Effectiveness of exercise programme to prevent falls

This chapter deals with the information collected in relation to the present study through published and unpublished materials for foundation, to prepare and to carry out the research work.

- SECTION A: Reviews related to need of exercise programme
- SECTION B: Reviews related to effect of age on balance
- SECTION C: Reviews related to effect of exercise on balance

A: Reviewsrelated to needs of exercise programme.

Gardner, M. M. et al., (2000) conducted a study to assess the effectiveness of exercise programme in preventing falls. The design used for this study was controlled clinical trials. A total of 4933 older adults were participated, including both Men and women. 11 trials met the criteria for inclusion, in which 8 of them were separate exercise interventions. Out of 8, five of them showed a significant reduction in falls rate. The conclusion of this study was, exercise is effective in reducing the fall risk in selected groups.

Faber, MJ. et al.,(2006) conducted a study to assess the effectiveness of exercise programme on mobility and falls among prefrail and frail older people. The design used for this study was multicenter randomized controlled study. The setting of the study was 15 long term care centers in Amsterdumin Netherland. 278 men and women (mean age±SD, 85±6y) were included in the study. Exercise programmes were randomly distributed across 15 Homes. Each home participant was assigned to an intervention group and control group. The main outcome measures were performance oriented mobility assessment, physical performance score, and the Groningen activity restriction scale. Fall incidence was higher in control

group 2. 5 falls/year, but in case of experimental group2. 4 falls/year. The conclusion of this study was fall incidences were higher in elderly people, who didn’t undergo exercise programme as compared to experimental group.

Sherrington, C. et al.,(2008) conducted a systematic review with meta-analysis among old age people to assess the effectiveness of exercise programme on falls and to find out any particular components are associated with reduction in falls. The design used for this study was systematic review with Meta-analysis. Randomized controlled trials that compaired falls rate in older people of both experimental group and control group. The pooled estimate effect of exercise was that it reduces the incidence of falls rate by 17% with 95% confidence interval p <0. 001. This study reveals that greater relative effects were seen in exercise programmes that challenge balance.

Theou, O. et al., (2011) conducted a study to examine the effectiveness of current exercise programme on frailty management. The study design was systematic review. For the randomized controlled trial 8 electronic databases were searched, which helps to identify the participants were frail either in title, abstract, text, or in exercise. Three of the 47 studies utilized a validated definition of fragility to categorize the participants. Evidence suggested that exercise had a positive impact on functional ability outcomes.

Cadore, E. L. et al., (2013) conducted a study to review the effect of exercise on functional ability of frail older adults. The study mainly focused on falls rate, lower body strength, and gait and balance. The data were collected from science direct, Medline from 1990-2012. Twenty studies were

investigated, in that ten trials were mainly regarding the effect of exercise on balance performance and seven of them showed enhanced balance. As conclusion the authors says that there was great significance in multicomponent exercise intervention on gait ability, balance, strength, and reduction of falls rate among physically frail older adults.

Fairhall, G., et al., (2006) conducted a study to examine the perspectives of older people in a community falls prevention programme. The design used for this study was grounded theory approach. The intervention was based on 2 hour sessions, which took place in a community group setting once a week for 7 weeks. The cohorts of the older people were recruited through editorials in local papers and from mail shots. The volunteering older persons were to be more than 70 years, with previous history of falls or have concerned about falling. Participants were interviewed after 3 months following the fall prevention programme. The participants were able to recall all the aspect of content learning during the programme. From those interventions, exercise was the only beneficial and enjoyable intervention to the participants. The conclusion of the study reveals that exercise is one of an important fall prevention programme.

Seoa B. D et al., (2008) conducted a study to compare the effectiveness of resistance and balance exercise for the reduction of fall risk among elderly females above the age group of 65 years. The design adopted for the study was single blind controlled trial, conducted for 12 weeks with pre and post exercise assessment. Ninety-five participants were randomly assigned to one of three groups: resistance-training group, balance training group, and control group. The first two group showed significant improvement in

balance as compared to control group after the intervention(p <0. 01). From this study the authors concluded that , the resistance and balance exercise have significant effects on balance ability and falls efficacy in older females.

Debolt, L. S et al., (2004) conducted a study to examine the effectiveness of home based resistance exercise programme on mobility, power and balance in people with multiple sclerosis. The study was conducted in general community. The design used for this study was experimental group design. The sample size was twenty seven. 19 of them were women and 8 of them were men. The group randomly divided into experimental group and control group. Experimental group underwent resistance exercise programme and control group for normal physical activity. The results of the study assessed by using, mobility assessment with the Up and Go test scale and leg extensor power rig. According to pretest score 3. 19 and for posttest score was 3. 95. So the authors concluded that home based resistance exercise training is effective to improve the leg extensor power within a short period of time.

