CHAPTER 1

INTRODUCTION

This chapter presents several topics including background and significance of the research problem, objectives of the study, research questions, assumptions, scope of the study, significance of the study, and definition of terms.

Background and Significance of Research Problem

Osteoporosis is a growing problem worldwide. Based on data obtained from epidemiological studies in some countries, the magnitude of osteoporosis becomes obvious. In 2002, ten million people in the United States already had osteoporosis (80% of those people affected by osteoporosis were women) and 34 million Americans, or 55% of the people aged 50 years and over had low bone mass, making them at increased risk for osteoporosis. In addition, approximately 1.5 million fractures are caused by osteoporosis each year. These include about 300,000 hip fractures, 700,000 vertebral fractures, 250,000 wrist fractures, and 300,000 fractures at other limb sites (National Osteoporosis Foundation, 2003). In European countries, although the true prevalence of osteoporosis is unknown, an estimate of 407,000 hip, 27,000 vertebral, and 340,000 forearm fractures associated with osteoporosis occur each year (International Osteoporosis Foundation, n.d). In Asian countries, a Japanese population-based osteoporosis study (JPOS) reported the prevalence rate of osteoporosis of subjects aged 50 through 79 years; 38.0% at the spine, 11.6% at the femoral neck and 56.8% at the distal one-third site of the radius. Those in the

Japanese female population of the same age had comparable incidences, 35.1%, 9.4% and 51.2%, respectively (Iki et al., 2001). The incidence of osteoporosis in Taiwan increased from 1.13% in the 21 to 30-year-old age group to 54.55% in those over 80 years of age (Lin, Chen, Chang, & Ho, 2001).

In Thailand, as in other countries, the prevalence of osteoporosis in Thai population is quite high. The prevalence of osteoporosis in 1,935 Thai women ranging in ages from 40 to 80 was 19.8% at the lumbar spine, 13.6% at the femoral neck, and 10% at the intertrochanteric when using the Thai bone mass density (BMD) standard. However, based on the American BMD reference, the prevalence was much higher at the spine (33.5%) and femoral neck (30.0%) sites. The prevalence increased noticeably after the age of 55, and arrived at a level of more than 50% after the age of 70 (Limpaphayom et al., 2001). It is obvious that, with advancing age, Thai women are more prone to osteoporosis, especially at the vertebral site. This is supported by another study conducted on 187 Thai postmenopausal women aged 65-84 years, which found that the prevalence of osteoporosis was 40.1% at the spine and femoral neck, 39% at the spine alone, and 8.6% at the femoral neck alone (Saetung, Ongphiphadhanakul, & Rajatanavin, 2000). Recently, a national survey was conducted to examine the prevalence of osteoporosis in Thai population by using quantitative ultrasound measurement. Results indicated that the prevalence of osteoporosis in Thai women and Thai men aged 60 years and over were 37.3% and 31.7%, respectively (Teinboon & Teinboon, 2002 a, 2002b). Additionally, a survey study conducted on Thai older adults living in Chiang Mai indicated that the prevalence of low bone mass at the calcaneus was 71.17 (Aree-Ue & Pothiban, 2003). This evidence suggested that even with different types of measurement and

anatomical sites, the estimates of the prevalence of osteoporosis are high. Obviously, osteoporosis in Thai men demands attention from health care providers as well as in women. As in western countries is that in the last few years, osteoporosis has been recognized as an important public health concern for men; an estimated 30% of the 1.7 million hip fractures, for example, worldwide in 1999, occurred in men (Seeman, 1997). Therefore, osteoporosis is a growing worldwide health problem impacting both women and men.

A condition of osteoporosis risk in older adults becomes increasingly prevalent because of the rapid increasing ageing of the contemporary population. According to the survey of population change reported by the Thailand National Statistical Office, in 1998, throughout the whole country there were 5,304,255 persons aged 60 and over, constituting 8.67 % of the total population. By the year 2001, these figures rose to 5,799,241, and constituting 9.34 % of the country's population (The National Statistics Record, n.d). Chiang Mai, a big city in the North of Thailand, is a city in which the older population growth is high. In 1999, 11.29% of the total population of Chiang Mai was reported to be older adults (Chiang Mai Population Statistics, n.d). The number of older adults increased to 12.7%, and comprised 3.5% of the total older population in Thailand in 2001 (The National Statistics Records, n.d). As a result of increasing numbers of at risk population, particularly older adults living in Chiang Mai, this health problem has been given much more attention from health care personnel.

