



COMPARISON OF EFFECT OF LOWER EXTREMITY MUSCLE STRENGTH TRAINING WITH CONVENTIONAL PHYSIOTHERAPY ON BALANCE PERFORMANCE AMONG HEALTHY ELDERLY INDIVIDUALS

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ABSTRACT

Aim: Aim of this study is to compare the effectiveness of strength training and conventional physiotherapy on balance performance and fall prevention among healthy elderly individuals.

Methods: 30 participants with age group between 65-75 years were taken among which 15 subjects in each group are selected (experimental and control group). The programme includes one hour of strength training for 15 weeks for experimental group and conventional physiotherapy for 15 weeks for control group. Outcome has been measured using Berg balance scale.

Results: In this study, 30 old age people in mean age of 68.4 years were studied. 16 male and 14 female old age people were included. There is a significant difference between pre test and post test BBS scores of the old age people (P Value <0.0001)

Conclusion: Strength training proves to be more effective in improving the balance than conventional physical exercises among elderly individuals.

KEYWORDS

Geriatrics, Strength training, berg score

Introduction

Aging is a complex biological process in which changes at molecular, cellular and organ level results in progressive, inevitable and inescapable decrease in body's ability to respond appropriately to internal and/or external stresses. The demographics of aging were showing that global population aged 65 and over was estimated to be 420 million by 2000. According to reports given by U.S. census bureau and National institute of aging (NIA) the world's population aged 65 and over is growing by an presented 8 lakh people a month. In India by the year 2000 there were 14 old people for every 100 people of Indian population and the projected statistics were showing that the number will go up to 38 old people for every 100 people. The percentage of old age people in India is 8.7% of total. World's population. According to 2001 census 77million people are older in India among them 37 million are males and 40 million are females. There are various physiological changes associated with aging they are, in musculoskeletal system the muscle strength is reduced leading to major functional losses. Reduced muscle strength is associated with reduced muscle mass resulting into reduced activity and disuse atrophy which causes decrease in muscle protein. The over all age related strength loss ranges from 24- 45 percent. Bony changes include osteoporosis, due to decline in bone mass which leads to increase risk of fractures, in old age bony remodelling is also affected. As age advances articular cartilage appears to become increasingly prone to fatigue and failure. In central nervous system there will be neuronal loss as age advances mainly due to diminution in cerebral blood flow and decrease in cerebral metabolic rate of oxygen which is responsible for neuronal death. In peripheral nervous system age related decline in some peripheral receptors and afferent nerve fibres are seen and nerve conduction velocity will be decreased. Central processing time is influenced by aging process. Loss in synapse and myelin sheath will be observed. Central vestibular system undergoes degeneration with age. Prebyastasis (disequilibrium associated with aging) is present. Balance control is critical for the efficient and effective performance of all goal directed activities. Balance control in a normal adult usually takes place at the sub-conscious level. It is a complex process involving the co-ordinated action of sensory and musculoskeletal systems integrated and modified with in the central nervous system in response to changing internal and external environmental conditions. The sensory system comprises the vestibular, visual and somatosensory systems but no one sensory system directly specifies the position of the COG.

Aim of this study is to compare the effectiveness of strength training and conventional physiotherapy on balance performance and fall prevention among healthy elderly individuals.

Materials and Methods

This prospective comparative study was conducted in a General hospital, in old-age people of both genders with age group ranging between 65-75 years. Inclusion criteria: Subjects who had history of falling once in an year before the study, Subjects walking with out assistive devices, Subjects with age group between 60 and 70 years, Berg balance scale score between 41-45. Exclusion criteria: Subjects suffering with neurological disorders, lower extremity musculo-skeletal disorders, cardio-vascular diseases, vertigo, who uses walker for support. After initial examination, subjects who met study criteria are agreed to participate were assigned into experimental and control groups, informed consent was taken from the subjects prior to the treatment. The experimental group and control group were given strength training programme and conventional physiotherapy respectively for a period of 15 weeks. Berg balance scale was administered to assess the balance for both groups before and after intervention.

Results

In this study, 30 old age people in mean age of 68.4 years were studied. 16 male and 14 female old age people were included. There is a significant difference between pre test and post test BBS scores of the old age people (P Value <0.0001), it infers that lower extremity strength training in improving balance is effective. At initial assessment, the subjects scored 41-45 in Berg balance scale and it indicates all subjects had balance deficits. There is evidence of gains in Berg balance scale scores and these supports that balance performance was improved between initial testing and 15 weeks of after intervention. The results of the study indicates that there is a significant improvement of balance in subjects trained with lower limb muscle strength training for 15 weeks and for the control group includes conventional sitting and standing balance exercises. This ensures that any difference in the results between the groups is due to increase in leg strength and endurance and not by conventional exercises. The improvement in Berg balance scale scores may also be due to increased leg strength.

Table 1 comparing the pre and post test Berg Balance Scale scores in the control group

BBS Scores	N	Mean	S.D.	P Value
Pre-test	15	42.80	1.37	<0.0001

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Post-test	15	48.33	0.99	
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Table 2 Comparing the pre and post test Short-Form Berg Balance Scale scores in the experimental group

SFBBS Scores	N	Mean	S.D.	P Value
Pre-test	15	43.06	1.38	<0.0001
Post-test	15	52.80	1.74	

Table 3 Comparison Short-Form Berg Balance scale scores between the 2 groups

SFBBS Scores	N	Mean	S.D.	P value
Experimental Group-post Score	15	9.73	2.15	<0.0001
Control Group-Post Score	15	5.73	1.38	

Discussion

Gehlsen et al, (1993) their studies showed that variety of exercise training programmes can improve leg strength in older subjects. This is further supported by results of lord et al, which showed that a 10 week programme of aerobics and body weight resistant training strengthened quadriceps in men and women aged 50-75 years. Exercise programme for 3 months in older adults has produced significant improvements in strength and balance and also reduce falls (Michael Rogers, 2003). Sauvage et al, in a study showed that appropriately designed high intensity exercise programme can result in improvement of gait and balance in elderly male people. In a study done by Wolfson et al, a combined programme of balance and strength training will be more effective than either approach alone in elderly population. On this basis of 9 randomised controlled studies conducted since 1996, exercise appears to be a useful tool in fall prevention in adults.(Carter 2001).

Conclusion

We conclude that lower extremity muscle strength training improves balance in healthy elderly individuals than conventional physiotherapy. This implies that lower extremity muscle strength training has produced improvements in leg strength and balance.

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