B: Reviews related to the effects of age on balance

Teimoori, A. et al., (2012) conducted a study to examine the age at which loss of muscle velocity, balance in adult healthy Iranian Females. 928 Iranian female participated in this study. They were in the age group of 20-26 years. The participants were divided in to four age groups. Balance , velocity were assessed for each group according to the age group and timed by digital stop watch. The study showed that, between the age group of 23-30 years the muscle velocity and balance were same. But in case of 40 age group

balance and muscle velocity were declined. By using one way ANOVA test balance and muscle velocity were differed with p <0. 001 among decades except 2 nd and 3 rd decades. The authors identified that age, balance, and muscle velocity had significant relationship with aging

Tiffani E et al., (2006) conducted a study to examine the association between measures of dynamic and static balance and performance of mobility task in elderly people of Western Carolina University. The design used was cross sectional analysis. The subjects were 195 community dwelling participants. Associations between balance and mobility measures were examined by using correlation and regression. Dynamic and static balance were moderately associated(r=-. 462). Regression age and balance were significant predictors of walking speed outcome. The authors concluded that, assessment of dynamic and static balance is an important, to know the physical functioning and mobility of elderly people.

Abrahamova, D. et al., conducted a study to examine aspects of balance control changes with age. The subjects participated for the study was between the age group (20-82). Centre of foot pressure positions used to evaluate body sway during a 50 second interval. Seven cop parameters were used to assess quiet stance and were analyzed in three groups. The regression analysis showed evident increase of body sway over 60 years of age. The normality of distribution of each cop parameter was examined by using the Kolmogorov –smirnov test. Mann Whitney test was used to analyze the differences between the age groups, if not normally distributed. If the cop parameters were normally distributed than two ways. ANOVA was used

to analyze the differences between the age groups. The level of significance was set at p <0. 05.

Gomes, M. M al., (2012) conducted a study to analyze the postural control at different age. The aim of the study is to evaluate static and dynamic balance as well as the pattern of muscle activation in elderly women from different age groups. A total of 57 women, divided in to 3 groups according to their age. Group 1(n) = 17, group2 (n) = 20, group3 (n) = 20. The center of pressure were analyzed. According to the age group, the participants showed similar displacement and muscle activation during static posture and dynamic posture. As by conclusion, the study proved that aging had an influence on balance and posture among elderly group.

Osama, B et al., (2004) conducted a study on 30 normal elderly individuals and 40 normal young adults between the age group of (20-40) years. The purpose of this study was to know the balance in elderly, and to compare postural stability, balance control and gait pattern in normal elderly persons to those of normal young adults. All participants were subjected to history taking, full routine balance test and functional test. When comparing the balance scales there was a significant difference between the two groups were noticed. (p= 0. 005). From this study, the results proved that there was a significant decrease in scores of different balance scales in elderly persons compared to young adults, besides that there was significant decrease in percent of maximum stability and was lesser in older subjects as compared to younger subjects

C: Reviews related to effect of exercise on balance

Knerl, CJ et al.,(2009) conducted a study to examine the effect of 6 weeks of balance training and strength training on dynamic balance in older adults. 51 seniors were participated.(17male and 34 females) between the age group of 60 and 93 years. Participants were divided in to 4 groups. 3 treatment groups and one control group. Each group were tested on measures of dynamic balance, flexibility and strength before and after 6 weeks of the exercise programme by using the outcome measures like Fullerton advanced balance scale. Repeated ANOVA'S shows that upper body strength and lower body flexibility including balance increased significantly (p <0. 05) in all treatment groups. The authors suggested that exercise programmes were effective on balance, strength and flexibility among older people.

Gusi, et al., (2013) conducted a study to determine the effects of balance training protocol with the balance system in institutionalized older people. 40 older adults were involved in study. The experimental group completed 12 week balance training protocol, 2 sessions per week. Both the groups ' received the same multidisciplinary care. The outcome measures were dynamic balance with the use of fall risk scale. The outcome measures were measured before and after the intervention. As compaired to control group, the experimental group had greater improvement at 12 weeks in case of dynamic balance. By conclusion the authors says that exercise programme was feasible on dynamic balance in institutionalized older people.

