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Research Article

EFFECTIVENESS OF LOW INTENSITY AEROBIC EXERCISE ON BALANCE AMONG ELDERLY PERSONS IN SELECTED OLD AGE HOMES AT KOLHAPUR

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ABSTRACT

The major area concern is the health of the elderly with multiple medical and psychological problems in the elderly. Falls are the major problem in the elderly. The study was conducted to evaluate effectiveness of low intensity aerobic exercise on balance among elderly persons who were 60 years in age and above from selected old age homes at Kolhapur. Non- probability purposive sampling method was used to collect 60 samples (30 experimental and 30 control groups). The study followed a quantitative evaluative survey approach with quasi experimental, Non- equivalent control group, pre-test post test design. The data was collected by using socio demographic data and bergs balance scale administered to both the groups to assess the balance score. After the pre assessment the experimental group underwent low intensity aerobic exercise program, 20 minutes per day for a period of 4 weeks. Post assessment was conducted after the 28th day on both the groups by using bergs balance scale. After Pre assessment there was all elderly persons from both the groups belong to High fall risk. The result showed that, obtained mean difference between pre-assessment and post assessment balance score in experimental group was 6.07 and the paired 't' calculated value (t_{cal}: 16.37) is greater than the tabulated value (t_{tab}: 2.09) So, it was found that low intensity aerobic exercise was effective in improving balance among elderly persons; and study also showed that, The obtained mean difference between post assessment balance scores in experimental and control groups was 6.1. Hence this indicates that, the unpaired 't' calculated value (t_{cal}: 5.47) is greater than the tabulated value (t_{tab}: 2.00). So, the mean post assessment balance score of subjects in experimental group was greater than the mean post assessment balance scores of subjects in control group. The study revealed that the low intensity aerobic exercise was proved to be very effective intervention strategy for improving the balance in elderly persons.

INTRODUCTION

Background of the Study

In India, the number of persons above the age of 60 years is fast growing, 76.6 million people in India at over the age of 60, constituting above 7.7% of total population and is expected to reach 8.9% in 2016. Health concerns among the elderly are multiple and complex which includes medical and psychosocial problems. Falls are one of the major problems in the elderly and are considered to be one of the "geriatric giants" (falls, confusion, incontinence, impaired homeostasis, iatrogenic disorders) leading to a significant proportion of morbidity. Falls are commonly defined as "inadvertently coming to rest on the ground, floor or other lower level excluding intentional change in position to rest in furniture, wall or other objects.[1] Each year, 2.5 million older people are treated in emergency departments for fall injuries. Over 700,000 patients a year are hospitalized because of a fall injury, most often because of a head injury or hip fracture. Each year at least 250,000 older people are hospitalized for hip fractures. More than 95% of hip fractures are caused by falling, usually by falling sideways. Falls are the most common cause of traumatic brain injuries (TBI).[2]

Good balance is essential to being able to control and maintain your body's position while moving and remaining still. And problems in balance leads to fall.[3]

Aerobic exercises are exercises that use the large muscles of the body usually arms & legs in repetitive and rhythmic movements increasing the need for oxygen in the muscles being exercised. Low-impact exercises, particularly aerobics improve balance, strength and decrease the risk of falling. Nobody could refute how beneficial physical exercise is, especially to older persons. Likewise, the benefits of physical activities spans to all ages and to all races. Such benefits

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include longer breathing capacity, stronger heart functions, endurance of muscle strength and a lot other healthy rewards.[4]

Objectives

1. To assess the balance among elderly persons in both the groups by using Berg balance scale.
2. To demonstrate the low intensity aerobic exercises to elderly Persons in experimental group.
3. To evaluate the effectiveness of low intensity aerobic exercises on balance among elderly persons in the experimental group.
4. To compare the post assessment balance scores of elderly persons between experimental and control groups.

MATERIALS AND METHODS

The population of this study was elderly persons 60 years of age and above from selected old age homes at Kolhapur. The evaluative survey was adopted for this study. Quasi experimental, Non equivalent control group pre test post test research design selected for this study. The non- probability, purposive sampling technique was used to select 60 samples for the present study. The samples for 30 experimental group and 30 control group were selected from different old age homes. The data was collected using Socio-demographic data and Berg Balance Scale. An informed consent was taken from the elderly persons. The Berg's balance scale was administered to both the groups to assess the balance level. After the pre-assessment, the experimental group underwent low intensity aerobic exercise programme, 20 minutes per day for a period of 4 weeks. Post assessment conducted after the 28th day both the groups by using berg balance scale to evaluate the effectiveness of low intensity aerobic exercise.

