CHAPTER V
DISCUSSION

This study recruited well-functioning older adults, aged 65 to 80 years, from 12 communities within Khon Kaen municipality in order to evaluate their ability of balance control, fall and quality of life. From the survey, the study found 272 older adults who were eligible to the criteria of the study. According to their daily lifestyle, 35% were accounted as insufficiently active, 38% were lifestyle active, and 27% were exercise older adults. After minimizing baseline differences (age, gender and BMI), exercise subjects achieved the best balance performance as measured by the TUGT and BBS, followed by lifestyle active and insufficiently active subjects respectively. Insufficiently active subjects also required the time to complete the TUGT more than 12 seconds which inferred the need for further (in-depth) mobility assessment and early intervention such as prescription of a walking aid, home visit or physiotherapy evaluation (Bischoff et al., 2003). There were statistically significant differences of balance control between exercise and insufficiently active subjects ($p<0.001$), but not between exercise and lifestyle active subjects. The time needed to complete the TUGT of insufficiently active subjects also clinically longer than that of the exercise and lifestyle active subjects (more than 0.09 seconds) (van Iersel et al., 2008). The findings of TUGT correlated to the incidences of falls experienced by subjects. However, there were no significant differences in QOL of subjects among three groups ($p>0.05$).

Regarding to functional balance assessment, the TUGT has been reported to have a higher sensitivity to detect balance impairment of older adults compared to BBS that was indicated to be a valid and reliable functional balance test for community-dwelling older adults (van Iersel et al., 2008; Langley and Mckintosh, 2007; Podsiadlo and Richardson, 1991). Nine percent differences of TUGT had 93% sensitivity for detection of clinically relevant differences of balance performance among the groups (van Iersel et al., 2008). Shumway-cook et al., (2000) also reported that the TUG was a sensitive (sensitivity = 87%) and specific (specificity = 87%)

measure for identifying older adults who are prone to falls. The results of the current study suggested that insufficiently active led to the significant decrement of balance control and increased risk for fall compared to sufficiently active. Although, insufficiently active subjects had less amount of activity, they still conducted routine sitting and standing physical activities (Table 3). This may enable them to have good scores of BBS which most tested items comprise of routine sitting and standing activities. Previous study reported that the scores of the BBS less than 45 points indicated a high risk of fall in older adults (Kulsatitporn, 2006). However, the findings of this study demonstrated that insufficiently active subjects had the BBS scores higher than 45 points even though they experienced greater incidences of fall than exercise and lifestyle active subjects. This may be explained that most falls occurred which subjects walking. The BBS involves predominantly static and dynamic sitting and standing tasks whereas the TUGT is a dynamic balance test which includes walking (Langley and Mackintosh, 2007). In addition, Rose et al. (2006) indicated that TUGT has fair to moderate correlation with BBS. As a result, TUGT was more relevant to the incidences of fall of the subjects than the BBS. Routine sitting and standing physical activities of insufficiently active subjects may impede them to accelerate their walking speed during performing the TUGT, thus they took significantly longer time to complete the TUGT than the regular active subjects. The changes of walking ability are common in older adults (Amatachaya, 2009). They normally tend to walk at a slower velocity, shorter step length, wider step width and a relatively increased proportion of time spent in the double-support phase. It is not clear whether these changes are due to physical limitations or an adaptive strategy for improved safety. However, these alterations are more common in fallers than non-fallers (Sturnieks et al., 2008). Snijders et al, (2007) also reported that fall is often caused by an underlying gait problem.

Although insufficiently active subjects clearly reported greater incidences of fall than those of regular active subjects, their consequences of fall were not much difference. Subjects in all groups experienced minimal consequences after falls. This may be related to baseline ability of the subjects. All subjects were well-functioning although they had different levels of daily physical activity. Thus they may have less consequence after falls.

Results of this study implied that participation in regular exercise activities most effectively delayed deterioration of balance control of well-functioning older adults, and lower the risk for fall. The findings correlated with other previous studies that reported the improvement of balance performance after exercise therapy (Shumway-Cook et al., 1997; Ballard et al., 2004; Hawk et al., 2006; Charuchit et al., 2008).

The results of this study also supported to the finding of Brach et al. (2004) that daily physical activity at a sufficiently level delayed the deterioration of balance control of well functioning older adults. Brach et al. (2004) arranged subjects into 3 groups including inactive, lifestyle active and exercise groups by using the past week's data for all physical activities (kcal/wk). The subjects were measured their physical functions by using a 400-m walk, isokinetic strength testing of the knee extensors and the Health ABC battery scores. The results showed that exercise subjects had better physical functions than lifestyle active and inactive subjects, respectively. However, the significant differences were found between exercise and inactive subjects ($p<0.01$). The authors suggested that older adults who participate in regular exercise activities appeared to derive additional benefits for physical functional capacity that were not conferred by physical activity from doing daily activities. In their study, the lifestyle active and the exercise groups had similar amounts of total physical activity but both groups differed in the intensity of physical activities. Exercise subjects demonstrated better physical function than lifestyle active subjects who participated in lower-intensity activity. Thus the authors suggested the program for older adults should emphasize on not only the frequency and duration of physical activity but also the intensity of activity.

In this study, exercise and active lifestyle subjects had similar intensity of activity but they differed in duration and types of activity. Exercise subjects conducted shorter duration of rather rapid activities such as brisk walk, jogging, aerobic dance, and Thai wand exercises. In contrast, lifestyle active subjects had longer duration of rather slow daily physical activities such as gardening, farming, care giving and household chores. It could be implied from the current findings that the intervention programs for older adults needed to consider not only sufficient level

of activity in terms of intensity, frequency and duration, but also types of activity that depending upon target ability.

Recently, the AHA and ACSM amended the recommendations for older adults, age over 65 years, and emphasized on regular physical activity (3-5 times a week), at a moderate level for 30 minutes or vigorous level for 20 minutes (Nelson et al., 2007). According to this suggestion, the study found 1/3 of well-functioning older adults were having an insufficiently active lifestyle. This finding agreed with the report of Porapakkham in 2006 that there were 15-52% insufficiently active older adults in Thailand. Results of this study confirmed benefit of regular active by either exercise and/or lifestyle active at a sufficient level on balance control and fall. Crespo et al. (1996) reported that about 40% of US older populations exercise regularly. In this study, only 27% older adults conducted a regular exercise. Thus, there is a need to encourage older adults to regularly participate in exercise or alternative methods at a sufficient level to delay the impairment of balance control and increase level of independent.

The non significant differences of QOL among the groups may be due to the scores of QOL were associated with not only physical performance but also many other factors such as psychological, social relationship and environment (Mahatnirunkul, 2002). The data were also subjective that minimal differences of balance performance with less consequences of fall may not clearly perceive the differences by the subjects. The results in this study differed from Charuchit et al. (2008) who investigated balance ability and quality of life in exercise and non-exercise elderly. The finding showed significant differences of QOL among groups by using WHOQOL. However, the characteristics of subjects in the study by Charuchit and colleagues differed from this study such as age. Most subjects in this study were early older adults (65 year-old) who might have good QOL due to better physical performance. Furthermore, the difference of environment and social relationship between two studies might result in the difference of QOL.