More, T. S, & Rao, K., et al., (2012) conducted a study to evaluate the effectiveness of 10 weeks of balance and strength training on dynamic balance of older adults. The study design was randomized controlled trial consists of 52 older adults between the age group of (60-75) years with

having poor balance and strength. They were divided in to strength training group (Group A), balance training group (Group B) and combination group(Group C). The duration of the training programme was 10 weeks. Outcome measures used were berg balance scale and senior fitness scale. Within the group statistical analysis done by using paired t test within the groups, which shows that marked improvement in all age groups with ($p < 0.01$). Group C showed more improvement in dynamic balance and strength of older adults. The result of this study shows the effectiveness of training programme on balance and strength among older adults.

Ullumen, G et al., (2010) conducted a study to examine the effects of exercise in improving balance, balance confidence and mobility in elderly people. The design used for this study was randomized control trial. The participants were randomly assigned to experimental group(n= 25) and control group(n= 22). The experimental group were attended 5 week of exercise programme, 60 minutes 3 times per week. The outcome measures were (timed up and go), balance confidence scale, falls efficacy scale. Pretest and post test were conducted. After the intervention, in experimental group balance ($p= 0.030$) and mobility ($p= 0.042$) were increased, while fear of falling ($p= 0.042$) decreased significantly. The participants of experimental group showed improvements in balance confidence ($p= 0.054$). As by conclusion the researchers suggests that exercises are an effective way to improve mobility and balance, thus by reducing the risk of falling among community –dwelling elderly people.

Zamanian, F., (2011) conducted a study to investigate the effects of balance exercise training on fall risk and postural control among older adults

especially women. 40 elderly people were participated in this study. The static balance and fall risk were measured by using Tandem and semi-tandem test, berg balance scale questionare. The subjects were divided in to experimental group and control group. Experimental group underwent 8 weeks of exercise programme. The control group didn’t participate in any of training programme. Outcome measures were analyzed after the intervention. Comparison was carried out by using paired t test and independent t test and correlation analyzed by Pearson correlation. After balance training the ability of older women in semi tandem and in tandem position was (p= 0. 007) and (p= 0. 02) respectively. So from this study, the authors concluded that balance control improves the postural control and reduces the risk of fall in older women (p= 0. 001).

Helbostard, JL et al., (2004) conducted a study to determine the effectiveness of home training exercises on functional abilities of old aged people with functional disabilities and balance problems. The design adopted for this Study was randomized trial with 77 persons aged 75 or more than that. Home training and combined training group were included in this study, for a period of 12 weeks. The exercises, rate of falls and balance functions were assessed with the outcome measures like Timed up and Go test, Maximum step length and timed pick up and sit to stand($p < 0.02$). As by conclusion the results of the study shows that, there was no group difference in case of falls rate. But there was significant improvement in functional abilities of older adults including balance.

Bird, M et al.,(2009) conducted a study to examine the long term effects of a multicomponent exercise on balance , mobility, and exercise behavior

among healthy older adults between the age group of (65-75) years. The design used for the study was randomized control intervention. The duration of the study was 12 months. Differences between those subjects, who continued to exercise and those who discontinued were investigated. The subjects who continued exercise had significantly greater improvement in strength after the intervention as compaired to those who discontinued. (p= 0. 004)

Bird, M. L et al., (2012) conducted a study to evaluate the effects of a Pilates intervention on balance and function among community dwelling older adults above 60 years. The design used was randomized cross over study for 16 weeks, conducted in university exercise clinic. Community dwelling older adults (n= 32) were selected. Out of 32, 27 were completed the intervention. Participants were allocated to either 5 weeks of a group Pilates training intervention for experimental group and 5 weeks of usual activity for control. After the 6 week, subjects performed alternate intervention. The outcome measures were 4 square test and Timed up and Go test. The results revealed that there was a significant improvement in static and dynamic balance from pre post Pilates (p <. 05) without significant changes in control phase.

Bulat, T et al (2007) conducted a study to assess the effectiveness of group functional balance training on balance outcomes in community dwelling elderly people. The study was conducted in Haley Veterans hospital in USA. The research design adopted for this study was one group pretest post-test. The participated study subjects were 51. These study subjects were participated in functional balance training programme once in a week and it lasts for a period of eight weeks. 1 hour classes were conducted weekly

ones. 84% of elderly people were completed five or more classes weekly. The outcome measures were evaluated by using berg balance scale, Limits of stability, before and after the balance training classes. The result of the study reveals that, there was a significant improvement in the Berg Balance Scale ($p < 0.0001$) and composite reaction time was ($p < 0.0004$) after the intervention. As by conclusion, the authors says that group functional exercise was effective and safe in improving balance among elderly.