Osteoporosis is a common silent disease. A significant number of clinical symptoms associated with osteoporosis become evident only after the occurrence of hip, vertebral, and wrist fractures. These fractures lead to many problems such as

mortality, loss of independence, and economic problems. Patients with hip fractures are two to five times more likely to die in the first 12 months following the fracture than patients the same age in the general population (P.D.Ross, 1996). An estimated 10% to 20% increase in risk of death occurs within 6 months, and a 14% to 36% of death occurs within the first year following the fractures (Galsworthy & Wilson, 1996; Woodhead & Moss, 1998). Loss of independence is another consequence of osteoporosis-related fractures. About 50% of individuals sustaining a hip fracture will be unable to walk without assistance for the remainder of their lives, and 25% will require long term care (Woodhead & Moss, 1998). In addition, vertebral fractures resulting from osteoporosis cause pain, debilitation, and impairment. These fractures can limit an individual's ability to perform activities of daily living, restrict function in social and recreational activities, and impact emotional functioning (Silverman, Minshall, Shen, Harper, & Xie, 2001).

The cost of fractures related to osteoporosis in the United States may be as much as $7 billion per year ($38 million each day), and the cost is rising (National Institutes of Health Osteoporosis and Related Bone Diseases National Resource Center, n.d). Even though there are no known national costs of fractures in Thailand, fracture costs in the hospitalized elderly admitted at Ramathibodi Hospital, Bangkok, were $3,649 for wrists (n = 11), $90,331 for hips (n =101), and $13,641 for vertebral fractures (n = 137) in 2000. These fracture costs were increasing in 2002; the costs for wrists (n = 20) were $9,229, for hips (n = 107) were $144,545, and for vertebral fractures (n = 125) were $27,472 (Medical Informatics, 2003). These figures showed that osteoporotic fractures will be a growing economic health problem in Thai society.

Previous studies suggested that the nature of osteoporosis is preventable and treatable. This makes the focus on prevention paramount. To eliminate factors involved in the development of osteoporosis is the optimal goal of prevention. The correction of lifestyle factors related to osteoporosis is a significant strategy for preventing osteoporosis that may be less costly when compared to pharmacologic strategies. Since adequate calcium intake is required for bone health during skeletal growth as well as for prevention of excessive bone loss with advancing age, studies promoting an adequate calcium intake have been conducted. Most of the studies have been reported from western countries (Bonjour, Chevalley, Ammann, Sloaman, & Rizzoli, 2001; Devine, Dick, Heal, Criddle, & Prince, 1997; Reid, Ames, Evans, Gamble, & Sharpe, 1993), and they may not completely apply to the Thai population. For example, Thais have different amounts of calcium and vitamin D consumption compared to western cultures. Survey studies have found that Thais living in Bangkok consume insufficient amounts of calcium, whereas their vitamin D serum levels and vitamin D absorption activity are normal (Chailurkit, Teerarungsikul, Rajatanavin, Ongphiphadhanakul, & Puavilai, 1996; Komindr et al., 1994). Thai people should be encouraged to consume greater amounts of calcium.

Exercise is also helpful in the prevention of osteoporosis. Several studies reported that weight-bearing exercise, such as running, walking, and aerobic dance can increase bone mass density (Greendale, Wells, Barrett-Connor, Marcus, & Bush, 1995; Heinonen et al., 1996). Although exercise is helpful in preventing osteoporosis, a preliminary study indicated that older adults living in Chiang Mai displayed low exercise, 61.3 % of the participants (Aree-Ue & Pothiban, 2003). In addition, there has not been any program focusing on encouraging older adults to exercise to prevent

osteoporosis. Encouraging Thai older adults living in Chiang Mai to practice more exercise is crucial.

