise had to consider that more short time period, more frequency in Tai Chi exercise. However, the measurements for balance assessment among these 3 studies were differently. Ross et al, (1999) and Zhang et al (2005) assessed the balance ability by using a single stance balance test. In this study, the balance ability was accessed by using The Berg Balance Test which was the most powerful test in discriminating fallers from non-fallers, among The Berg Balance Test (BBS), Tinetti Mobolity Score (TMS), Elderly Mobility Scale (EMS), and Time up and Go test (TUG) (Chiu, Au-Yeung and Lo, 2003).

Moreover, this study showed the effect of Tai Chi exercise in the shorter time than other studies, such as Li et al (2004) who conducted RCT studied a 24-form of

the classical Yang style Tai Chi exercise in the elders. The subjects practiced Tai Chi exercise 3 times/ week x 6 months, the results showed that the Berg Balance Scale scores in the experimental group were significantly improved than the control group.

In this study, the participants also practiced exercise at home following a Tai Chi exercise CD or poster. The self monitoring about tai Chi exercise at home found that 87.5% of the participants practice Tai Chi exercise independently at home and group session at least 5 time/week, 35-40 minutes/ time. McInnes et al. (2004) suggested one of the key implications for developing a fall prevention program that; it should be ensure that program is flexible enough to accommodate participants' needs and interests. Therefore, it can be assumed that this Fall Prevention Program is additional successful in term of participants' compliance.

In this study also found that the elders who participate in a Fall Prevention Program had significantly improved their the Berg Balance Scale mean scores (p <.05). It meant that Tai Chi exercise could improve individual balance in elder when practice Tai Chi exercise at least 5 times/week, 35-40 minutes/ time.

The Time up and Go test

The results of the study found that the Time up and Go test mean scores in the experimental group were significantly lower or better than the control group ($p < .05$). In addition, after participation in a Fall Prevention Program, the experimental group had significantly lower or better mean score of the Time up and Go test than before participation in the Program ($p = .001$), while the control group had no significantly higher or worse mean scores of the Time Up and Go Test than before the program ($p = .069$). It can be concluded that the elders who participated in a Fall Prevention

Program had significantly improved their gait than ones who did not participate in the program.

This study was congruent with Murphy and colleagues (2005) who examined the effect of Yang style 5-form Tai Chi exercise, 60-90 minutes/ time x 2 times/week x 12 week, found that the Time up and Go test scores were significantly better than pretest (p = .000). However, there was no control group in Murphy's study. In addition, the result of this study was consistent with Taggart's study (2002) which found that after control by time for 3 months, then the subjects practiced 10 forms of Tai Chi exercise x 2 times/ week x 3 months, the results show that Time up and Go test scores were significantly improved.

With increase age, the temporal and spatial parameters of gait initiation were smaller, slower, more variable, and less forceful in both the mediolateral (ML) and anteroposturior (AP) directions (Hass, 2004). Cummings and Nevitt (1989) suggested that the inability to generate sufficient momentum during gait initiation might cause people to fall. In addition, the alterations in posture, movement patterns, and gait among older individuals might be caused by varying degree of slowed movement, reduced range of motion (ROM), reduced muscle strength, increased flexed posture, reduced rotational movements; especially in the trunk, reduced arm swing, and decreased unilateral weight shifts and stance times. In fact, as people age, axial movements, and motions at the cervical spine becomed more limited, while trunk postural muscles tended to be more slowly engaged when upper extremity motions were made (Wolf, 1997).

This study consistentd with Hass et al (2004) that Tai Chi forms involved transitioning from double-limb to single-limb support, thus emphasizing dynamic

weight shifting to a narrowing base of support (Hass et al, 2004). Some studies had quantified the changes in motor coordination or postural control that occured after Tai Chi training (Mak and Ng, 2003). It can conclude that the results of the study confirmed therapeutic elements of Tai Chi exercise benefited to increase gait ability in elders.

Summary

The results of this study added supportive to the use of Tai Chi as a form of exercise in the elders. In particular, Tai Chi exercises as a safe and enjoyable form of exercise that could be learned in a short period of time. The physiologic benefits indicated that Tai Chi exercises were valuable as a method of improving gaits and balances in the elders especially in one who had a high risk of fallings. Tai Chi exercises had several appealing advantages over other forms of exercises including it didn't require any special clothing or equipment and therefore was less expensive, once the movement was learned, it could be practiced individually at home or in a group setting, and finally, the simple, soft, and fluid movements were ideally for the elders (Schaller, 1996).

The Theoretical aspects of a Fall Prevention Program

This research finding demonstrated that a Fall Prevention Program in this study effectively improved gait and balance in community-dwelling elders. In addition, it was proved that applying constructs of the Health Belief Model (HBM) into a Fall Prevention Program can be valuable. The Health Belief Model was used to

understand health behavior changes and possible reasons for health actions (Becker and Rosenstock, 1984) and it was very useful in guideline development for a Fall Prevention Program which included fall prevention education sessions and Tai Chi exercise sessions.

It can be explored regarding a Fall Prevention Program which applied by the constructed of the Health Belief Model, Adult learning principles, and considerations about normal aging changes related learning ability in the elders, as follow:

Perceived severity of a fall

A perceived severity of a fall was when the individual believed that a fall would have at least a moderate to severe affect on some components of the individual life or on the well-being of the individuals. Knowles (1990) believed that adult were problem centered in their orientation to learning and will learn when they perceived a need. Providing incident of falls in community-dwelling elders, discussion about their own falls experiences and severity or effect of falls might increase awareness of falls and increase the elders' desire for falls prevention learning.

The results showed that after participation in a Fall Prevention Program, the experimental and the control groups had no significantly different mean score of the perceived severity of a fall. However, before and after the program, the both groups had the mean score higher than 80%.

All participants in this study had at least 1 fall within 12 month prior to participation in the study. It can be assumed that their falls experienced made the participants already had the realistic perception of the facts concerning falls and theirs consequences which could be physical injury, such as a bone fracture or head injury,

disability, a financial burden, psychological effects and the susceptibility to recurrent falls.

If an individual perceived the severity of the consequences of a fall, then that same person might recognize the susceptibility of an actual event and realize personal susceptibility.

Perceived susceptibility of a fall

Perceived susceptibility of a fall was when the individual believed that he or she was personally susceptible of a fall. The results in this study showed that before and after participation in a Fall Prevention Program, the experimental group had significantly higher mean scores of the perceived risk of falls than the control group (p = .010 and .004 respectively). Perceived susceptibility should be replaced with their experiences of falls.

However, a previous study found that some elders had the idea that a fall was fatalism; they could not stop themselves from falling because of God's will (Machen, Dickinson, Horton, and Kapoor, Available from http://64.233. 167). Some elders had believed that falls were the part of the normal aging process, so they could not prevent it. To be able to perceive the susceptibility of falls, the participants should have a realistic perception of the facts concerning their own fall risk factors and an understanding that falls could be prevented by minimizing their risks of falls.

People from different regions of the world might accept the perception of their own susceptibility to having falls but with those realizations there must be expectations associated with possible outcomes of the event.

Perceived benefits of fall prevention behavioral practice

Perceived benefits of fall prevention behavioral practice was when the individual believed that being involved fall prevention behavioral practice would be beneficial by reducing the individual's susceptibility to a fall. In this study, in order to promote the participants' perceived benefits of fall prevention behavioral practice, the researcher promoted the benefits of fall prevention strategies including fall prevention behavioral practice and Tai Chi exercise.

The results of the study found that after participation in a Fall Prevention Program, the experimental and the control groups had no significantly different mean score of the perceived benefit of fall prevention behavior practices. However, before and after the program, the both groups had the mean score of the perceived benefit of fall prevention behavior practices higher than 80%. It could be explained by the facts that the participants in the both groups had their fall experiences for a period of time; the situations might encourage them to have falls prevention behaviors and seek more information about falls prevention strategies. Moreover, before the program, the both groups were explained about the benefit of the program and were encouraged to participate in a Fall Prevention Program by the researcher and staffs at the local health centers.

While many elders could recognize the benefits of fall prevention behavioral practice, they could also identify certain barriers to attaining these benefits.

Perceived barrier of fall prevention behavioral practice

Perceived barrier of a fall prevention behavioral practice was when the individual believed that the action of a fall prevention behavioral practice did not entail overcoming important barriers such as cost, inconvenience, pain or embarrassment. A qualitative study showed that the barriers, which prevented action in a fall prevention program, were denial of age, a fatalistic attitude, a lack of knowledge, and the lack of information (Machen et al Available from http://64.233.167).

In this study reduced perceived barrier of a fall prevention behavioral practices through discussion about perceived barrier of a fall prevention behavioral practices' participants and brainstorming to find out or faced to overcome each barrier. In addition, to reduce perceived barrier of a fall prevention behavioral practices, this Fall Prevention Program sessions were conducted at the Faculty of nursing, Burapha university, Chonburi: Thailand, where were completely facilities for organization the Fall Prevention education sessions and Tai Chi exercise sessions through out the 8-week intervention. It included a natural air flow big room for safety and comfortable, the adequately stable chairs for safety supportive when exercising; the teaching media included a visualize projector for clearly vision, the perfect sound system for clearly hearing, and suitable and enough rest room for the elders' incontinence. For decreasing perceives barriers of a fall prevention behavioral practices, the participants were reassured that pain and fatigue are not inevitable when exercising. In view of fact that, the most participants had not enough income, therefore, the transportation was organized for travel supportive and the travel cost of the participant were refunded.

The t-test analysis found that before and after participation in a Fall Prevention Program, the experimental group had significantly perceived barrier of fall prevention behavior practice less than the control group (p = .017 and .000 respectively).

Perceived cues to action of the fall prevention behavioral practice

Perceived cues to action of the fall prevention behavioral practice was when an individual believed that a cue to appropriate action appears to be essential. An important consideration for a fall prevention behavioral practice was to focus on providing cues that could enhance the adherence which was relevant to the encouragement of fall prevention behaviors. In this study, researcher considered cues in terms of accessibility, such as the convenient place of the program and the availability of free transportation, the characteristics of the fall prevention program, invitation individual verbally and a individual invitation letter, supportive staffs and family members (family members were invited to participate in a session of falls prevention education. The role of a family member in fall prevention behaviors' elder was discussed and informed.), and free of charge program. These cues to action were congruent with the result of a qualitative study that the triggers to action of a fall prevention behavioral practices were a bad fall, an invitation to participate, family/friends, and other networks (Machen et al, 2004).

This study also provided support for the longstanding belief that continuously practiced fall prevention behaviors and Tai Chi exercise could improve gait and balance which as meant to decrease fall risks. After re-evaluation the Berg Balance Scale and the Time up and Go test after the intervention, the participants in the experimental group were verbally and documentary reported their results. This

strategy was applied from Knowles' adult learning principles that adults need to be involved in the planning and evaluation of their instructions or their results, adults are most interested in learning about subjects that have immediate relevance to their job or personal life, and adult learning is problem-centered rather than content-oriented (Knowles, 1970). In addition, this strategy also encouraged them to have more self-efficacy to continue fall prevention behaviors practices and Tai Chi exercise.

The availability of social support should be considered for a cue to successfully program (Taggart, 2002). This support might be from the community nurses, family members, relatives, friends, neighborhoods, or other sources such as local government, sub-district administration organization. In this study, there were 3 couples who were the participants; several participants indicated that their children and grand-children had encouraged and supported them in Tai Chi exercise such as participated in falls prevention educational and Tai Chi exercise sessions, helping them to open the Tai Chi exercise in CD player, some bought a new CD player for them, some practiced Tai Chi exercise together at home, some picked them up to the research setting. One participant, her daughter-in-law participated with group all of sessions. Moreover, the participants who participated in the program encouraged each other during the falls prevention education sessions and Tai Chi exercise sessions for keeping track of attendance.

Moreover, this study recruited the participants through a local health system. A great amount of enthusiasm and support for the initial recruitment and consent processes from nurses and health volunteers in each local health centers made them widely accessible. The program was implemented at the faculty of nursing, Burapha University; Chonburi: Thailand. It was the local facility in the community, it seem to

be sustainable and transferable to other settings. One of the participants was suspected that she had an early sign (tremor) of a Parkinsonism syndrome, the researcher advised, provided information about the disease and the health care service system, and encouraged to visit a Neuromedicine specialist at government hospital. After visiting the specialist, she was taken care as a Parkinsonism with some medicines and continuing participated in the program with decrease tremor and feel very happy.

The t-test analysis found that after participated in a Fall prevention Program, the experimental group had significantly perceived cue to action of a fall prevention behavior practices mean scores higher than the control group (p = .042).

A Fall Prevention Program needed more than external help, such as educational programs, clinical help and community participation, but it also needed for the elders to believe in their capabilities to take care to prevent falls.

Perceived self-efficacy of fall prevention behavioral practices

Perceived self-efficacy of fall prevention behavioral practice was when the individual beliefed in his or her ability to carry out fall prevention behavioral practice. In this study, the elders who had at least an experience of falling, might feel a loss of self-confidence to ambulate safely which could result in self-imposed functional limitations (Brown, 1999; Clark, Lord, and Webster, 1993). The important strategies in a Fall Prevention Program for achieving competence were provided training skill for changing positions and Tai Chi exercise sessions, verbally goal setting to falls prevention, giving verbal and non-verbal positive reinforcement by individual recognition and praised them when they had positively fall prevention behaviors practices. These strategies were essential for an individual perception that he or she

could positively help increase fall prevention behavioral practices. After skill for changing positions and Tai Chi exercise sessions training, the participants in the experimental group had their more perceived self-Efficacy of falls prevention behavior practices than before the program and had significantly perceived self-Efficacy of falls prevention behavior practices mean scores higher than the control group (p = .011).

