

## CHAPTER III

### METHODOLOGY

This chapter details materials and methods of the study. It is divided into following topics: designs and setting, sample sizes, subjects, experimental protocol, outcome measures, instrumentation and statistical analysis. Details of each topic are as follows;

#### 1. Designs and setting

This research was conducted cross-sectionally from several communities in the Khon Kaen province, Thailand.

#### 2. Sample sizes

The sample size of the study was calculated by using the formula;

$$n = \frac{2 \left[ Z_{\alpha/2c} + Z_{\beta} \right]^2 \sigma^2}{\Delta^2}$$

$\sigma$  = mean square error

$\Delta$  = effect size

$\alpha, \beta$  =  $\alpha$  error and  $\beta$  error

$c$  = number of pairwise condition (Chirawatkul, 2007)

The study used the TUGT as a major variable to investigate balance performance of the subjects. Bischoff et al. (2003) suggested that nine percent differences in TUGT with a standard deviation ( $\sigma$ ) of 1.9 had a clinically relevant difference between the groups and the effect size ( $\Delta$ ) is 1.08. The significant level was 0.05 and power level was 0.80. The number of pairwise conditions was 3 (3 groups: insufficiently active, lifestyle active and exercise groups).

$$\begin{aligned} n &= \frac{2 \left[ Z_{0.05/2 \times 3} + Z_{0.2} \right]^2 1.9^2}{1.08^2} \\ &= \frac{2 \left[ 2.41 + 0.84 \right]^2 1.9^2}{1.08^2} \end{aligned}$$

Thus, number of subjects in each group was = 65 persons

### 3. Subjects

Well-functioning older adults, aged 65 to 80 years with a BMI of 20-30 kg/m<sup>2</sup>, were conveniently recruited from several communities in the Khon Kaen province. They were excluded from the study if they presented signs and symptoms that might affect an ability to perform the tests or participate the study such as

- Required walking device
- Unable to understand and follow the command
- Dizziness
- History of neuromuscular diseases with residual impairments that affected balance and walking
- Inflammation in LE joints with the visual analog pain scale at least 5.

Then the eligible subjects were arranged into 3 groups which were insufficiently active, lifestyle active and exercise groups using the data from the health history form (see appendix D).

**Table 1** The criteria to assign subjects into the groups<sup>1</sup>

Groups	Frequency of exercise (times/week)	Duration of exercise (min/day)	Duration of physical activity (min/day)	Intensity (Borg scale)
Insufficiently active	0-1	-	< 30	< 10
Lifestyle active	< 3	-	≥ 30	≥ 11
Exercise	≥ 3	≥ 30	< 30	≥ 11

<sup>1</sup> modified from Mazzeo et al., 1998; American College of Sports Medicine, 2006 and Porapakkham et al., 2006.

In each group, the subjects required to have such lifestyles at least 1 year continuously. All subjects had to read and sign an informed consent (see appendix B-C) approved by The Khon Kaen University Ethics Committee for Human Research prior to participate in the study.

#### 4. Experimental protocol

All subjects were tested their balance ability using the Timed Up and Go Test (TUGT) which was the main parameter of this study, and the Berg Balance Scale (BBS). The TUGT was a timed functional balance test that required subjects to rise from a chair, walk at a comfortable pace for 3 meters, turn 180 degrees, walk back and sit down (see figure 4, Chapter 2). Each subject performed 2 trials and the average time of the 2 trials was reported. Bischoff et al. (2003) suggested that community-dwelling older adults, age between 65 and 85 years, should be able to perform the TUGT in no more than 12 seconds. Longer time required to complete the TUGT suggests the necessity of an in-depth mobility assessment and early intervention, such as prescription of a walking aid, home visit or physiotherapy (Bischoff et al, 2003). The BBS also measured functional balance, however, during performing sitting and standing tasks, totally 14 activities (see appendix E). The score of each activity ranges from 0 (unable/unsafe) to 4 (completely independent/safe) which a total possible score ranges from 0 to 56. A total score of 45 or less indicates a greater risk for falls (Kulsatitporn, 2006). In order to reduce crossover effects, sequences of these balance tests were randomly ordered. Furthermore, subjects were interviewed their fall history during the past 6 months and quality of life (QOL) by using questionnaires. History of fall and its consequences were determined by using a questionnaire that was modified from Brotherton (2007) (see appendix F). The questions indicated incidences, time, places and consequences of fall during the past 6 months. In this study, fall is operationally defined as an event that people found themselves unintentionally on the ground such that their parts of body touch or hit the ground, not as a result of an overwhelming hazard. QOL of subjects was determined by using a self-administered World Health Organization Quality of Life, Thai brief version (WHOQOL-BREF-THAI) questionnaire (see appendix G). This questionnaire consists of 24 items that detail physical, psychological, social relationship and environmental domains. The score of each item ranges from 1 to 5 points. Hence, the total possible score ranges from 26 to 130 points. The scores of 26-60 points indicate poor QOL, 61-95 points indicate moderate QOL, and 96-130 points refer to good QOL (Mahatnirunkul, 2002).

## 5. **Outcome measures**

Outcomes of this study included;

1. Ability of balance control: TUGT and BBS
2. Incidences and consequences of falls
3. Quality of life: WHOQOL-BREF-THAI scores

## 6. **Instrumentation**

1. Health history form
2. Fall questionnaire
3. WHOQOL-BREF-THAI questionnaire
4. Functional reach test tool
5. Step
6. Color tapes
7. Traffic cone
8. Armchair
9. Stool
10. Stopwatch

## 7. **Statistical analyses**

Descriptive statistics was used to describe demographic characteristics of subjects. Intraclass correlation coefficients (ICCs) were applied to determine the intratester reliability of balance tests. The one-way analysis of variance (ANOVA) was used to analyze the differences among the 3 groups. Then, the Post-hoc (Turkey) analysis was utilized to identify the differences of every pairwise condition. The statistically different level was set at 0.05.