A number of studies have reported that osteoporosis knowledge encouraged women to engage in preventive behavior, such as starting exercise, making dietary changes, increasing calcium intake, and getting early diagnostic tests (Blalock et al., 2000; Rubin & Cummings, 1992); but only one published study conducted on Thai older adults was reported (Tongcharlern, Petpunsri, Nakasuwan, & Chusung, 1996). Because osteoporosis is a silent disease requiring long term practice of healthy behavior in prevention, osteoporosis knowledge alone might not sufficiently motivate at risk people to engage in preventive behavior (Kasper, Perterson, Allegrante, Galsworthy, & Gutin, 1994). However, knowledge of osteoporosis is a predictor of osteoporosis preventive behavior, calcium intake and weight-bearing exercise, when mediated by health beliefs and self-efficacy (Piaseu, Schepp, & Belza, 2002). Moreover, substantial empirical evidence suggests that perceived self-efficacy and health beliefs can improve the applicability to behavior change (Committee on Health and Behavior: Research Practice and Policy Board on Neuroscience and Behavioral Health, 2001).

Osteoporosis is quite common in older adults and can potentially devastate both the individual and the society. It should no longer be treated as only a part of the ageing process. For those who have already had osteoporosis, prevention of further deceleration of bone should be made. Prevention interventions should be set up to maintain bone density. Bone loss is irreversible in bone structure by the time fractures begin to occur, and bone strength cannot be fully restored, but additional bone loss can be slowed (McBean, Forgac, & Finn, 1994; P.D.Ross, 1996). In

addition, prevention of osteoporosis and related problems will be more effective than treatment in terms of the cost; a person and society will spend much more money on treating the consequences of this disease than on prevention. Previous studies incorporated osteoporosis knowledge, osteoporosis health beliefs, osteoporosis self-efficacy, and bone mass testing in their educational osteoporosis prevention programs. Results showed the effectiveness of these programs on osteoporosis preventive behavior (Blalock et al., 2002; Jamal et al., 1999; Peterson, Klesges, Kaufman, Cooper, & Vukadinovich, 2000; Rolnick, Kopher, Jackson, Fischer, & Compo, 2001; Sedlak, Doheny, & Jones, 2000)

Obviously, targeted education is one important strategy that can be implemented to initiate changes in osteoporosis preventive behavior. Since there has been no published study or has had limited success of the program that contributes changes in behavior for prevention osteoporosis for Thai older adults, it is necessary to determine whether the developed program is both feasible and acceptable for use by Thai older adults. Additionally, there is no question that based on feedback from participants in this study, modification of the program would be essential to maximize its effectiveness for further research.

Objectives of the Study

The objectives of this study were:

1. To evaluate the feasibility and acceptability of osteoporosis prevention program for Thai older adults.
2. To investigate the short-term (immediately after class) and intermediate (3 and 6-months after enrollment) effects of osteoporosis prevention program

on knowledge, health beliefs, and self-efficacy related to osteoporosis in older adults.

3. To evaluate the effects of osteoporosis prevention program on intermediate (3 and 6-months after enrollment) osteoporosis preventive behavior in older adults.

Research Questions

1. Is an osteoporosis prevention program feasible and acceptable for Thai older adults?
2. Is there any short-term (immediately after class) and intermediate (3 and 6-months after enrollment) effect of osteoporosis prevention program on knowledge, health beliefs, and self-efficacy related to osteoporosis?
3. Is there any effect of osteoporosis prevention program on intermediate (3 and 6-months after enrollment) osteoporosis preventive behavior in older adults?

Assumptions

The assumptions made for this study are that dietary calcium-rich food intake and weight-bearing exercise play major roles in the prevention of bone loss and in the maintenance of bone health. Additionally, risk behaviors can be changed into healthy behavior.

Scope of the Study

The study was conducted at the Health Promotion Center for the Elderly (HPCE), Faculty of Nursing, Chiang Mai University, Thailand. Older adults residing nearby Chiang Mai who were attending at the HPCE were eligible to participate in the study.

Significance of the Study

This study is the first known published intervention program for Thai older adults relating to osteoporosis preventive behavior. As health promotion, disease prevention and self-care for older adults are strategies for promoting well-being in older persons carried out under the National Plan for Older Persons (2002-2021) (Committee of the Second National Plan for Older Persons National Commission on the Elderly, 2001), this program addressed initial information for program development that was more suitable for older adults involvement. The significance of the study is that it is the first step in evaluating a program that may impact the potential for development of an intervention program associated with the prevention of osteoporotic fractures. In the long -term, these programs may augment quality of life for older adults who are at-risk for developing osteoporosis and osteoporosis related- fractures.