Implications and Recommendations

The findings of this study have implications for nursing practices, nursing educations, and national health policy. In addition, recommendations for future researches are presented.

1. Implications for nursing practices

The results of the study revealed that a Fall Prevention Program could improve gait and balance, increased health belief pattern for fall prevention behavior and increased fall prevention behaviors in the elders. It can conclude that a Fall Prevention Program in this study appeared to be powerful enough to exert an impact on gait and balance, appropriated intensity to actually improve gait and balance, and while being flexible enough to be delivered in community real world settings. This program can be established as a part of health promotion at all levels of the health care services including government and private sectors such as; local community health centers, community hospitals, and general hospitals.

One important finding emerged in this Fall Prevention Program was successful participants' behavioral change strategies. The participant needed to frequent reminders and encouragement to attend the beginning classes, until the group developed cohesiveness and skills in the Tai Chi exercise.

Nurses should focus to fostering independence by promoting exercise activity among elders. Nurses are frequently in the position to assess activity level and recommend exercise as an independent nursing role. It is vital that nurses working with elders are aware of the different forms of exercise that are available and what each method can offer. Tai Chi exercise is a type of exercise that nurses might consider when discussing exercise options with clients. Community nurses are well placed to encourage this Fall Prevention Program of primary prevention to reduce the likelihood of a person falling (Schaller, 1996).

For effectively maintenance a Fall Prevention Program, it's needed to promote the social value of a Fall Prevention Program and the physical benefits to make the elder' attractive to participate in the program. The importance of identifying and addressing factors associated with activity avoidance or barrier to fall prevention behavior practice, particularly for those new to exercise. In clinical practice, it is important to consult with individual potential participants and find out what characteristics they are willing to modify, and what changes they are prepared to make to reduce their risk of falling (McInnes and Askie, 2004). Practitioners should put the older person in contact to assist them in accessing an exercise program (Unsworth and Mode, 2003).

Tai Chi for nurse

Nurses can counsel and refer people who may benefit from Tai Chi and also learn Tai Chi and teach those who are interested. Otherwise, nurses may talk with people who have taken Tai Chi and find out more about different teachers that are available in the community.

Tai Chi classes are available at several community health centers and on videotapes at video stores, libraries, and through mail order. However, it can be difficult for elders to access these facilities, nurses are in a key position to assist older adults in accessing the resources they need to make a decision and take action to start and maintain a Tai Chi exercise program to improve their health condition (Adler and Roberts, 2006).

Nurses can use Tai Chi and its principles to care for older adults in a variety of settings. Although someone could not stand and needed to remain seated, they were able to follow along and perform the arm movements while breathing slowly. Tai Chi is a viable exercise option with many potential benefits for elders. Therefore, nurses have the responsibility to promote the use of Tai Chi to improve the lives and health of the people they work with and care for.

Implications for Nursing Education

Curriculum of fall prevention program should be developed for many levels of health care providers and health educators including health volunteers, undergraduate nurse, graduated nurses, and advanced nurse practitioners training.

Implications for National Health Policy

The successful results of this study show the effectiveness of a Fall Prevention Program that can improve gait and balance of community-dwelling elders. The national health policy should be concerned with the following points:

1. The public health organizations should promote widespread adoption this program to all local levels.

2. The Outpatient Falls Clinics should be established at all level of health care services by developing an agreed set of protocols and procedures for outpatient fall clinics based on an assessment of evidence. The clinics will be undertaken to scope the demand on day hospital services. The clinics may undertake specialist medical review with comprehensive fall risks screening prior to referring to a Fall Prevention Program and/ or The Home Falls Prevention Services.

3. The Home Falls Prevention Services should be established at all level of local health care services for the home assessment and home modification for the safety living of the elders. It can be cooperated by the disciplinary team including physicians, community nurses, occupational therapists, physiotherapists, social workers, and health volunteers.

4. The community health center and the hospital should collaborate for developing of agreements about patient pathways, referral criteria and resources.

5. The fall prevention education materials such as leaflets, a Fall Prevention Educational manual, a Tai Chi Exercise manual, and a CD in Tai Chi exercise instruction should be provided and didtributed widely.

Recommendations for Future Research

Several issues pertaining to a Fall Prevention Program in this study, await additional researches:

1. It would be useful if future researches examine how long the effects of a Fall Prevention Program last.

2. Under what conditions, and to what extent organizations continue offering the program.

3. Studies on patients' views and preferences to a Falls Prevention Program is needed.

4. As older people with cognitive impairment and dementia are at particularly high risk of falls and their associated morbidity, it is important that prevention of falls remains a research priority in this patient group. Further work is required in elders with cognitive impairment and dementia who fall to determine optimal delivery of interventions and to identify the most important modifiable risk factors.

5. Additional efforts are needed to successfully calculate and disseminate cost effective of fall prevention programs.

6. More research is also needed to better understand the cost-effectiveness of injury prevention strategies.

7. Analysis of Pattern of Falls and continence assessments.

8. Long-term studies of the effect of a Fall Prevention Program on the incidence of falls, depression, and analgesic use may be important.

9. Examining the effect of a Fall Prevention Program using randomized

clinical trial design with the experimental and the control group may reduce potential confounding effects.

10. Exploring potential mechanism underlying the gait and balance in the elder with each form or movement of the Tai Chi exercise.

11. Examining the effect of a Falls Prevention Program with the elders with other chronic diseases such as in hemodialysis patients or vestibular dysfunction patients to determine if similar benefit can be achieved.

Generalizability of the results

The result of this study may highlight the contribution to the evidence base practice, particularly for a combine strategies fall prevention program. With respect to the intervention, this program can be used elsewhere and is likely to have similar effects when offered to similar target population. A complete intervention guide is available, making it to use in different settings. More broadly, the results showed this Fall Prevention Program can effectively enhance gait and balance in elders. To do so, this program should do the following:

1. Focus on the high risk group such as elders who have experienced of falls or elders who have gait and balance deficit.

2. Respect knowledge under principles of the Health belief model, Adult Learning Principle, consideration of the age related-changes, and concerning of the dose, duration, and intensity of the program.

APPENDICES

APPENDIX A

The Fall in Community – Dwelling Elder Survey Form

แบบสำรวจการหกล้มในผู้สูงอายุที่อาศัยอยู่ในชุมชน

สถานีอนามัยตำบล.....อ.เมือง จ.ชลบุรี

รายนามหัวหน้าสถานีอนามัย.....

เบอร์โทรศัพท์ที่ติดต่อได้สะดวก.....

คำชี้แจง โปรดเติมคำในช่องว่างหรือใช้เครื่องหมาย / กาลงในช่องว่างหน้าข้อความ ที่ตรงกับความเป็นจริง

ชื่อผู้สูงอายุ.....นามสกุล.....อายุ.....ปี

บ้านเลขที่.....หมู่ที่.....ชื่อชุมชน/หมู่บ้าน.....

ถนน.....ตำบล.....อ.เมือง จ.ชลบุรี รหัสไปรษณีย์.....

เบอร์โทรศัพท์ที่บ้าน.....เบอร์โทรศัพท์มือถือ.....

<u>แบบสอบถามเกี่ยวกับการหกล้มของผู้สูงอายุ</u>

1. ในรอบ 12 เดือน ที่ผ่านมา ท่านเคยหกล้มหรือไม่

☐ เคย จำนวน.....ครั้ง ☐ ไม่เคย

2. กรุณาระบุรายละเอียดของการหกล้ม

2.1 การหกล้มครั้งที่ 1 เกิดเมื่อเดือน.....พ.ศ.....

ในการหกล้มครั้งนั้น ท่านได้รับบาดเจ็บหรือไม่

☐ ไม่ได้รับบาดเจ็บใดๆ

☐ ได้รับบาดเจ็บเล็กน้อย มีแผลถลอก ฟกช้ำ ปวดเมื่อย แต่ไม่ต้องไปรับการรักษาที่สถานีอนามัยหรือ รพ.

☐ ได้รับบาดเจ็บขั้นปานกลาง มีบาดแผล หรือรอยฟกช้ำขนาดใหญ่ เจ็บปวดตามร่างกาย ต้องไปรับการรักษาที่สถานีอนามัยหรือรพ. แต่แพทย์อนุญาตให้กลับไปรักษาตัวที่บ้านได้

☐ ได้รับบาดเจ็บขั้นรุนแรงเช่น กระดูกหัก ข้อเคลื่อน หรือ บาดเจ็บที่ศีรษะ ต้องไปนอนพักรักษาตัวที่รพ.

.

2.3 การหกล้มครั้งที่ 3 เกิดเมื่อเดือน.....พ.ศ.....

.

หมายเหตุ: การหกล้มในที่นี้ หมายถึง การที่ร่างกายสูญเสียการทรงตัวทำให้อวัยวะส่วนใดส่วนหนึ่งของร่างกายตกหรือกระแทกพื้น หรือกระแทกระดับที่ต่ำกว่าเช่น โต๊ะ เก้าอี้ หรือพื้น โดยบังเอิญ การหกล้มที่เกิดขึ้นอาจทำให้ร่างกายของท่านได้รับบาดเจ็บหรือไม่ก็ตาม ทั้งนี้ไม่นับการหกล้มที่เกิดจากโรคหลอดเลือดสมองแตก ตีบ หรือตัน ไม่นับการหกล้มที่เกิดจากการ เป็นลม หรือ การหกล้มที่เกิดจากแรงกระแทกภายนอก เช่นถูกเดินชน เป็นต้น

APPENDIX B

The Community Surveys for Research Settings Selection (June 2006)

ตำบล	อสม. (คน)	สำรวจ (คน)	หกล้ม (คน)	ร้อยละ
บางทราย	6	61	50	
แสนสุข	15	106	46	
บ้านสวน	10	116	42	
บ้านปึก	7	84	24	
อ่างศิลา	5	49	8	
บ้านโขด, มะขามหย่ง, บางปลาสร้อย	12	139	57	
รวม	**43**	**416**	**170**	**40.86**

APPENDIX C

The General Information Questionnaire

แบบสอบถามเกี่ยวกับข้อมูลทั่วไปของผู้สูงอายุ

คำชี้แจง โปรดเติมคำในช่องว่างหรือใช้เครื่องหมาย / กาลงในช่องว่างหน้าข้อความ ที่ตรงกับความเป็นจริง

ชื่อผู้สูงอายุ.....นามสกุล.....อายุ.....ปี

บ้านเลขที่.....หมู่ที่.....ชื่อชุมชน/หมู่บ้าน.....

ถนน.....ตำบล.....อ.เมือง จ.ชลบุรี รหัสไปรษณีย์.....

เบอร์โทรศัพท์ที่บ้าน.....เบอร์โทรศัพท์มือถือ.....

การตรวจสุขภาพ

ชีพจร.....ครั้ง/นาที ☐ สม่ำเสมอ ☐ ไม่สม่ำเสมอ

ความดันโลหิต.....มม.ปรอท

ส่วนสูง.....เซนติเมตร น้ำหนัก.....กิโลกรัม.....

ส่วนที่ 1 แบบสอบถามเกี่ยวกับข้อมูลทั่วไปของผู้สูงอายุ

1. เพศ ☐ ชาย ☐ หญิง
2. สถานภาพสมรส ☐ โสด ☐ คู่ ☐ หม้าย หย่า แยก
3. สถานภาพความเป็นอยู่ ☐ อยู่คนเดียว ☐ อยู่กับคู่ครอง
   ☐ อยู่กับบุตรหลาน ☐ อยู่กับคู่ครองและบุตรหลาน
   ☐ อยู่กับญาติ ☐ อยู่กับคนอื่น
4. อาชีพ .....
5. ผู้ดูแลหลักยามเจ็บป่วย (เฉพาะคนที่อยู่บ้านเดียวกัน)
   ☐ ไม่มี
   ☐ มี ชื่อ.....นามสกุล.....อายุ.....ปี
   อาชีพ.....วันที่สามารถมาร่วมกิจกรรมกลุ่มได้ (จันทร์-อาทิตย์).....
   ความสัมพันธ์.....เบอร์โทรศัพท์ที่บ้าน.....เบอร์โทรศัพท์มือถือ.....

.

13. ท่านรับประทานยาอะไรเป็นประจำ

☐ ไม่มี ☐ มี จำนวน.....ชนิด (โปรดระบุชนิดของยา).
☐ ยารักษาความดันโลหิตสูง
.
.
☐ อื่นๆโปรดระบุ.....

<u>ส่วนที่ 2 แบบสอบถามเกี่ยวกับการหกล้มของผู้สูงอายุ</u>

1. ในรอบ 12 เดือน ที่ผ่านมา ท่านเคยหกล้มหรือไม่

☐ เคย จำนวน.....ครั้ง ☐ ไม่เคย

2. กรุณาระบุรายละเอียดของการหกล้ม

2.1 การหกล้มครั้งที่ 1 เกิดเมื่อเดือน.....พ.ศ.....

