

## CHAPTER 1

### INTRODUCTION

Poor postural stability is one of the main risk factors for falls in elders. Falls are among the most common and serious health problems for elderly population (1, 2). In United States, falls are the leading cause of injuries and mortality in people aged over 65 years (3). Approximately 35-40% of generally healthy elders aged over 65 years fall annually. The incidence of falls progressively increases with an increasing age (4, 5). In Thailand, it is estimated that elderly population would reach 11.4% of the total nation population by the year 2010 (6). With the rapidly increase in number of elderly persons, the problems of fall and its consequences become critical. It was reported that Thai elders (aged 60 years and older) had one or more falls in the past 6 months (7). Women fall more often than men. Most falls occur outdoor, during the day time, while walking or changing positions. Non-fatal falls are often followed by many consequences such as soft tissue injury, head injury and fracture, especially, hip fracture (8, 9). In addition, falls may induce fear of falling, which can lead to restriction in activities and poor quality of life (10, 11).

Causes of falls are multi-factorials. Many intrinsic and extrinsic factors have been identified (8, 12). For extrinsic factor, footwear has been reported to affect postural stability, consequently, contribute to falls (4, 13). Footwear may alter postural stability by a combination of mechanical and neurophysiological factors (14).

For example, a shoe's heel height may affect limits of stability, sole material and tread pattern may affect the coefficient of friction on the walking surface. Previous studies reported that 45-51% of falls and 75% of fall-related hip fracture were associated with inappropriate footwear (9, 15-17).

In Western countries, many studies emphasized on the importance of footwear styles and features since they have significant impact on postural stability in elderly adults. Athletic and canvas shoes (sneakers) were the most commonly worn styles of footwear and associated with lowest risk of falls (13). Shoes with elevated heel or soft soles were shown to impair balance and walking stability (18, 19). Thus, footwear plays an important role either in reducing or increasing risk of falls in elderly adults (13, 14). Athletic shoes are often recommended to elderly since it provides optimal postural stability. Footwear styles that have different features may affect postural control in elderly differently. Despite this significant impact of footwear on balance and falls, based on our knowledge, no study has investigated the effects of footwear types on postural stability in Thai elders. Due to cultural and life style differences, it would not be appropriate to directly apply knowledge derived from western researches to Thai population. Therefore, the aims of this study are two folds: 1) to identify the most common footwear styles worn by Thai elderly women and 2) to investigate their postural control abilities while wearing those footwear styles compared with the recommended footwear style (i.e. athletic shoes). Information derived from this study would be useful in recommending proper footwear and consequently, may lead to reduce risk of falls in Thai elders.

## **Research Questions and Hypotheses**

### ***Research questions***

1. What are the top three footwear styles commonly worn by Thai elderly women?
2. How do these footwear styles affect postural control of Thai elderly women?

### ***Hypotheses***

Postural control (as measured by the OLST, Reach test, mCTSIB, TMW, and TUG) will be different when the participants wear each footwear style. Specifically, the postural control ability will be greatest when participants wear the athletic shoes compared to the top three footwear styles most commonly worn by Thai elderly women.

### ***Dependent variables***

1. One Leg Stance test (OLST)
2. Reach test (functional and lateral reach tests)
3. Modified Clinical Test of Sensory Interaction and balance (mCTSIB)
4. Gait speed (10-Meter Walk test; TMW)
5. Timed Up & Go (TUG) test

**Purposes of the study**

1. To identify the top three footwear styles commonly worn by Thai elderly women.
2. To determine postural control (as measured by the OLST, Reach test, mCTSIB, TMW, and TUG) of Thai elderly women while wearing those footwear styles compared with the recommended footwear (i.e. athletic shoes).

**Advantages of the study**

The knowledge derived from this study will provide useful information about the proper footwear style that gives optimal postural stability. Understanding how footwear styles influence postural stability in elderly is essential to develop guidelines for falls prevention. Thus, the implication of the present study can be used as part of a fall prevention program. Specifically, findings can be used as a guideline in recommending elderly women on the appropriate footwear style to buy and wear.