Definition of Terms

Older adults: were persons aged 60 and over who live in nearby Chiang Mai, Thailand.

Osteoporosis: is a disease characterized by low bone mass and microarchitectural deterioration of bone tissue, leading to enhanced bone fragility and consequent increase in fracture risk. It is diagnosed when bone mineral density (BMD) is a 2.5 standard deviation (SD) or more below the average BMD for young adults (World Health Organization, 1998).

Osteoporosis prevention program: was a program called "Join the Movement to Have Healthy Bone Project: JHBP" This program included providing a booklet, pamphlets, and a 6-month intervention. The 6-month intervention consisted of 4 class sessions (meeting once per week), bone mass screening, individual counseling, and/or a group meeting.

Feasibility: was determined by the retention of study participants that was summarized by the percent of participants who completed the program and all follow-up measures, and was determined by the investigator's record of problems implementing the program.

Acceptability: was determined by participants' ratings of acceptability of the program and by participants' description of self-report walking exercise and dietary calcium intake incorporating into the participants' daily life.

Osteoporosis knowledge: was the understanding of osteoporosis, risk factors, and preventive behaviors evaluated by the Fact on Osteoporosis Quiz (FOOQ) (Ailinger, Harper, & Lasus, 1998).

Osteoporosis health beliefs: were the older adult's perception of susceptibility to a disease, seriousness of a disease, benefits of the recommendation of action, barriers to the recommendation of action, and health motivation pertaining to osteoporosis

measured by Osteoporosis Health Belief Scale (OHBS) (Kim, Horan, Gendler, & Patel, 1991).

- Perceived susceptibility was the older adult's beliefs that he or she was at risk for osteoporosis measured by the Perceived Susceptibility Subscale of the OHBS.
- Perceived seriousness was the older adult's beliefs that he or she had consequences in relation to personal physical health, role, and ability to complete desired tasks measured by the Perceived Seriousness Subscale of the OHBS.
- Perceived benefits were the older adult's beliefs in the effectiveness of specific behaviors to prevent the occurrence of osteoporosis, such as dietary calcium intake and weight-bearing exercise measured by the Perceived Benefits subscale of the OHBS.
- Perceived barriers were the older adult's beliefs in the difficulty of practicing or maintaining dietary calcium intake and weight-bearing exercise behaviors to prevent osteoporosis measured by the Perceived Barriers Subscale of the OHBS.
- Health motivation was the general tendency of the older adult to have adequate dietary calcium intake and weight-bearing exercise measured by the Perceived Motivation Subscale of the OHBS.

Osteoporosis self-efficacy: was the older adult belief about his/her ability to perform osteoporosis preventive behaviors: calcium intake and walking exercise measured by the Osteoporosis Self-Efficacy Scale (OSES) (Horan, Kim, Gendler, Froman, & Patel, 1998).

Osteoporosis preventive behavior: was calcium intake and walking exercise undertaken by an older adult who believes him/her being healthy for the purpose of preventing osteoporosis.

Calcium intake: was the consumption of foods containing calcium content that was derived from manufacturer's data and from tables of nutritive values of Thai foods (Nutrition Division of the Public Health Ministry, n.d.). Calcium intake was estimated as the number of calcium-rich foods serving per day measured by the Dietary Calcium Food-Frequency Questionnaire (Piaseu, 1994).

Walking exercise: were walking steps, speed (mile/hr), distance (mile), energy (kcal), and time (minutes) that were performed by older adults in a week. These were reported by pedometer reading.

Brisk walking: was a moderate physical activity when performed at the 3 to 4 mile/hour (2,000 steps = approximately 1 mile). This is equal to physical activity performed at an intensity of 3 to 6 MET (work metabolic rate/resting metabolic rate), or 4-7 Kcal/minute (Pate et al., 1995). In this study, brisk walking was defined as walking of the older adults performed at a pace faster than usual walking, but not so fast as to be uncomfortable or to cause shortness of breath (Ebrahim, Thompson, Baskaran, & Evans, 1997).

Weight-bearing exercise: physical stress on bones to promote bone deposition, such as brisk walking and jogging. It was measured by the Exercise Survey modified from the Self-Report Athletic Pursuits Questionnaire (Stillman, Lohman, Slaughter, & Massey, 1986), and a recommendation of exercise from the National Osteoporosis Society (National Osteoporosis Society, n.d.).