ในการหกล้มครั้งนั้น ท่านได้รับบาดเจ็บหรือไม่

☐ ไม่ได้รับบาดเจ็บใดๆ

☐ ได้รับบาดเจ็บเล็กน้อย มีแผลถลอก ฟกช้ำ ปวดเมื่อย แต่ไม่ต้องไปรับการรักษาที่สถานีอนามัยหรือ รพ.

☐ ได้รับบาดเจ็บขั้นปานกลาง มีบาดแผล หรือรอยฟกช้ำขนาดใหญ่ เจ็บปวดตามร่างกาย ต้องไปรับการรักษาที่สถานีอนามัยหรือรพ. แต่แพทย์อนุญาตให้กลับไปรักษาตัวที่บ้านได้

☐ ได้รับบาดเจ็บขั้นรุนแรงเช่น กระดูกหัก ข้อเคลื่อน หรือ บาดเจ็บที่ศีรษะ ต้องไปนอนพักรักษาตัวที่รพ.

.

2.3 การหกล้มครั้งที่ 3 เกิดเมื่อเดือน.....พ.ศ.....

.

หมายเหตุ: การหกล้มในที่นี้ หมายถึง การที่ร่างกายสูญเสียการทรงตัวทำให้อวัยวะส่วนใดส่วนหนึ่งของร่างกายตกหรือกระแทกพื้น หรือกระแทกระดับที่ต่ำกว่าเช่น โต๊ะ เก้าอี้ หรือพื้น โดยบังเอิญ การหกล้มที่เกิดขึ้นอาจทำให้ร่างกายของท่านได้รับบาดเจ็บหรือไม่ก็ตาม ทั้งนี้ไม่นับการหกล้มที่เกิดจากโรคหลอดเลือดสมองแตก ตีบ หรือตัน ไม่นับการหกล้มที่เกิดจากการ เป็นลม หรือ การหกล้มที่เกิดจากแรงกระแทกภายนอก เช่นถูกเดินชน เป็นต้น

APPENDIX D

The Modified Barthel Activities Daily Living Index (BAI)

แบบประเมินความสามารถในการปฏิบัติกิจวัตรประจำวันของผู้สูงอายุ

1. การรับประทานอาหารเมื่อเตรียมสำรับไว้ให้เรียบร้อยต่อหน้า

    0. ไม่สามารถตักอาหารเข้าปากได้ ต้องมีคนช่วย
    1. ตักอาหารเองได้ แต่ต้องมีคนช่วย เช่นช่วยใช้ช้อนตักเตรียมอาหารไว้ให้ หรือตัดให้เป็นชิ้นเล็กๆ ไว้ล่วงหน้า
    2. ตักอาหารเองและช่วยตัวเองได้เป็นปกติ

2. การล้างหน้า แปรงฟัน หวีผม ในระยะ 24 – 48 ชั่วโมง ที่ผ่านมา

    0. ต้องการความช่วยเหลือ
    1. ทำได้เอง (รวมทั้งที่ทำได้เอง ถ้าเตรียมอุปกรณ์ไว้ให้)
    2. ช่วยตัวเองได้ดี (รวมทั้งการติดกระดุม รูดซิบ หรือใช้เสื้อผ้าที่ดัดแปลงให้เหมาะสมได้)

.

.

.

10. การกลั้นปัสสาวะใน 1 สัปดาห์ที่ผ่านมา

    0. กลั้นไม่ได้ หรือใส่สายสวนปัสสาวะ แต่ไม่สามารถดูแลตนเองได้
    1. กลั้นไม่ได้เป็นบางครั้ง (เป็นน้อยกว่า 1 ครั้งต่อสัปดาห์)
    2. กลั้นได้เป็นปกติ

เกณฑ์การตีความ

0 – 11 คะแนน หมายความว่า การช่วยเหลือตนเองอยู่ในระดับที่ต้องการพึ่งพา

12 คะแนนขึ้นไป หมายความว่า มีความสามารถในการช่วยเหลือตนเองได้ดี

APPENDIX E

Chula Mental Test: CMT

แบบทดสอบสภาพจิตจุฬา

คำชี้แจง ให้ผู้สัมภาษณ์ถามผู้สูงอายุ แต่ละข้อเกี่ยวกับข้อมูลทั่วไป และโปรดทำเครื่องหมาย √ ใน ( ) หน้าข้อความ หรือวงกลมตามคะแนนที่ผู้สูงอายุตอบคำถามได้ตามความเป็นจริง

1. ผู้สูงอายุเคยประสบอุบัติเหตุจนได้รับความกระทบกระเทือนทางสมองหรือไม่ 1( ) ไม่ใช่ 2( ) ใช่ 3( ) ไม่ทราบ
2. ผู้สูงอายุเคยเป็น หรือเป็นโรคที่มีผลกระทบกระเทือนทางสมองใช่หรือไม่ 1( ) ไม่ใช่ 2( ) ใช่ 3( ) ไม่ทราบ
3. ผู้สูงอายุอยู่ในสภาพดังต่อไปนี้หรือไม่ 1( ) ไม่รู้สึกตัว 2( ) พูดไม่ได้. . 6( ) ไม่มีความผิดปกติใด ๆ ดังกล่าวข้างต้น

เฉพาะผู้ที่ตอบคำถามในข้อที่ 3 ว่า ไม่มีความผิดปกติใด ๆ ดังกล่าวข้างต้นเท่านั้น จึงมาทำการทดสอบ สุขภาพจิตในลำดับต่อไป โดย ถ้าคำตอบถูกต้อง ให้คะแนนข้อละ 1 คะแนน ถ้าคำตอบไม่ถูกต้อง ให้คะแนนข้อละ 0 คะแนน

ข้อคำถาม	คำตอบ	คะแนน
1. ปีนี้คุณอายุเท่าไร		1/0
2. ขณะนี้เวลากี่นาฬิกา (อาจตอบคลาดเคลื่อนได้ 1 ชั่วโมง)		1/0
.		
.		
13. 20 ลบ 3 ได้เท่าไร	17	1/0
17 ลบ 4 ได้เท่าไร	13	1/0
14 ลบ 3 ได้เท่าไร	11	1/0

ให้คะแนน 1 คะแนนเมื่อตอบถูกต้อง

คะแนนรวม.....

เกณฑ์การตีความ

คะแนน 0 – 4 หมายถึง มีปัญหาการทำหน้าที่ของสมองระดับรุนแรง
คะแนน 5 - 9 หมายถึง มีปัญหาการทำหน้าที่ของสมองระดับปานกลาง
คะแนน 10 -14 หมายถึง มีปัญหาการทำหน้าที่ของสมองระดับเล็กน้อย
คะแนน 15 -19 หมายถึง มีการทำหน้าที่ของสมองอยู่ในระดับปกติ

APPENDIX F

The Geriatric Depression Scale (GDS)

แบบประเมินภาวะซึมเศร้าของผู้สูงอายุ

คำชี้แจง ก. สอบถามผู้สูงอายุโดยขึ้นต้นประโยคว่า"ใน 1 สัปดาห์ที่ผ่านมานี้ ท่านรู้สึกว่า....."

ข. ทำเครื่องหมาย ☐ "ใช่" เมื่อผู้สูงอายุตอบรับ

ทำเครื่องหมาย ☐ "ไม่ใช่" เมื่อผู้สูงอายุตอบปฏิเสธ

ค. **ข้อ 1 – 5** ถ้าตอบ "ไม่ใช่" ให้คะแนนข้อละ 1 คะแนน

ถ้าตอบ "ใช่" ให้คะแนนข้อละ 0 คะแนน

ข้อ 6 – 15 ถ้าตอบ "ใช่" ให้คะแนนข้อละ 1 คะแนน

ถ้าตอบ "ไม่ใช่" ให้คะแนนข้อละ 0 คะแนน

1. คุณรู้สึกพอใจในชีวิตความเป็นอยู่รอบตัว ☐ ใช่ ☐ ไม่ใช่
2. คุณรู้สึกสดชื่นเกือบตลอดเวลา ☐ ใช่ ☐ ไม่ใช่
3. คุณคิดว่าคุณโชคดีที่มีชีวิตอยู่ในขณะนี้ ☐ ใช่ ☐ ไม่ใช่
4. คุณรู้สึกว่ามีพลังที่จะทำสิ่งต่างๆ ☐ ใช่ ☐ ไม่ใช่
5. คุณรู้สึกมีความสุขอยู่เสมอ ☐ ใช่ ☐ ไม่ใช่

.

.

.

14. คุณคิดว่าคนอื่นๆดีกว่าคุณ ☐ ใช่ ☐ ไม่ใช่
15. คุณกลัวว่าสิ่งที่ไม่ดีจะเกิดกับคุณ ☐ ใช่ ☐ ไม่ใช่

คะแนนรวม.....

ภาวะซึมเศร้าอยู่ในระดับ.....

เกณฑ์การตีความภาวะซึมเศร้าของผู้สูงอายุ

คะแนน 0 – 5 หมายถึง ไม่มีปัญหาซึมเศร้า

คะแนน 6 – 10 หมายถึง มีปัญหาซึมเศร้าระดับน้อย

คะแนน 11 – 15 หมายถึง มีปัญหาซึมเศร้าระดับมาก

APPENDIX G

Characteristics related to functional and mental status of the samples.

Items	Experiment Group n (23) N (%)	Control Group n (23) N (%)	Total N (46) N (%)	Mann-Whitney U Z	p < .05
BAI scores				.000	1.000
Dependent (0 – 11 scores)	0	0	0		
Independent (>= 12 scores)	23 (100)	23 (100)	46 (100)		
CMT scores				.000	1.000
Normal cognition (15 - 19 scores)	20 (87.0)	20 (87.0)	40 (87.0)		
Mild cognitive function problems (10 – 14scores)	3 (13.0)	3 (13.0)	6 (13.0)		
Moderate cognitive function problems (5 - 9 scores)	0	0	0		
Severe cognitive function problems (1 - 4 scores)	0	0	0		
GDS scores				-.664	.507
No depression (0 - 5 scores)	16 (69.6)	18 (78.3)	34 (73.9)		
Mild depression (6 –10 scores)	7 (30.4)	5 (21.7)	12 (26.1)		

APPENDIX H

A Fall Prevention Program for community-dwelling elders

โปรแกรมการป้องกันการหกล้มสำหรับผู้สูงอายุที่อาศัยอยู่ในชุมชน

โดย นางสาวนัยนา พิพัฒน์วณิชชา

เมื่อบุคคลก้าวเข้าสู่วัยสูงอายุ การเปลี่ยนแปลงตามกระบวนการสูงอายุที่เกิดขึ้นรวมทั้งการทำหน้าที่ต่างๆ ของร่างกายที่เสื่อมถอยลง ส่งผลต่อการเกิดอัตราการหกล้มในผู้สูงอายุเพิ่มขึ้น ซึ่งเป็นปัญหาที่คุกคามต่อสุขภาพทั้งทางด้านร่างกาย จิตใจ สังคม และเศรษฐกิจของผู้สูงอายุและผู้ดูแล รวมทั้งเกิดการสูญเสียเศรษฐกิจของชาติ กล่าวคือ ร้อยละ 10 ของผู้สูงอายุที่หกล้มจะได้รับบาดเจ็บรุนแรง เช่น กระดูกหัก ข้อเคลื่อน หรือได้รับบาดเจ็บที่ศีรษะ จะมีโอกาสเสี่ยงต่อการเสียชีวิตก่อนวัยอันสมควร แม้ว่าในรายที่ได้รับบาดเจ็บไม่รุนแรง การหกล้มที่เกิดขึ้นยังส่งผลให้ผู้สูงอายุสูญเสียความมั่นใจในตนเองเกี่ยวกับการเคลื่อนไหวอย่างปลอดภัย กลัวการหกล้มที่อาจเกิดขึ้นอีก จึงไม่สามารถดำเนินกิจวัตรประจำวันได้ด้วยตนเองตามปกติ เกิดภาวะซึมเศร้า ต้องการพึ่งพาผู้อื่นและมีคุณภาพชีวิตลดลง

ผลกระทบทั้งหลายดังกล่าวเป็นปัญหาที่สำคัญของประเทศไทยในปัจจุบันและในอนาคต ที่ประเทศไทยจะมีประชากรผู้สูงอายุเพิ่มจำนวนมากขึ้นอย่างรวดเร็ว ผู้วิจัยได้ตระหนักถึงความสำคัญในเรื่องนี้จึงได้พัฒนาโปรแกรมการป้องกันการหกล้มในผู้สูงอายุที่อาศัยอยู่ในชุมชนขึ้น มุ่งเน้นการมีพฤติกรรมในการป้องกันการหกล้มเพื่อส่งเสริมการก้าวเดินและการทรงตัวของผู้สูงอายุให้ดีขึ้น เป็นการลดปัจจัยเสี่ยงที่สำคัญที่ก่อให้เกิดการหกล้มในผู้สูงอายุ โดยประยุกต์แนวคิดทฤษฎีความเชื่อด้านสุขภาพ การเรียนรู้ในผู้ใหญ่ รวมทั้งความรู้ที่เกี่ยวข้องกับการเปลี่ยนแปลงเมื่อเข้าสู่วัยสูงอายุ เนื้อหาในโปรแกรมแบ่งเป็น 2 ส่วน ส่วนแรกเป็นโปรแกรมการให้ความรู้แก่ผู้สูงอายุและสมาชิกในครอบครัวเกี่ยวกับการปฏิบัติตนเพื่อป้องกันการหกล้ม โดยวิธีการอภิปรายแบบกลุ่มย่อย สัปดาห์ละ 1 ครั้ง ครั้งละ 1 -1.30 ชั่วโมง จำนวน 4 ครั้ง ส่วนที่สองเป็นโปรแกรมออกกำลังกายแบบไทชิ (Tai Chi) โดยมีการสอนออกกำลังกายแบบไทชิ ครั้งละ 1 ชั่วโมง จำนวน 8 ครั้ง หลังจากนั้นผู้สูงอายุจะได้รับคำแนะนำให้มารวมกลุ่มออกกำลังกายฝึกแบบไทชิ ที่คณะพยาบาลศาสตร์ มหาวิทยาลัยบูรพา อีกสัปดาห์ละ 3 ครั้ง ครั้งละ 30 – 45 นาที ตลอดระยะเวลา 8 สัปดาห์ ร่วมกับการแนะนำให้นำความรู้ที่ได้เกี่ยวกับการปฏิบัติตนเพื่อป้องกันการหกล้ม