Inclusion Criteria

Elderly persons who are;

- having the problem of balance.
- 60 years in age and above.
- able to perform low intensity aerobic exercise.
- able to follow instructions.
- present during data collections.

Exclusion criteria

Elderly persons who are

- having major cardiovascular, respiratory and spine problems.
- using assistive devices for walking, lower extremity fracture, sprain or injury.

Duration

The data collection period extended from 13/02/2016 to 14/03/2016.

Procedures for Data Collection

The research investigator obtained Ethical clearance from the ethical committee. Permission obtained from concern authorities of old age homes. Selected old age homes for experimental (Matoshree old age home R. K. Nager) and control group (Matoshree old age home, Nagdevwadi).

The main study was conducted at these old age homes from 13th February 2016 up to 14th March 2016. Planning of time schedule for data collection was done as per the timings given by the authorities of the old age homes. On 13th February 2016, in experimental group, the investigator introduces himself and explained the purposes and objectives to the subjects. By using the non-probability, purposive sampling 30 subjects selected those who were willing to participate and fulfilling the criteria of selection. After which written consent was taken from the participants. Thereafter pre assessment was done by using Berg balance scale following which low intensity aerobic exercises were demonstrated by the investigator start on the 14 February 2016 to the elderly people in experimental group. These exercises were performed daily under the supervision and guidance of investigator for four weeks i.e. 14th February 2016 to 12th March 2016. Post assessment was conducted on 30 elderly people using the same berg balance scale on 13th March 2016.

On 13th February 2016 in control group the investigator introduces himself and explained the purposes and objectives to the elderly people residing at old age home. Using the non-probability, purposive sampling 30 elderly people who were willing to participate and those who were fulfilling the criteria for selection were selected. After which written consent was taken from the participants.

Table 1 Frequency and percentage distribution of subjects according to their selected demographic variables. n- 60

Sr. no	Variables	Experimental group(30)		Control group(30)		Total	
		f	%	f	%	f	%
1.	**Age in years**						
	a.61-70	24	80	18	60	42	70
	b.71- 80	03	10	09	30	12	20
	c.81- 90	03	10	03	10	06	10
2.	**Gender**						
	a.Male	24	80	17	56.66	41	68.33
	b.Female	06	20	13	43.33	19	31.07
3.	**Education**						
	a.Illiterate	11	36.66	08	26.66	19	31.66
	b.Primary	12	40	10	33.33	22	66.66
	c.Secondary	06	20	07	23.33	13	21.66
	d.Higher secondary	00	00	01	3.33	01	1.66
	e.Graduate	01	3.33	04	13.33	05	8.33
4.	**Occupational history**						
	a. Social worker	03	10	03	10	06	10
	b. Farmer	10	33	09	30	19	31.66
	c. Industrial worker	05	16.66	03	10	08	13.33
	d. House w1ife	06	20	13	43.33	19	31.66
	e.Professional	04	13.33	02	6.66	06	10
	f. construction labor	02	6.66	00	00	02	3.33
5.	**Marital Status**						
	a. Married	22	77.33	21	70	43	71.66
	b. Unmarried	05	16.66	01	3.33	06	10
	c. Divorced	02	6.66	02	6.66	04	6.66
	d. Widowed	01	3.33	06	20	07	11.66
6.	**Habitat**						
	a. Rural	24	80	26	86.66	50	83.33
	b. Urban	06	20	04	13.33	10	16.66
7.	**Type of diet**						
	a. Veg	12	40	15	50	27	45
	b. Mixed	18	60	15	50	33	55
8.	**Imbalance Problem**						
	Since,						
	• 1 – 5 years	26	86.66	15	56.66	41	68.33
	• 6-10 years	04	13.33	15	43.33	19	31.66

Pre assessment was done using berg balance scale. No intervention was given to the elderly people. Post assessment was conducted on 30 elderly people using the same berg balance scale on 13th March 2016.