ไปประยุกต์ใช้ในชีวิตประจำวันจนกระทั่งเกิดพฤติกรรมในการป้องกันการหกล้ม โดยขอความร่วมมือจากสมาชิกในครอบครัวให้ความร่วมมือและให้กำลังใจในการปฏิบัติตนเพื่อป้องกันการหกล้มของผู้สูงอายุ ผู้สูงอายุและสมาชิกในครอบครัวสามารถติดต่อผู้วิจัยเพื่อซักถามข้อสงสัยต่างๆ ได้ตลอดเวลา

คุณสมบัติผู้เข้าร่วมโปรแกรม

กลุ่มเป้าหมายเป็นผู้สูงอายุที่อาศัยอยู่ในชุมชน ที่มีคุณสมบัติดังนี้

1. อายุ 60 ปีบริบูรณ์ หรือมากกว่า
2. มีประสบการณ์การหกล้มมาแล้วอย่างน้อย 1ครั้ง ในรอบ 6 เดือนผ่านมา ซึ่งหมายถึงผู้สูงอายุที่เข้าร่วม
3. โครงการเป็นผู้ที่มีความเสี่ยงต่อการหกล้มในระดับสูง ....

.

.

การคัดเลือกกลุ่มเป้าหมาย

1. คัดเลือกผู้สูงอายุตามคุณสมบัติข้างต้น
2. มีการลงนามในใบยินยอมเข้าร่วมโปรแกรม

ผู้ใช้โปรแกรม

พยาบาลผู้มีประสบการณ์ในการดูแลผู้สูงอายุ มีประสบการณ์ในการดำเนินการการอภิปรายกลุ่ม และเป็นผู้นำในการออกกำลังกายแบบไทชิ 18 ท่า

การประเมินผล

ประเมินการทรงตัวและการก้าวเดินของร่างกายก่อนเริ่ม ระหว่างการใช้และหลังจากการใช้โปรแกรม โดยใช้แบบทดสอบการทรงตัวของเบิร์ก (Berg Balance Scale) และแบบทดสอบการก้าวเดินของผู้สูงอายุ (Time up and go test)

APPENDIX I

The Manual of a Fall Prevention Program for community-dwelling elders

คู่มือโปรแกรมการป้องกันการหกล้มสำหรับผู้สูงอายุที่อาศัยอยู่ในชุมชน

ส่วนที่ 1 คู่มือความรู้เกี่ยวกับการปฏิบัติตนเพื่อป้องกันการหกล้มแก่ผู้สูงอายุและสมาชิกในครอบครัว
คำนำ
ความหมายของการหกล้ม
สถิติการหกล้มในผู้สูงอายุ
ปัจจัยเสี่ยงต่อการเกิดการหกล้มของผู้สูงอายุ
อันตรายและผลกระทบที่เกิดจากการหกล้มในผู้สูงอายุ
การปฏิบัติพฤติกรรมการป้องกันการหกล้มสำหรับผู้สูงอายุ
การลดปัจจัยเสี่ยงภายในตัวผู้สูงอายุ
การลดปัจจัยเสี่ยงภายนอก
การลดปัจจัยเสี่ยงจากสิ่งแวดล้อม
อุปสรรคและการกำจัดอุปสรรคของการปฏิบัติพฤติกรรมการป้องกันการหกล้ม
สิ่งชักนำให้เกิดพฤติกรรมในการป้องกันการหกล้มในผู้สูงอายุ
บทบาทของบุคลากรทางการพยาบาล
บทบาทของสมาชิกในครอบครัว
แหล่งข้อมูลและสิ่งชักนำหรือสิ่งกระตุ้นเตือนความจำที่ทำให้เกิดการปฏิบัติพฤติกรรมเพื่อป้องกันการหกล้ม
สรุป
ส่วนที่ 2 คู่มือการออกกำลังกายแบบไทชิ 18 ท่า
ท่าที่ 1 ปรับลมปราณ (ภาพที่ 1 - 3)
1. ท่าเตรียม (ภาพที่ 1) ท่าเตรียมเป็นสิ่งสำคัญ เพื่อฝึกความพร้อมของการออกกำลังกายทั้งชายและหญิง ควรใช้กางเกงหรือชุดกีฬา และรองเท้าที่ใช้สำหรับออกกำลังกายเพื่อสะดวกในการปฏิบัติกิจกรรม ขณะปฏิบัติต้องทำจิตให้นิ่งและสงบ 1. ยืนตรง 2. แยกเท้าออกให้ห่างเท่ากับความกว้างของไหล่ ปล่อยตัวตามสบาย 3. เข่าทั้งสองย่อลงเล็กน้อย ร่างกายส่วนบนตั้งตรง 4. สองแขนปล่อยตามสบาย 5. ตามองไปข้างหน้า ใบหน้ายิ้มแย้มแจ่มใส
2. หายใจเข้า (ภาพที่ 2) 1. คว่ำฝ่ามือลงล่าง ข้อมืองอลง

2. ค่อย ๆ ยกแขนขึ้นเรื่อย ๆ จนถึงระดับไหล่ 3. แล้วกดฝ่ามือทั้งสองลงอย่างช้า ๆ
3. หายใจออก (ภาพที่ 3) 1. พร้อมย่อเข่าทั้งสองลงเล็กน้อย 2. มือทั้งสองค่อย ๆ ลดลง จนกระทั่งปลายนิ้วมือแตะหัวเข่า 3. และเริ่มชูมือทั้งสองขึ้นอีก พร้อมหายใจเข้าใหม่ (ทำซ้ำลักษณะเดียวกันอีก 5 ครั้ง โดยถือเอาการหายใจเข้าและออกนับเป็น 1 ครั้ง)
ประโยชน์ของกายบริหารท่าที่ 1 ท่านี้เป็นการอบอุ่นร่างกาย ช่วยในเกิดการปรับความสมดุล มีการเคลื่อนไหวบริเวณหน้าอกและการเอื้อมแขนไปข้างหน้าในขณะที่น้ำหนักตัวทิ้งอยู่บนขาทั้งสองข้างในลักษณะงอเล็กน้อย ช่วยส่งเสริมความแข็งแรงของแขน ขา และกลไกการทรงตัวของร่างกายให้ดีขึ้น ทำให้อวัยวะต่างๆมีการทำงานอย่างประสานกัน นอกจากนี้ในขณะที่มีการเคลื่อนไหว สมาธิที่มุ่งไปยังการเคลื่อนไหวของแขนขาอย่างผสมผสานในจังหวะและความเร็วที่สม่ำเสมอประสานกับการหายใจเข้าออกยาว ๆ ช่วยทำให้จิตใจสงบ และเกิดความรู้สึกผ่อนคลาย
ท่าที่ 2 ยืดอกขยายทรวง ลีลาต่อเนื่องจากท่าที่ 1 (ภาพที่ 4 - 7)
4. หายใจเข้า (ภาพที่ 4 - 5) 1. ยกแขนทั้งสองขึ้นหลังจากที่นิ้วแตะที่เข่าทั้งสองแล้ว ยกขึ้นไปจนถึงระดับอก พร้อมหันฝ่ามือทั้งสองเข้าหากัน 2. พร้อมยืดเข่าที่ย่อ ให้ค่อย ๆ ยืนตรง 3. เมื่อยกแขนทั้งสองถึงระดับอกแล้ว ให้กางแขนออกจนสุดในท่าขยายอก
5. หายใจออก(ภาพที่ 6 - 7) 1. พร้อมหุบแขนทั้งสองที่กางออกนั้นเข้าหากันตรงบริเวณหน้าอก 2. คว่ำฝ่ามือลงแล้วกดฝ่ามือทั้งสองลง พร้อมกับย่อเข่าลงจนนิ้วมือแตะที่เข่า (ทำซ้ำในลักษณะเดียวกันอีก 5 ครั้ง)
ประโยชน์ของกายบริหารท่าที่ 2 ท่านี้มีการเคลื่อนไหวบริเวณหน้าอก แขน และข้อมือ ในขณะที่น้ำหนักตัวทิ้งอยู่บนขาทั้งสองข้างในลักษณะงอเล็กน้อย ช่วยส่งเสริมความแข็งแรงของแขน ขา และกลไกการทรงตัวของร่างกายให้ดีขึ้น ทำให้อวัยวะต่างๆมีการทำงานอย่างประสานกัน ท่านี้ยังช่วยให้ปอดสามารถขยายตัวได้เต็มที่ สมรรถภาพของ ปอด ไต หัวใจ จึงแข็งแรงสมบูรณ์ขึ้น
. . .
ท่าที่ 18 ผ่อนคลายลมปราณ ลีลาต่อเนื่องจากท่าที่ 17 (ภาพที่ 62 - 66)
36. หายใจเข้า (ภาพที่ 62 - 65)

1. แยกเท้าออกระดับไหล่ ย่อเข่าลง 2. มือทั้งสองลดลงอยู่ข้างลำตัว 3. หงายฝ่ามือ ออกวาดแขนทั้งสองเสมือนกอบโกยอะไรสักอย่าง 4. พร้อมที่จะยืนขึ้น 5. สองแขนค่อย ๆ ชูขึ้น พร้อมยืดตัวขึ้นในท่าตรง 6. ชูแขนเลยไหล่ แล้วคว่ำมือทั้งสองลง
37. หายใจออก (ภาพที่ 66) 1. ค่อย ๆ กดฝ่ามือทั้งสองลง ขณะที่เลยจากไหล่ให้ย่อตัวลง 2. ลดแขน พร้อมย่อเข่าลงอยู่ในท่าแรก (ทำซ้ำในลักษณะเดียวกันอีก 5 ครั้ง)
ประโยชน์ของกายบริหารท่าที่ 18 ท่านี้เป็นการผ่อนคลายกล้ามเนื้อต่างๆของร่างกายและจิตใจ เป็นการเก็บพลังลมปราณของร่างกาย จากขบวนท่าต่าง ๆ มาแล้วโดยใช้จิตนำพลังลมปราณนั้นมาไว้ที่ท้องน้อย (จุดใต้สะดือลงไป 3 นิ้ว) แล้วหายใจเข้า - ออก ลึก - ยาว อย่างสม่ำเสมอเพื่อปรับสภาพร่างกายให้เข้าสู่สภาพปกติ

APPENDIX J

List of Experts

1. The 6 experts who had validated the content of a Fall Prevention Program for Community –Dwelling Elders consisted of:

1. Professor Dr. Pranom Othakanont	Faculty of Nursing, Nareesuan University
2. Dr. Raweewan Phaokunha	Faculty of Nursing, Burapha University
3. Assistant Professor Dr. Nareerut Jitmontri	Faculty of Nursing, Mahidol University
4. Assistant Professor Dr. Sirirut Panuthai	Faculty of Nursing, Chaing Mai University
5. Assistant Professor Somnok Kulsatitporn	Faculty of Allied Health Sciences, Chulalongkorn University
6. Ajarn Supol Lochitkul	A Tai Chi Experts

2. The 4 experts who had validated the content of the manual for a Fall Prevention Program for community-dwelling elders consisted of:

1. Dr. Raweewan Phaokunha	Faculty of Nursing, Burapha University
2. Assistant Professor Dr. Nareerut Jitmontri	Faculty of Nursing, Mahidol University
3. Assistant Professor Dr. Sirirut Panuthai	Faculty of Nursing, Chaing Mai University
4. Assistant Professor Somnok Kulsatitporn	Faculty of Allied Health Sciences, Chulalongkorn University

3. The 3 experts who had validated the Health Belief Pattern for Fall Prevention Behaviors in elders' questionnaire consisted of:

1. Dr. Raweewan Phaokunha	Faculty of Nursing, Burapha University
2. Assistant Professor Dr. Nareerut Jitmontri	Faculty of Nursing, Mahidol University
3. Assistant Professor Dr. Sirirut Panuthai	Faculty of Nursing, Chaing Mai University

4. The 3 experts who had validated the Change position skills in elders' evaluation consisted of:

1. Dr. Raweewan Phaokunha	Faculty of Nursing, Burapha University
2. Assistant Professor Dr. Nareerut Jitmontri	Faculty of Nursing, Mahidol University
3. Assistant Professor Somnok Kulsatitporn	Faculty of Allied Health Sciences, Chulalongkorn University

5. The 5 experts who had validated the content of a Tai Chi Exercise Skills Evaluation and a Tai Chi Exercise Checklist consisted of:

1. Dr. Raweewan Phaokunha	Faculty of Nursing, Burapha University
2. Assistant Professor Dr. Nareerut Jitmontri	Faculty of Nursing, Mahidol University
3. Assistant Professor Somnok Kulsatitporn	Faculty of Allied Health Sciences, Chulalongkorn University
4. Assistant Professor Anak Sootmongkol	College of Sport Science, Burapha University
5. Ajarn Supol Lochitkul	A Tai Chi Experts

6. The 2 experts who had validated the content of the Fall Prevention Behaviors for Elders Questionnaire consisted of:

1. Dr. Raweewan Phaokunha	Faculty of Nursing, Burapha University
2. Assistant Professor Dr. Nareerut Jitmontri	Faculty of Nursing, Mahidol University

7. The 3 experts who had validated the Berg Balance Scale and the Time up and Go Test consisted of:

1. Dr. Raweewan Phaokunha	Faculty of Nursing, Burapha University
2. Assistant Professor Dr. Nareerut Jitmontri	Faculty of Nursing, Mahidol University
3. Assistant Professor Somnok Kulsatitporn	Faculty of Allied Health Sciences, Chulalongkorn University

APPENDIX K

Health Belief Pattern for Fall Prevention Behaviors in elders Questionnaire (HBFPB)

แบบสัมภาษณ์ความเชื่อด้านสุขภาพเกี่ยวกับการหกล้มของผู้สูงอายุที่อาศัยอยู่ในชุมชน

หมวดการรับรู้โอกาสเสี่ยงต่อการเกิดการหกล้มในผู้สูงอายุ

ข้อความ	เห็นด้วยอย่างยิ่ง	เห็นด้วย	ไม่เห็นด้วย	ไม่เห็นด้วยอย่างยิ่ง
1. ท่านหกล้มได้ง่ายกว่าคนอื่น ที่มีอายุรุ่นราวคราวเดียวกัน				
2. การหกล้มเป็นเรื่องของดวงชะตาที่ถูกกำหนดไว้แล้ว หากดวงไม่ดี จะต้องหกล้ม ก็จะต้องหกล้ม ไม่มีทางใดที่จะป้องกันได้				
กรณีหรือเหตุการณ์ต่อไปนี้ ทำให้ผู้สูงอายุเสี่ยงต่อการหกล้ม				
4. การมีอายุมากขึ้น				
5. การมองเห็นไม่ชัดเจน				
.				
19. การเปลี่ยนอิริยาบถท่าทางต่างๆอย่างรวดเร็ว				

หมวดการรับรู้เกี่ยวกับความรุนแรงของการหกล้มในผู้สูงอายุ

ข้อความ	เห็นด้วยอย่างยิ่ง	เห็นด้วย	ไม่เห็นด้วย	ไม่เห็นด้วยอย่างยิ่ง
1. การหกล้มทำให้เกิดแผลฟกช้ำ เคล็ดขัดยอก และกระดูกหัก				
.				
7. การหกล้มเป็นสาเหตุของการเสียค่าใช้จ่ายในการรักษาพยาบาลเพิ่มขึ้น				
8. การหกล้มไม่มีผลเสียต่อสุขภาพ				

หมวดการรับรู้เกี่ยวกับประโยชน์ของการปฏิบัติพฤติกรรมการป้องกันการหกล้มสำหรับผู้สูงอายุ

ข้อความ	เห็นด้วยอย่างยิ่ง	เห็นด้วย	ไม่เห็นด้วย	ไม่เห็นด้วยอย่างยิ่ง
1. การปฏิบัติพฤติกรรมการป้องกันการหกล้มสำหรับผู้สูงอายุมีประโยชน์ต่อตัวท่านในการป้องกันการหกล้ม				
.				
4. ไม่มีวิธีการใดที่สามารถป้องกันการหกล้มในผู้สูงอายุได้				
กิจกรรมหรือสิ่งต่อไปนี้ สามารถป้องกันการหกล้มได้				
5. การไปรับการตรวจสุขภาพประจำปีโดยแพทย์อย่างน้อยปีละ 1 ครั้ง เพื่อหาปัจจัยเสี่ยงต่อการหกล้ม				
.				
28. จัดตู้เก็บของให้อยู่ในระดับที่สามารถเอื้อมหยิบของได้ง่าย ไม่อยู่สูงเกินไป				

หมวดการรับรู้อุปสรรคของการปฏิบัติพฤติกรรมการป้องกันการหกล้มสำหรับผู้สูงอายุ

ข้อความ	เห็นด้วยอย่างยิ่ง	เห็นด้วย	ไม่เห็นด้วย	ไม่เห็นด้วยอย่างยิ่ง
1. ท่านต้องการปฏิบัติตนเพื่อป้องกันการหกล้มที่อาจเกิดขึ้น				
2. การปฏิบัติพฤติกรรมการป้องกันการหกล้ม ยุ่งยากเกินไปสำหรับท่าน				
.				
7. ท่านมีภาระเกี่ยวกับงานบ้าน หากท่านต้องไปร่วมกิจกรรมการปฏิบัติตนเพื่อป้องกันการหกล้ม				
ท่านมีปัญหาเรื่องค่าใช้จ่าย หากได้รับคำแนะนำในสิ่งต่อไปนี้				
.				
14. เปลี่ยนโถส้วมเป็นชนิดนั่งแบบเก้าอี้				

หมวดการรับรู้เกี่ยวกับสิ่งชักนำให้เกิดพฤติกรรมการป้องกันการหกล้มสำหรับผู้สูงอายุ

ข้อความ	เห็นด้วยอย่างยิ่ง	เห็นด้วย	ไม่เห็นด้วย	ไม่เห็นด้วยอย่างยิ่ง
1. สมาชิกในครอบครัวเต็มใจให้ท่านเข้าร่วมกิจกรรมการปฏิบัติพฤติกรรมการป้องกันการหกล้มสำหรับผู้สูงอายุ				
2. สมาชิกในครอบครัวร่วมค้นหาและช่วยลดปัจจัยเสี่ยงต่อการหกล้มของท่าน				
.				
14. โปสเตอร์ที่มอบให้ท่านเพื่อนำมาติดที่บ้าน ช่วยกระตุ้นเตือนให้ท่านมีพฤติกรรมในการป้องกันการหกล้มอยู่เสมอ				

หมวดการรับรู้ศักยภาพของตนเองเกี่ยวกับการมีพฤติกรรมการป้องกันการหกล้มในผู้สูงอายุ

ข้อความ	เห็นด้วยอย่างยิ่ง	เห็นด้วย	ไม่เห็นด้วย	ไม่เห็นด้วยอย่างยิ่ง
1. ท่านมั่นใจว่าจะสามารถประเมินปัจจัยเสี่ยงต่อการหกล้มของท่านได้				
2. ท่านมั่นใจว่าจะสามารถลดปัจจัยเสี่ยงต่อการหกล้มของท่านได้				
.				
.				
13. ท่านมั่นใจว่าจะสามารถทำกิจวัตรประจำวันภายนอกบ้านได้ด้วยตนเองอย่างปลอดภัย				
14. ท่านมั่นใจว่าจะสามารถเปลี่ยนแปลงตนเอง ให้มีพฤติกรรมป้องกันการหกล้มได้เป็นประจำ				

APPENDIX L

Change position skills in elders' evaluation
แบบประเมินผลการฝึกเปลี่ยนอิริยาบทของผู้สูงอายุ

คำชี้แจง ให้ประเมินผลการฝึกเปลี่ยนอิริยาบทของผู้สูงอายุเป็นรายบุคคล ตามกิจกรรมที่กำหนด โดยให้ใส่เครื่องหมาย ✓ลงในช่องท้ายข้อความที่ตรงกับสภาพความจริง ตามความหมายดังนี้

ดี	หมายถึง	ผู้สูงอายุปฏิบัติตามขั้นตอนได้ถูกต้อง	ให้คะแนนข้อละ	3 คะแนน
พอใช้	หมายถึง	ผู้สูงอายุปฏิบัติตามขั้นตอนได้ถูกต้องบางส่วน	ให้คะแนนข้อละ	2 คะแนน
ต้องปรับปรุง	หมายถึง	ผู้สูงอายุปฏิบัติไม่ถูกต้องตามขั้นตอน	ให้คะแนนข้อละ	1 คะแนน

กิจกรรมที่ทำการประเมิน	ดี	พอใช้	ต้องปรับปรุง
1. การนั่งเก้าอี้ 1.1 ย่อเข่าใช้มือทั้งสองข้าง จับริมเก้าอี้ หรือที่พักแขน 1.2 หย่อนก้นนั่งริมเก้าอี้ แล้วค่อยๆเลื่อนก้นไปนั่งจนสุดเก้าอี้ โดยใช้มือทั้งสองจับที่ริมเก้าอี้ หรือจับที่พักแขน หลังตรง 1.3 วางแขนบนที่พัก หรือในท่าที่สบาย			
. .			
11. การเดินขึ้นบันได 11.1 ยืนชิดราวบันไดข้างใดข้างหนึ่ง ใช้มือข้างที่ถนัดหรือทั้งสองข้างจับราวบันได 11.2 ก้าวเท้าข้างตรงข้ามกับมือที่จับราวบันไดขึ้นไปก่อน แล้วก้าวเท้าอีกข้างตามไป โดยใช้มือช่วยดึงลำตัวขึ้นบันได			
12. การเดินลงบันได 12.1 ยืนชิดราวบันไดข้างใดข้างหนึ่ง ใช้มือข้างที่ถนัดหรือทั้งสองข้างจับราวบันได 12.2 ก้าวเท้าข้างเดียวกับมือที่จับราวบันไดลงไปก่อน แล้วก้าวเท้าอีกข้างตาลงไป โดยใช้มือจับราวบันไดพยุงตัวไว้			
คะแนนรวม (คะแนนเต็ม 36 คะแนน)			

เกณฑ์การตีความ

คะแนน 12 - 21 หมายถึง การเปลี่ยนอิริยาบถของผู้สูงอายุอยู่ในเกณฑ์ต้องปรับปรุง

คะแนน 22 - 28 หมายถึง การเปลี่ยนอิริยาบถของผู้สูงอายุอยู่ในเกณฑ์ปานกลาง

คะแนน 29 – 36 หมายถึง การเปลี่ยนอิริยาบทของผู้สูงอายุอยู่ในเกณฑ์ดี

APPENDIX M

Tai Chi Exercise Skills Evaluation

แบบประเมินผลทักษะการฝึกออกกำลังกายแบบไทชิของของผู้สูงอายุ

คำชี้แจง ให้ประเมินผลการฝึกออกกำลังกายแบบไทชิของผู้สูงอายุเป็นรายบุคคล ตามกิจกรรมที่กำหนด โดยให้ใส่เครื่องหมาย ✓ ลงในช่องท้ายข้อความที่ตรงกับสภาพความจริง ตามความหมายดังนี้

ดี	หมายถึง	ผู้สูงอายุฝึกออกกำลังกายแบบไทชิได้ถูกต้อง	ให้คะแนนข้อละ	3 คะแนน
พอใช้	หมายถึง	ผู้สูงอายุฝึกออกกำลังกายแบบไทชิได้ถูกต้องบางส่วน	ให้คะแนนข้อละ	2 คะแนน
ต้องปรับปรุง	หมายถึง	ผู้สูงอายุฝึกออกกำลังกายแบบไทชิไม่ถูกต้อง	ให้คะแนนข้อละ	1 คะแนน

กิจกรรมที่ทำการประเมิน	ดี	พอใช้	ต้องปรับปรุง
ท่าที่ 1 ปรับลมปราณ			
ท่าที่ 2 ยืดอกขยายทรวง			
ท่าที่ 3 เฉิดฉายสายรุ้ง			
ท่าที่ 4 ตะวันเบิกฟ้า			
ท่าที่ 5 ยืนหยัดดัดแขน			
ท่าที่ 6 พายเรือกลางน้ำ			
ท่าที่ 7 เมฆขลาล่อแก้ว			
ท่าที่ 8 สาวน้อยชมจันทร์			
ท่าที่ 9 หมุนกายผลักกร			
ท่าที่ 10 เยื้องย่างบังแสงส่อง			
ท่าที่ 11 แหวกธารชมเวหา			
ท่าที่ 12 แหวกคลื่นกลางสมุทร			
ท่าที่ 13 วิหคกระพือปีก			
ท่าที่ 14 ยืดแขนปล่อยหมัด			
ท่าที่ 15 อินทรีทะยานฟ้า			
ท่าที่ 16 กังหันต้องลม			
ท่าที่ 17 ลีลาพาจร			
ท่าที่ 18 ผ่อนคลายลมปราณ			

คะแนนรวม.....

APPENDIX N

Tai Chi Exercise check list

ตารางการบันทึกการออกกำลังกายแบบไทชิ <u>เดือนที่ 1</u>

<u>วิธีการบันทึก</u> ขอให้ท่านออกกำลังกายแบบไทชิ ครั้งละ 30 - 45 นาที สัปดาห์ละ 3 - 5 วัน ติดต่อกัน 8 สัปดาห์ และทำเครื่องหมาย ✓ หลังจากที่ท่านออกกำลังกายเสร็จแล้ว

สัปดาห์ที่	วันที่	รวมเวลา ออกกำลังกาย (นาที)	กรุณา ทำเครื่องหมาย ✓ หลังจากที่ท่านออกกำลังกายเสร็จแล้ว
สัปดาห์ที่ 1	วันจันทร์ที่ 25 ธันวาคม 2549		
	วันอังคารที่ 26 ธันวาคม 2549		
	วันพุธที่ 27 ธันวาคม 2549		
	วันพฤหัสที่ 28 ธันวาคม 2549		
	วันศุกร์ที่ 29 ธันวาคม 2549		
	วันเสาร์ที่ 30 ธันวาคม 2549		
	วันอาทิตย์ที่ 31 ธันวาคม 2549		
สัปดาห์ที่ 2	วันจันทร์ที่ 1 มกราคม 2550		
	วันอังคารที่ 2 มกราคม 2550		
	วันพุธที่ 3 มกราคม 2550		
	วันพฤหัสที่ 4 มกราคม 2550		
	วันศุกร์ที่ 5 มกราคม 2550		
	วันเสาร์ที่ 6 มกราคม 2550		
	วันอาทิตย์ที่ 7 มกราคม 2550		

APPENDIX O

The Fall Prevention Behaviors for Elders Questionnaire

แบบประเมินพฤติกรรมการป้องกันการหกล้มในผู้สูงอายุ

คำชี้แจง สัมภาษณ์ผู้สูงอายุโดยขึ้นต้นประโยคว่า "ใน 2 สัปดาห์ที่ผ่านมาข้อความต่อไปนี้ ตรงกับสิ่งที่ท่านปฏิบัติในชีวิตประจำวันมากที่สุด" แล้วตามด้วยข้อความที่กำหนดให้ ใส่เครื่องหมาย ✓ ลงในช่องท้ายข้อความที่ตรงกับคำตอบของผู้สูงอายุเพียง 1 ช่อง ตามความหมายดังนี้

ทำเสมอ	หมายถึง	ผู้สูงอายุปฏิบัติเป็นประจำทุกวัน	ให้คะแนนข้อละ	3 คะแนน
ทำบางครั้ง	หมายถึง	ผู้สูงอายุปฏิบัติเป็นบางครั้ง ไม่สม่ำเสมอ	ให้คะแนนข้อละ	2 คะแนน
ไม่เคยทำ	หมายถึง	ผู้สูงอายุไม่เคยปฏิบัติเลย	ให้คะแนนข้อละ	1 คะแนน

ข้อความต่อไปนี้ ตรงกับสิ่งที่ท่านปฏิบัติในชีวิตประจำวันมากที่สุด	**ทำเสมอ**	**ทำบางครั้ง**	**ไม่เคยทำ**
1.รับประทานอาหารที่มีธาตุแคลเซี่ยมสูงเพื่อบำรุงกระดูกให้แข็งแรง			
2.หลีกเลี่ยงการสูบบุหรี่ และดื่มสุรา			
3.เปลี่ยนอิริยาบถอย่างช้าๆ และถูกวิธีด้วยความมั่นใจ ไม่รีบร้อน			
4.การออกกำลังกายอย่างสม่ำเสมอ โดยเฉพาะการออกกำลังกายแบบไทชิ อย่างน้อย สัปดาห์ละ 3 ครั้ง			
.			
.			
18.ดูแลให้มีราวจับไว้ใกล้ๆโถส้วม และบริเวณที่อาบน้ำ			
19.ดูแลให้พื้นห้องครัวสะอาด แห้ง ไม่มีคราบน้ำมันเกาะ			
20.ไม่เอื้อมหยิบของต่างๆ หากอยู่สูงเกินไป			
คะแนนรวม			

คะแนนเต็ม 60 คะแนน

เกณฑ์การตีความการมีพฤติกรรมการป้องกันการหกล้มในผู้สูงอายุ

20 – 35 คะแนน หมายถึง พฤติกรรมการป้องกันการหกล้มในผู้สูงอายุอยู่ในเกณฑ์ต้องปรับปรุง

36 - 47 คะแนน หมายถึง พฤติกรรมการป้องกันการหกล้มในผู้สูงอายุอยู่ในเกณฑ์ปานกลาง

49 - 60 คะแนน หมายถึง พฤติกรรมการป้องกันการหกล้มในผู้สูงอายุอยู่ในเกณฑ์ดี

APPENDIX P

The Berg Balance Scale

แบบทดสอบการทรงตัวของเบิร์ก

ดัดแปลงโดย นส. นัยนา พิพัฒน์วณิชชา

อุปกรณ์ 1. เก้าอี้แบบมีที่พักแขน และไม่มีแขนอย่างละ 1 ตัว 2. นาฬิกาจับเวลา 1 เครื่อง

3. รองเท้า 1 ข้าง (ใช้ฝากล่องแทน) 4. ไม้บรรทัดยาว 12 นิ้ว จำนวน 1 อัน

5. เก้าอี้เตี้ย สูงประมาณ 6 นิ้ว จำนวน 1 ตัว 6. กระดาษสีสดใส 1 แผ่นพร้อมเทปกาว

1. ลุกขึ้นยืนจากท่านั่ง

คำสั่ง โปรดลุกขึ้นยืน โดยพยายามอย่าใช้มือช่วยพยุงตัว

4. ลุกขึ้นยืนได้โดยไม่ใช้มือช่วยและยืนได้มั่นคง

3. ลุกขึ้นยืนได้ตามลำพัง แต่ใช้มือช่วย

2. ลุกขึ้นยืนได้ แต่ต้องใช้มือช่วยพยุงตัวหลายครั้ง

1. ต้องการความช่วยเหลือเล็กน้อยในการลุกขึ้นยืน หรือเพื่อ ช่วยให้ยืนได้มั่นคง

0. ต้องการความช่วยเหลือปานกลางถึงมาก เพื่อช่วยให้ยืนได้

2. ยืน โดยไม่จับอะไร

คำสั่ง โปรดยืนนิ่งๆ (ลืมตา) เป็นเวลา 2 นาที โดยไม่จับอะไร

4. สามารถยืนได้ 2 นาทีด้วยตัวเองอย่างปลอดภัย

3. สามารถยืนได้ 2 นาที แต่ต้องเฝ้าระวังอยู่ใกล้ๆตลอดเวลา โดยไม่ต้องสัมผัสตัวผู้สูงอายุ

2. สามารถยืนได้ 30 วินาที โดยไม่ต้องจับอะไร

1. ใช้ความพยายามหลายครั้งจึงจะยืนได้ 30 วินาที โดยไม่ต้องจับอะไร

0. ไม่สามารถยืนได้ถึง 30 วินาที หากไม่มีการจับอะไร

.

.

14. ยืนขาเดียว

คำสั่ง โปรดยืนยกขาข้างหนึ่งค้างให้นานที่สุดเท่าที่จะทำได้ โดยไม่จับอะไร

4. สามารถยกขาข้างหนึ่งขึ้นได้อย่างอิสระ และยืนขาเดียวได้นานกว่า 10 วินาที

3. สามารถยกขาขึ้นข้างหนึ่งได้อย่างอิสระ และยืนขาเดียวได้นาน 5 - 10 วินาที

2. สามารถยกขาขึ้นข้างหนึ่งได้อย่างอิสระ และยืนขาเดียวได้นาน 3 วินาทีขึ้นไป

1. ใช้ความพยายามในการยกขาขึ้นข้างหนึ่งได้อย่างอิสระ แต่ยืนขาเดียวได้น้อยกว่า 3 วินาที

0. ไม่สามารถทำได้หรือต้องการความช่วยเหลือขณะทำ เพื่อป้องกันการหกล้ม

ใบสรุปผลแบบทดสอบการทรงตัวของเบิร์ก

ดัดแปลงโดย นส. นัยนา พิพัฒน์วณิชชา

ข้อที่	**หัวข้อการประเมิน**	**คะแนน (0-4)**
1	ลุกขึ้นยืนจากท่านั่ง	_____
2	ยืน โดยไม่จับอะไร	_____
3	นั่งโดยไม่พิงพนักเก้าอี้	_____
4	เปลี่ยนจากท่ายืนลงนั่ง	_____
5	การเคลื่อนย้าย	_____
6	ยืนหลับตาโดยไม่จับอะไร	_____
7	ยืนเท้าชิดโดยไม่จับอะไร	_____
8	ยืนเอื้อมแขนไปข้างหน้า	_____
9	หยิบของจากพื้นจากท่ายืน	_____
10	ยืนหันไปมองด้านหลัง	_____
11	หมุนตัว 360 องศา	_____
12	ยกเท้าแตะเก้าอี้เตี้ย	_____
13	ยืนต่อเท้า	_____
14	ยืนขาเดียว	_____
	รวม	_____ (คะแนนเต็ม 56 คะแนน)

เกณฑ์การตีความแบบทดสอบการทรงตัวของเบิร์ก

0 – 35 คะแนน หมายความว่า ผู้สูงอายุมีการทรงตัวบกพร่องในระดับรุนแรง มีโอกาสเสี่ยงต่อการหกล้มสูงถึงเกือบ 100 %

36 - 45 คะแนน หมายความว่า ผู้สูงอายุมีการทรงตัวบกพร่อง มีโอกาสเสี่ยงต่อการหกล้ม

46 – 56 คะแนน หมายความว่า ผู้สูงอายุมีการทรงตัวเป็นปกติ

APPENDIX Q

The Timed Up and Go Test
แบบทดสอบการก้าวเดินของผู้สูงอายุ

ดัดแปลงโดย นส. นัยนา พิพัฒน์วณิชชา

อุปกรณ์

1. เก้าอี้แบบมีที่พักแขน 1 ตัว
2. เชือกยาว 3 เมตรพร้อมเทปกาว
3. นาฬิกาจับเวลา 1 เครื่อง

คำชี้แจง

สถานที่ ให้ผู้ตรวจทำเส้นตรงยาว 3 เมตรลงบนพื้นบริเวณหน้าเก้าอี้

วิธีการทดสอบ บอกให้ผู้สูงอายุนั่งพิงพนักเก้าอี้ วางแขนทั้งสองบนที่ท้าวแขน เมื่อได้ยินคำว่า **"เริ่มได้"** ให้ปฏิบัติดังนี้

1. ลุกขึ้นยืนจากเก้าอี้
2. เดินตามปกติไปตามเส้นที่กำหนดไว้
3. หมุนตัวกลับ
4. เดินกลับที่เก้าอี้ตามเส้นเดิม
5. นั่งลง พิงพนักเก้าอี้ วางแขนทั้งสองบนที่ท้าวแขนเหมือนเดิม

ให้ผู้ตรวจเริ่มจับเวลา (วินาที) เมื่อสั่งว่า **"เริ่มได้"** และหยุดเมื่อผู้สูงอายุกลับมานั่งที่เก้าอี้ พิงพนักเก้าอี้ วางแขนทั้งสองบนที่ท้าวแขนเรียบร้อยแล้ว

จับเวลาได้.....วินาที

หมายเหตุ

1. การทดสอบนี้เป็นการทดสอบการเดินของผู้สูงอายุตามลำพัง จึงไม่มีการช่วยพยุงเดิน ผู้ตรวจต้องดูแลความปลอดภัยของผู้สูงอายุขณะก้าวเดิน และพร้อมให้การช่วยเหลือเพื่อป้องกันการหกล้มที่อาจเกิดขึ้นได้
2. ขณะทดสอบให้ผู้สูงอายุใส่รองเท้าตามปกติ และใช้อุปกรณ์ช่วยเดินตามที่ใช้อยู่เป็นประจำได้
3. อนุญาตให้ผู้สูงอายุทดลองทำได้ 1 ครั้งก่อนทดสอบจริง

เกณฑ์การตีความ

7 – 10 วินาที หมายความว่า ผู้สูงอายุมีการก้าวเดินเป็นปกติ

11 - 19 วินาที หมายความว่า ผู้สูงอายุมีปัญหาในการก้าวเดิน

20 วินาที ขึ้นไป ผู้สูงอายุมีปัญหาในการก้าวเดินมาก

APPENDIX R

Comparison of the each domain of the Health Belief Pattern for Fall Prevention Behavior in Elders Questionnaire (HBPFPB) mean score between the experimental and the control groups before and after participation in a Fall Prevention Program by the independent samples *t* test.

Variables	**Total Score 388**	**Experiment Group n (23) Mean (SD)**	**Control Group n (23) Mean (SD)**	**Independent *t* test**	
				t	***p* value**
Pretest Perceive Severity of falls	32	25.74 (3.36)	25.91 (3.33)	-.176	.861
Post Perceive Severity of falls	32	26.39 (3.39)	25.96 (3.20)	.447	.657
Pretest Perceive Risk of falls	76	61.57 (7.04)	55.35 (8.56)	2.690	.010*
Post Perceive Risk of Falls	76	61.57 (6.34)	54.96 (8.24)	3.048	.004*
Pretest Perceive Benefit of falls prevention behavior practices	112	95.39 (9.91)	94.48 (9.95)	.312	.757
Post Perceive Benefit of falls prevention behavior practices	112	95.74 (8.42)	94.87 (9.57)	.327	.745
Pretest Perceive Barrier of falls prevention behavior practices	56	33.30 (6.45)	29.65 (2.50)	2.533	.017*

* Significance at $p<.05$

Variables	Total Score	Experiment Group n (23) Mean (SD)	Control Group n (23) Mean (SD)	Independent *t* test *t*	*p* value
Post Perceive Barrier of falls prevention behavior practices	56	35.00 (4.25)	29.70 (3.81)	4.456	.000*
Pretest Perceive Cue to action of falls prevention behavior practices	56	45.13 (5.85)	44.78 (5.98)	.199	.843
Post Perceive Cue to action of falls prevention behavior practices	56	47.57 (5.59)	44.26 (5.10)	2.094	.042*
Pretest Perceive Self-Efficacy of falls prevention behavior practices	56	45.17 (6.47)	43.61 (4.45)	.956	.345
Post Perceive Self-Efficacy of falls prevention behavior practices	56	47.65 (5.79)	43.61 (4.45)	2.656	.011*

* Significance at $p<.05$

The results showed the comparison of the each domain of the Health Belief Pattern for Fall Prevention Behaviors in Elders Questionnaire (HBFPB) mean scores between the experimental and the control group before with after participation in a Falls Prevention Program as follows

1. Perceived severity of falls.

Before participation in a Fall prevention Program, the experimental had no significantly lower mean score of the perceived severity of falls than the control group (p = .861). After participation in a Fall prevention Program, the experimental had no significantly higher mean score of the perceived severity of falls than the control group (p = .657).