FINDINGS AND DISCUSSION

To begin with, the data was entered in a master sheet for tabulation and statistical processing. Analysis of data is organized and presented under following headings:

Section I: - Description of the selected demographic variables of elderly persons.

Section II: - Analysis of pre and post assessment balance scores of subjects in experimental and control groups.

Section III:-Testing of hypothesis for the evaluation of effectiveness of low intensity aerobic exercise.

Section IV: - Testing of hypothesis for comparison of post assessment balance score of subjects in experimental and control groups to draw the conclusion.

Section:1

Description of the selected demographic variables of elderly persons

Table 1: Indicates that,

- In experimental group majority of samples 24 (80 %) belonged to the age group of 61-70 years and 03 (10 %) belonged to 71-80 years of age where in control group 18 (60 %) of elderly persons belonged to 61-70 years of age and 03
- (10 %) belonged to the age group of above 81 years.
- Majority of the elderly persons in the experimental group 24 (80 %) were Male where as 06 (20 %) were female. Majority of the elderly persons in the control group 24 (80 %) were Male where as 06 (20 %) were female.
- For education, Majority of the samples in experimental group 11 (36.66 %) were Illiterate, where as 01 (3.33 %) were graduate, majority of the samples in control group 10 (33.33 %) were Primary whereas 01 (3.33 %) belonged to higher secondary.
- For occupation, Majority of the samples in experimental group 10 (33 %) belonged to farmer where as 02 (6.66 %) belonged to construction labor. Majority of samples in control group 13 (43.33 %) were to house wife and 02 (6.66 %) were Professional.
- For Marital status, Majority of the samples in experimental group 22 (77.33 %) married whereas 1 (3.33 %) was Widowed, majority of the samples in control group 21 (70 %) married, where as 01 (3.33 %) unmarried.
- For Habitat, Majority of the samples in experimental group 24(80%) belonged to rural habitat whereas 06 (20 %) belonged to Urban. Majority of samples in control group 26 (86.66 %) belonged to Rural habitat whereas 04 (13.33 %) belonged to urban.
- For diet, Majority of the samples in experimental group 18(60%) they take mixed diet where as 12 (40 %) vegetarian. Samples in control group 15 (50 %) they take vegetarian diet where as 15 (50 %) mixed diet.
- Majority of the samples in experimental group 26 (86.66 %) having imbalance problem since 1-5 years, whereas 04 (13.33 %) having since 6-10 years. Majority of the samples in control group 15 (50 %) having imbalance problem since 6-10 years, whereas 04 (13.33 %) having since 6-10 years.

The findings of this study are supported with the study done in Mangalore on the effectiveness of low intensity aerobic exercise on balance among elderly persons. The major findings of the study showed that, majority of elderly persons 40 (76.9%) had medium fall risk, 8 (15.4%) low fall risk and 4 (7.7%) high fall risk.

Section-II

Analysis of pre and post-assessment balance scores of subjects in experimental and control groups.

Table 2- Frequency and percentage distribution of pre-assessment and post-assessment balance scores of subjects in experimental group. n- 30

Balance Scores	Pre- Assessment Scores		Post- Assessment Scores	
	F	%	F	%
Low Fall risk 41 to 65	00	00	00	00
Medium fall risk 21 to 40	00	00	12	40
High fall risk 0 to 20	30	100	18	60

Table 2- Reveals that in pre-assessment of the subjects in experimental group 30 (100%) had high fall risk, were none of them had medium fall and low fall risk; where as in post-assessment 18 (60%) subjects had high fall risk, and 12 (40%) had in medium fall risk.

Table 3 Frequency and percentage distribution of pre-assessment and post-assessment balance scores of subjects in control group. n- 30

Balance Scores	Pre- Assessment Scores		Post- Assessment Scores	
	F	%	F	%
Low Fall risk 41 to 65	00	00	00	00
Medium fall risk 21 to 40	00	00	00	00
High fall risk 0 to 20	30	100	30	100

Table 3- Reveals that in pre-assessment of the subjects in control group 30 (100%) had high fall risk, were none of them had medium fall and low fall risk; where as in post-assessment 30 (100 %) None of them had medium fall risk and low fall risk.

Section- III

Testing of hypothesis for the evaluation of effectiveness of low intensity aerobic exercise in experimental group.

In order to find out the difference between the scores of pre-assessment and the post-assessment balance scores of elderly persons Paired 't' test was computed and data is presented in table.