2. Perceived risk of falls.

Before and after participation in a Fall prevention Program, the experimental group had significantly higher mean scores of the perceived risk of falls than the control group (p = .010 and .004 respectively).

3. Perceived benefit of falls prevention behavior practices.

Before and after participation in a Fall prevention Program, the experimental group had no significantly higher mean scores of the perceived benefit of fall prevention behavior practices than the control group (p = .757 and .745 respectively).

4. Perceived barrier of fall prevention behavior practice.

Before and after participation in a Fall prevention Program, the experimental group had significantly higher mean scores of the perceived barrier of fall prevention behavior practice or had significantly less perceive barrier of fall prevention behavior practice than the control group (p = .017 and .000 respectively).

5. Perceived cue to action of fall prevention behavior practice

Before participation in a Fall prevention Program, the experimental group had no significantly higher mean scores of the perceived cue to action of fall prevention behavior practice than the control group (p = .843). After participation in a Fall prevention Program, the experimental group had significantly higher mean scores of

the perceived cue to action of fall prevention behavior practice than the control group (p = .042).

6. Perceived self-Efficacy of fall prevention behavior practice.

Before participation in a Fall prevention Program, the experimental group had no significantly higher mean scores of the perceived self-Efficacy of fall prevention behavior practice than the control group (p = .345). After participation in a Fall prevention Program, the experimental group had significantly higher mean scores of the perceived self-Efficacy of fall prevention behavior practice than the control group (p = .011).

In conclusion, after participation in a Fall prevention Program, the experimental group had significantly less mean score of the perceived barrier than the control group (p = .000), had significantly higher mean score of the perceived risk of falls, the perceived cue to action and the perceived self-efficacy of fall prevention behavior practice than the control group (p = .004, .042, and .011 respectively). However, the experimental group had no significantly mean score of the perceived severity of falls and the perceived benefit of fall prevention behavior practice than the control group (p = .657 and .745 respectively).

APPENDIX S

APPENDIX T

Population sample / Participant information sheet (Thai Version)

ข้อมูลสำหรับประชากรตัวอย่างหรือผู้มีส่วนร่วมในการวิจัย

1. ชื่อโครงการวิจัย เรื่อง **ผลของโปรแกรมการป้องกันการหกล้มต่อการก้าวเดินและการทรงตัวของผู้สูงอายุที่อาศัยอยู่ในชุมชน**

2. ชื่อผู้วิจัย นางสาวนัยนา พิพัฒน์วณิชชา นิสิตคณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย กรุงเทพมหานคร

3. สถานที่ปฏิบัติงาน มหาวิทยาลัยบูรพา
   โทรศัพท์ที่ทำงาน 038 – 745900 ต่อ 3610 โทรศัพท์ที่บ้าน 038 - 764796
   โทรศัพท์เคลื่อนที่ 085-119-9979 E-mail:Naiyana_P2005@Hotmail.com

4. ข้อมูลที่เกี่ยวข้องกับการให้คำยินยอมในการวิจัยประกอบด้วย คำอธิบายดังนี้
   4.1 โครงการนี้เกี่ยวข้องกับการศึกษาเรื่อง ผลของโปรแกรมการป้องกันการหกล้มต่อการก้าวเดินและการทรงตัวของผู้สูงอายุที่อาศัยอยู่ในชุมชน
   4.2 วัตถุประสงค์ของการวิจัย เพื่อทดสอบผลของโปรแกรมการป้องกันการหกล้มต่อการก้าวเดินและการทรงตัวของผู้สูงอายุที่อาศัยอยู่ในชุมชน
   4.3 การวิจัยนี้เป็นการวิจัยเชิงทดลอง ผู้เข้าร่วมการวิจัยทั้งหมดประมาณ 68 คน
      4.3.1 ผู้เข้าร่วมการวิจัยต้องมีคุณสมบัติดังนี้
      - อายุ 60 ปีบริบูรณ์ หรือมากกว่า
      - อาศัยอยู่ที่บ้านในตำบลใด ตำบลหนึ่งในเขตเมือง อำเภอเมือง จังหวัดชลบุรี
      - มีประสบการณ์การหกล้มมาแล้วอย่างน้อย 1 ครั้ง ในรอบ 12 เดือนที่ผ่านมา ซึ่งหมายถึงผู้สูงอายุที่เข้าร่วมโครงการเป็นผู้ที่มีความเสี่ยงต่อการหกล้มในระดับสูง ทั้งนี้การหกล้มในการศึกษานี้หมายถึงเหตุการณ์ที่ทำให้อวัยวะส่วนใดส่วนหนึ่งของร่างกายสัมผัสพื้นหรือระดับที่ต่ำกว่าเช่น โต๊ะ หรือเก้าอี้ โดยบังเอิญการหกล้มที่เกิดขึ้นนี้อาจทำให้ร่างกายได้รับบาดเจ็บหรือไม่ก็ตาม ทั้งนี้ไม่นับการหกล้มที่เกิดจากโรคหลอดเลือดสมอง แตก ตีบ หรือตัน ไม่นับการหกล้มที่เกิดจากการเป็นลม หรือการหกล้มที่เกิดจากแรงกระแทกภายนอก เช่นถูกเดินชน เป็นต้น

- เพื่อทำให้เกิดความมั่นใจว่าผู้ที่เข้าร่วมโปรแกรมสามารถเรียนรู้และทำความเข้าใจทั้งส่วนที่เป็นการให้ความรู้และเป็นการออกกำลังกายได้ ผู้สูงอายุต้องมีคุณสมบัติดังนี้
    - มีความตื่นตัว รู้สึกตัวดี สามารถสนทนาโต้ตอบได้เข้าใจ
    - มีสภาพจิตปกติ หรือมีปัญหาการทำหน้าที่ของสมองระดับเล็กน้อย (คะแนนการประเมินสภาพจิตของผู้สูงอายุ ได้อย่างน้อย 10 คะแนน)
    - ไม่มีภาวะซึมเศร้า หรือมีภาวะซึมเศร้า ระดับเล็กน้อย (คะแนนการประเมินภาวะซึมเศร้าของผู้สูงอายุ ไม่เกิน 10 คะแนน)
    - สามารถอ่านและเข้าใจภาษาไทย
- เพื่อทำให้เกิดความมั่นใจว่าผู้สูงอายุที่เข้าร่วมโปรแกรม ทั้งส่วนที่เป็นการให้ความรู้และเป็นการออกกำลังกาย สามารถเข้าร่วมกิจกรรมต่างๆ ได้อย่างอิสระ และปลอดภัย ผู้สูงอายุต้องมีคุณสมบัติดังนี้
    - สามารถเคลื่อนไหวได้ด้วยตนเอง โดยไม่ต้องใช้อุปกรณ์ช่วยเดินเป็นประจำ (อนุญาตในรายที่ใช้ไม้เท้าช่วยเดินเป็นครั้งคราว)
    - สามารถช่วยเหลือตนเองได้ (คะแนนการประเมินความสามารถในการปฏิบัติกิจวัตรประจำวันของผู้สูงอายุ โดยใช้ Barthel ADL Index ได้อย่างน้อย 12 คะแนน)
- ยินดีในการเข้าร่วมโครงการด้วยความเต็มใจ

4.3.2 ขั้นตอนในการคัดเลือกผู้เข้าร่วมการวิจัย มีดังนี้

4.3.2.1 ผู้วิจัยทำการสำรวจชุมชนโดยขอความร่วมมือจากหัวหน้าสถานีอนามัยและอาสาสมัครสาธารณสุขประจำหมู่บ้าน (อสม.) ในเขตตำบลดังกล่าว เพื่อสำรวจหาจำนวนผู้สูงอายุที่มีประวัติเคยหกล้มอย่างน้อย 1 ครั้ง ในรอบ 1 ปีที่ผ่านมา

4.3.2.2 ผู้วิจัยคัดเลือกตำบลตัวอย่างอย่างน้อย 2 ตำบล ที่มีผู้สูงอายุที่มีประวัติเคยหกล้มอย่างน้อย 1 ครั้งในรอบ 1 ปีที่ผ่านมา มาเป็นพื้นที่ในการคัดเลือกผู้เข้าร่วมการวิจัย จำนวนอย่างน้อย 2 ตำบล ตามเงื่อนไขดังนี้

- เป็นตำบลที่มีผู้สูงอายุที่มีประวัติเคยหกล้มอย่างน้อย 1 ครั้ง ในรอบ 1 ปีที่ผ่านมา ที่ผ่านมาจำนวนมากที่สุด 2 - 3 อันดับแรก เพื่อให้ได้จำนวนผู้เข้าร่วมการวิจัยในแต่ละตำบลอย่างเพียงพอ
- ตำบลตัวอย่างที่เลือก ต้องไม่มีอาณาเขตติดต่อกัน เพื่อป้องกันการติดต่อสื่อสารกันของผู้เข้าร่วมการวิจัยทั้งสองกลุ่ม ซึ่งอาจทำให้เกิดการคลาดเคลื่อนในการศึกษาได

4.3.2.3 ผู้วิจัยขอความร่วมมือจากหัวหน้าสถานีอนามัยและอาสาสมัครสาธารณสุขประจำหมู่บ้าน (อสม.) ในเขตตำบลตัวอย่างทั้งสองที่ถูกเลือก เชิญผู้สูงอายุดังกล่าว เข้าร่วมประชุมเพื่อชี้แจงรายละเอียดของโครงการวิจัย เพื่อขอความร่วมมือและความสมัครใจในการเข้าร่วมกิจกรรม โดยเชิญผู้สูงอายุและสมาชิกในครอบครัวในแต่ละตำบลเข้าร่วมประชุมคนละวันกันเพื่อหลีกเลี่ยงการติดต่อสื่อสารกันของผู้เข้าร่วมการวิจัยทั้งสองกลุ่ม

4.4 ผู้เข้าร่วมการวิจัยจะได้รับการตรวจร่างกายและสัมภาษณ์เพื่อประเมินภาวะสุขภาพโดยบุคลากรทางสุขภาพ ซึ่งประกอบด้วย การตรวจนับชีพจร การวัดความดันโลหิต การชั่งน้ำหนัก วัดส่วนสูง การประเมินสภาพจิตโดยใช้แบบประเมินสภาพจิตจุฬา การประเมินภาวะซึมเศร้าโดยใช้แบบการประเมินภาวะซึมเศร้าของผู้สูงอายุ การประเมินความสามารถในการปฏิบัติกิจวัตรประจำวัน โดยใช้แบบประเมินความสามารถในการปฏิบัติกิจวัตรประจำวันของผู้สูงอายุ

หากผลการตรวจอยู่ในเกณฑ์คัดเลือกให้เข้าเป็นกลุ่มตัวอย่างได้ จะมีการสุ่มผู้เข้าร่วมการวิจัยแยกออกเป็น 2 กลุ่มโดยผู้เข้าร่วมการวิจัยมีโอกาสในการถูกสุ่มให้เลือกอยู่ในแต่ละกลุ่มเท่าๆกัน ทั้งนี้ผู้เข้าร่วมการวิจัยและผู้วิจัยไม่สามารถกำหนดให้ผู้เข้าร่วมการวิจัยเลือกอยู่ในกลุ่มใดกลุ่มหนึ่งได้ ผู้เข้าร่วมการวิจัยกลุ่ม ก. จะได้รับการพยาบาลจากพยาบาลอนามัยชุมชนตามปกติร่วมกับการได้รับโปรแกรมการป้องกันการหกล้ม ในขณะที่ผู้เข้าร่วมการวิจัยกลุ่ม ข. จะได้รับการพยาบาลจากพยาบาลอนามัยชุมชนตามปกติ

4.5 ผู้เข้าร่วมการวิจัยในกลุ่ม ก. จะได้รับการพยาบาลจากพยาบาลอนามัยชุมชนตามปกติ ร่วมกับการได้รับโปรแกรมการป้องกันการหกล้ม ซึ่งประกอบด้วย การให้ความรู้ในการป้องกันการหกล้มแก่ผู้เข้าร่วมการวิจัยและสมาชิกในครอบครัวสัปดาห์ละ 1 ครั้ง ครั้งละ 1 ชั่วโมง รวมทั้งหมด 4 วัน หรือ 4 ครั้ง ร่วมกับการฝึกการออกกำลังกายแบบไทชิสำหรับผู้เข้าร่วมการวิจัย วันละ 45 นาที รวมทั้งหมด 8 วัน หลังจากนั้นเป็นการออกกำลังกายแบบ ไท ชี แบบรวมกลุ่มที่คณะพยาบาลศาสตร์ มหาวิทยาลัยบูรพา จ.ชลบุรี สัปดาห์ละ 3 วัน ครั้งละ 30 - 45 นาที ต่อเนื่องตลอดระยะเวลา 8 สัปดาห์ ทั้งนี้ผู้เข้าร่วมการวิจัยจะได้รับคู่มือการป้องกันการหกล้มซึ่งมีรายละเอียดเกี่ยวกับความรู้ในการป้องกันการหกล้ม ภาพประกอบพร้อมคำอธิบายเกี่ยวกับการออกกำลังกายแบบไทชิ 18 ท่า วีซีดีสาธิตการออกกำลังกายแบบไทชิ 18 ท่า และโปสเตอร์ภาพประกอบพร้อมคำอธิบายเกี่ยวกับการออกกำลังกายแบบไทชิ 18 ท่า เพื่อให้ผู้เข้าร่วมการวิจัยสามารถปฏิบัติตามได้อย่างถูกต้อง

ทั้งนี้การออกกำลังกายแบบ ไท ชี 18 ท่านี้ เป็นการฝึกการบริหารการเคลื่อนไหวของร่างกายเพื่อส่งเสริมการทรงตัวและการก้าวเดินของผู้สูงอายุ เป็นการออกกำลังกายอย่างเชื่องช้า นุ่มนวล ต่อเนื่องกัน 18 ท่าร่วมกับการปรับการหายใจให้ลึกยาวต่อเนื่อง เป็นการปรับจิตให้มีความสงบ เป็นสมาธิ ช่วยส่งเสริมให้ร่างกายและจิตใจทำงานอย่างประสานกัน ทำการสอนโดยผู้เชี่ยวชาญซึ่งมีประสบการณ์เป็นผู้นำฝึกการออกกำลังกายแบบ ไท ชีของชมรมการออกการออกกำลังกายแบบ ไท ชีจังหวัดชลบุรีมาประมาณ 20 ปี โดยมีผู้วิจัยและผู้ช่วยวิจัยอีก 2 คนซึ่งได้รับการฝึกโดยผู้เชี่ยวชาญเป็นผู้ช่วยสอน

4.6 ในการประเมินผลการวิจัย จะมีการทดสอบการทรงตัวของผู้เข้าร่วมการวิจัยทั้งสองกลุ่ม โดยใช้แบบทดสอบการทรงตัว (Berg Balance Scale) และทดสอบการก้าวเดินผู้เข้าร่วมการวิจัยทั้งสองกลุ่ม โดยใช้แบบทดสอบการก้าวเดินของผู้สูงอายุ (Timed Up and Go Test) ทั้งหมด 2 ครั้ง ได้แก่ก่อนเริ่มการทดลอง และเมื่อการทดลองครบ 8 สัปดาห์

แบบทดสอบการทรงตัว ซึ่งเป็นชุดของคำถาม 14 ข้อ ที่ให้ผู้สูงอายุแสดงพฤติกรรมต่าง ๆ เช่นการเปลี่ยนท่าจากท่ายืนเป็นท่านั่งแล้วผู้วิจัยสังเกตลักษณะการนั่ง แล้วให้คะแนนตามระดับตั้งแต่ 0-4 คะแนน คะแนนเต็มทั้งชุดเท่ากับ 56 คะแนน หากได้น้อยกว่า 46 คะแนน หมายถึง ผู้สูงอายุมีการทรงตัวบกพร่อง มีโอกาสเสี่ยงต่อการหกล้ม ทั้งนี้การทดสอบแต่ละครั้งใช้เวลาประมาณ 15-20 นาที

แบบทดสอบการก้าวเดินของผู้สูงอายุ เป็นการจับเวลาการเดินของผู้สูงอายุโดยให้ผู้ตรวจทำเส้นตรงยาว 3 เมตรลงบนพื้น ให้ผู้สูงอายุอยู่ในท่าเริ่มต้นด้วยการนั่งพิงพนักเก้าอี้ วางแขนทั้งสองบนที่ท้าวแขน เมื่อได้ยินคำว่า "ไป" ให้ผู้สูงอายุลุกขึ้นยืนจากเก้าอี้ เดินตามปกติไปตามเส้นที่กำหนดไว้ แล้วหมุนตัวกลับ เดินกลับที่เก้าอี้ตามเส้นเดิมจากนั้นให้ นั่งลง พิงพนักเก้าอี้ วางแขนทั้งสองบนที่ท้าวแขนเหมือนเดิม ให้ผู้ตรวจเริ่มจับเวลา (วินาที) เมื่อสั่งว่า "ไป" และหยุดเมื่อผู้สูงอายุกลับมานั่งที่เก้าอี้ พิงพนักเก้าอี้ วางแขนทั้งสองบนที่ท้าวแขนเรียบร้อยแล้ว เวลาที่จับได้มีหน่วยเป็นวินาที การใช้เวลานานกว่า 10 วินาทีหมายถึงการมีปัญหาในการก้าวเดิน ทั้งนี้การทดสอบแต่ละครั้งใช้เวลาประมาณ 5 นาที

4.7 ข้อมูลที่อาจระบุเชื่อมโยงหรือพาดพิงถึงผู้เข้าร่วมการวิจัยจะถูกแทนที่ด้วยรหัส และผลการวิจัยที่ตีพิมพ์จะไม่มีชื่อของผู้เข้าร่วมการวิจัย

5. ความเสี่ยงหรือความไม่สุขสบายที่อาจเกิดขึ้น

ผู้เข้าร่วมการวิจัยในกลุ่ม ก. จะได้รับการให้ความรู้ในการป้องกันการหกล้ม ร่วมกับการฝึกการออกกำลังกายแบบไทชิ ซึ่งการออกกำลังกายแบบไทชิ อาจทำให้เกิดอาการเหมือนกับการออกกำลังกายทั่วไปได้ เช่นอาจมีอาการเจ็บเข่า ปวดไหล่หรือปวดหลังในระยะ 3 สัปดาห์แรก แต่อาการจะบรรเทาลงเรื่อยๆ อย่างไรก็ตามหากอาการไม่บรรเทาลงขอให้ผู้เข้าร่วมการวิจัยแจ้งให้ผู้วิจัยทราบ เพื่อให้การพยาบาลที่เหมาะสมต่อไป

6. ผลประโยชน์ที่ได้รับ

6.1 ผู้เข้าร่วมการวิจัยทั้งสองกลุ่มจะได้รับการ*ทดสอบ* ทำให้ผู้เข้าร่วมการวิจัยทราบและเข้าใจความสามารถในการก้าวเดินและการทรงตัวของร่างกายของตนเองดีขึ้น

6.2 ผู้เข้าร่วมการวิจัยในกลุ่ม ก. ที่ได้รับโปรแกรมการป้องกันการหกล้ม ซึ่งประกอบด้วย การให้ความรู้ในการป้องกันการหกล้มร่วมกับการฝึกการออกกำลังกายแบบไทชิ จะได้รับความรู้เกี่ยวกับการป้องกันการหกล้มเพื่อนำไปปฏิบัติในการป้องกันการหกล้มที่อาจเกิดขึ้นอีกได้ นอกจากนี้มีการศึกษาพบว่าผู้ที่ออกกำลังกายแบบไท ชิ ในระยะหนึ่งจะมีการทรงตัวของร่างกายดีขึ้นและสามารถลดปัจจัยเสี่ยงในการหกล้มได้ ซึ่งผลการวิจัยนี้อาจมีประสิทธิภาพกว่าการศึกษาหรือโปรแกรมป้องกันการหกล้มอื่นก็เป็นได้ แต่ว่าไม่สามารถรับรองผลที่อาจเกิดขึ้นได้

7. ไม่มีการจ่ายค่าตอบแทนให้แก่ผู้เข้าร่วมการวิจัย และไม่มีการคิดค่าบริการใดๆ ในการเข้าร่วมการวิจัยนี้

8. ในกรณีผู้เข้าร่วมการวิจัยรู้สึกไม่สุขสบาย เจ็บปวด หรือมีการบาดเจ็บใดๆ เกิดขึ้นในระหว่างการออกกำลังกายแบบไทชิ ผู้เข้าร่วมการวิจัยจะได้รับคำแนะนำให้หยุดการออกกำลังกายและแจ้งแก่ผู้วิจัยทันที ผู้วิจัยจะดำเนินการตามลำดับโดยให้การประคับประคองด้านจิตใจ ประเมินสภาพร่างกาย และให้การปฐมพยาบาล ส่วนในรายที่มีอาการรุนแรง จะทำการส่งต่อไปรับการรักษาที่โรงพยาบาลที่ใกล้ที่สุด โดยค่าใช้จ่ายที่เกิดขึ้น ใช้ตามสิทธิการรักษาของผู้เข้าร่วมการวิจัย เช่น สิทธิเบิกได้จากราชการหรือรัฐวิสาหกิจ หรือสิทธิบัตรทอง 30 บาทรักษาทุกโรค

ในกรณีผู้เข้าร่วมการวิจัยมีข้อสงสัย รู้สึกไม่สบายใจ มีความกังวลหรือมีความเครียดขึ้นในระหว่างการให้ความรู้เกี่ยวกับการป้องกันการหกล้ม หรือในระหว่างการฝึกออกกำลังกายแบบไทชิ ผู้เข้าร่วมการวิจัยจะได้รับคำแนะนำให้แจ้งแก่ผู้วิจัย และซักถามเกี่ยวกับข้อสงสัยต่างๆอย่างละเอียด ผู้วิจัยจะดำเนินการให้การประคับประคองด้านจิตใจและตอบข้อสงสัยต่างๆอย่างละเอียด ส่วนในรายที่มีอาการรุนแรงจะทำการส่งต่อไปปรึกษากับนักจิตวิทยาเพื่อประเมินภาวะสุขภาพจิตและให้คำปรึกษา หรือส่งต่อไปรับการรักษาที่เหมาะสมกับจิตแพทย์ที่โรงพยาบาลที่ใกล้ที่สุด

APPENDIX U

INFORMED CONSENT FORM

ใบยินยอมของประชากรตัวอย่างหรือผู้มีส่วนร่วมในการวิจัย

ชื่อโครงการ ผลของโปรแกรมการป้องกันการหกล้มต่อการก้าวเดินและการทรงตัวของผู้สูงอายุที่อาศัยอยู่ในชุมชน

เลขที่ ประชากรตัวอย่างหรือผู้มีส่วนร่วมในการวิจัย.....

ข้าพเจ้าชื่อ (นาย, นาง, นาวสาว).....ได้รับทราบรายละเอียดของโครงการศึกษาวิจัยเรื่อง "ผลของโปรแกรมการป้องกันการหกล้มต่อการก้าวเดินและการทรงตัวของผู้สูงอายุที่อาศัยอยู่ในชุมชน" จากผู้วิจัยชื่อ นางสาวนัยนา พิพัฒน์วณิชชา

ข้าพเจ้าเข้าใจวัตถุประสงค์และแนวทางการวิจัยครั้งนี้โดยละเอียด และทราบจากผู้วิจัยว่าข้าพเจ้ามีสิทธิที่จะแจ้งขอออกจากการวิจัยก่อนที่การวิจัยจะสิ้นสุดลงได้ โดยไม่ต้องให้เหตุผลหรือคำอธิบายใดๆ และจะไม่มีผลใดๆต่อการบริการหรือการดูแลจากบุคลากรในทีมสุขภาพแต่ประการใด ผู้วิจัยรับรองว่าจะเก็บข้อมูลเป็นความลับและจะเปิดเผยเฉพาะข้อมูลสรุปผลการวิจัย

ถ้าข้าพเจ้าสงสัยสามารถติดต่อกับผู้วิจัยโดยตรงหรือที่หมายเลข 085 – 11999XX (มือถือ) หรืออีเมล์ Naiyana_P2005@Hotmail.com

ข้าพเจ้าได้รับทราบและได้ซักถามผู้วิจัยจนหมดข้อสงสัยโดยตลอดแล้วและยินดีเข้าร่วมในการศึกษาวิจัยครั้งนี้ ภายใต้เงื่อนไขที่ระบุไว้ข้างต้นจึงได้ลงลายมือชื่อไว้เป็นหลักฐาน

..... สถานที่/ วันที่	..... (.....) ประชากรตัวอย่าง
..... สถานที่/ วันที่	..... (นางสาว นัยนา พิพัฒน์วณิชชา) ลงนามผู้วิจัยหลัก
..... สถานที่/ วันที่	..... (.....) ลงนามพยาน

Biography

Naiyana Piphatvanitcha was born January 1, 1964 in Chonburi province, the Eastern seaboard of Thailand. After attending school in Chonburi, she earned the following degrees: Diploma in Nursing and Midwifery: Equivalent to Bachelor of Nursing, from Chonburi Nursing College (1986); Certificated in Medical Nursing Specialty, from Mahidol University (1988), M.S.N. (Medical and Surgical Nursing), from Chiang Mai University (1992), Certificated in Occupational Nursing, from Burapha University (2003), and Ph.D. (Nursing) from Chulalongkorn University (2007). She had experienced as a Registered Nurse in the area of medical nursing services department for the older adults at Chonburi hospital for 11 years. In 1997-present, she has worked as an instructor of the Faculty of Nursing, Burapha University, Chonburi: Thailand.