H_1- The mean post-assessment balance score of subjects in experimental group exposed to low intensity aerobic exercise on balance is greater than pre assessment balance scores as measured by berg balance scale.

Table 4 Mean, median, mode, standard deviation, range of balance scores of subjects in experimental group n- 30

Area of analysis	Mean	Median	Mode	SD	Range
Pre assessment	13.23	12	12	3.84	12
Post assessment	19.3	17	15	5.07	16

Table 4- Indicates that, after pre assessment mean was 13.23, median 12, mode 12, standard deviation 3.84 and range was 12 of balance score. Whereas, after post assessment mean was 19.3, median 17, mode 15, SD 5.07and range 16 of balance score in experimental group.

Table 5- Mean difference, standard error and paired 't' value of balance scores of subjects in experimental group n- 30

Mean Difference	Standard Error (SE)	Paired 't' Values		Df
		Calculated	Tabulated	
6.07	0.37	16.37	0.05	29

The data presented in table 5 shows that; the obtained mean difference between pre assessment and post assessment balance score in experimental group was 6.07. The obtained calculated value (t_{cal}- 16.37) is greater than the tabulated value (t_{tab}-2.09). Therefore, research hypotheses H_1 is accepted i.e. H_1:$\mu \neq \mu_o$. So, it is found that low intensity aerobic exercise is effective in improving balance among elderly persons.

The findings of this study are supported with the study done in Mangalore on the effectiveness of low intensity aerobic exercise on balance among elderly persons. The major findings of the study showed that, Mean pre assessment balance scores of subjects in the experimental group were 33.30, whereas after intervention the post test mean scores were increased to 43.15, which showed a significant improvement in the balance level after intervention. The calculated 't' value of balance scores using paired 't' test, was 16.678, which was more than the table value tabulated 't' value(19)= 2.09 at 0.05 level of significance. Hence, it was concluded that low intensity aerobic exercise is an effective strategy for elderly persons to improve the balance.

Section- IV

Testing of hypothesis for comparison of post assessment balance score of subjects in experimental and control groups to draw the conclusion.

H_2- The mean post-assessment scores of subjects exposed to low intensity aerobic exercise in experimental group greater than the mean post assessment balance scores of subjects in control group.

Table 6 Mean, median, mode, standard deviation, range values of balance scores of subjects in experimental and control groups n- 60

Area of analysis	Mean	Median	Mode	SD	Range
Exp. group	19.3	17	15	5.07	16
Control group	13.2	14	14	2.92	12

Table 6: Indicates that in experimental group mean was 19.3 , median 17, mode 15, standard deviation 5.07 and range was 16; whereas in control group mean was 13.2, median 14, mode 14, SD 2.92 and range 12.

Table 7- Mean difference, standard error and unpaired 't' value of balance scores of subjects in experimental group and control group. n- 60

Mean Difference	Standard Error Difference (SED)	Unpaired 't' Values		df
		Calculated	Tabulated	
6.1	1.06	5.47	2.00	58

The data presented in table 7 shows that, the obtained mean difference between post assessment balance scores in experimental and control group is 6.1. This indicates that there was improvement in balance scores in experimental group after administrating low intensity aerobic exercise to elderly persons.

Reveals that, the Calculated 't' value (t_{cal}- 5.47) is greater than Tabulated value (t_{tab}- 2.00). Hence; Hypotheses (H_2) is accepted. i. e. H_2:$\mu \neq \mu_o$. Thus, the low intensity aerobic exercise was proved to be very effective intervention strategy for improving the balance in elderly persons.

The findings of this study are supported with the study done in Mangalore on the effectiveness of low intensity aerobic exercise on balance among elderly persons. The difference in the level of balance in control group were statistically compared using independent sample 't' test which revealed that the difference of mean balance scores of experimental group was 8.7500 and control group was 7.144, which was more than the table value (38)= 2.021 at 0.05 level of significance. Hence, it was concluded that there was a significant difference between post balance scores of control and experimental group and hence aerobic exercise is effective to improve balance among elderly persons.

CONCLUSION

This proves that the balance score was increased after administrating low intensity aerobic exercise to elderly persons. Hence, the Low intensity aerobic exercise is effective to maintain the balance in elderly persons.

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Conflict of Interest

There is no conflict of interest for the present study.

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