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Research Article

COMPARATIVE STUDY OF PHYSICAL FITNESS AND QUALITY OF LIFE IN EXERCISING AND NON-EXERCISING INSTITUTIONALISED ELDERLY

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ABSTRACT

Introduction: Aging is a very complex process leading to decline in the body's physiological systems and physical fitness. Change in lifestyle and bodily adaptations are expected in community dwelling and institutionalized elderly individuals because of the difference in their demands.¹ This study has been undertaken to understand their Fitness and Quality of life (QOL)

Methodology: A sample size of 30 institutionalized elderly included 15 exercising and non-exercising each. Physical fitness and QOL were assessed using Senior Fitness Test (SFT) and Older People's QOL Questionnaire respectively.

Results: There was a significant difference in upper body strength and flexibility (p value = 0.0418; p value = 0.0481 respectively), 2 minute step test (p value = 0.0471), QOL (p value = 0.0153) which was better in exercising group.

Conclusion: The study suggests that upper body strength and flexibility, aerobic endurance and QOL are better in exercising as compared to non-exercising institutionalized elderly.

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INTRODUCTION

The World Health Organization defined health as a state of complete physical, psychologic and social well being, and not merely the absence of disease or infirmity. Aging of the population is occurring at an increased rate in the past and currently India is in the late expanding phase in the demographic cycle.² As people age profound physiologic changes occur in every bodily system. Due to ageing changes are seen in the Pulmonary system, Cardiovascular system, Skeletal system and Muscle performance, Sensory system and Nervous system.¹ This makes the elderly predisposed to certain diseases like arthritis, hypertension, stroke, dementia and infections. The extent of these physiologic changes has a significant impact on the ability of an individual to function in daily life.¹ Arthritis, high blood pressure, hearing impairments and heart disease are most prevalent conditions in elderly and more in elderly who are alone and poor.³

Elderly population is classified into Young old that include individuals between 65-75 years of age, Middle-old group includes between 75-85 years of age and Old-old group is comprised of individuals older than 85 years.¹ Community dwelling elderly includes elderly (>= 60 years of age) who live independently in the community. Institutionalised elderly

includes elderly (>= 60 years of age) who live in some committed specialized institution.³ In recent years in India the number of older people living in institutional long term care has been gradually increasing due to structural changes and disintegration of the joint family system in the Indian society.⁴

The ability to function independently declines with age and that decline is influenced by a host of biologic, psychologic and social factors. Factors affecting an elder's quality of life are 1) Family who are a major source of emotional support, care giver 2) Grief due to loss of physical function, life roles and responsibilities, loved one's 3) Fear of isolation, pain and dependence.¹ It has been proved that older adults who spend more time in physical activity exhibit improved physical fitness.⁵ Recent available studies suggest that institutionalised elderly people have a low level of physical fitness which restricts their daily life activities.⁵

So the study has been undertaken to assess the physical fitness and quality of life in exercising and non-exercising group of institutionalised elderly.

Need for study

At present the sedentary lifestyle has become a common feature at any age, while aging leads to decline in the physical activity level. To prevent or delay the further health related

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impairments and help them lead an independent life it is important to study the level of physical fitness and quality of life in them.

Change in lifestyle and bodily adaptations can be expected in community dwelling and institutionalised elderly individuals because of the difference in demands placed on them by their lifestyle.¹ Assessment of the physical fitness and its effect on the well being, participation level and social functioning will help us in better understanding of HRQoL that may guide to develop and apply strategies for promoting health in the institutionalised group of elderly.⁶

This research will guide us for designing better health care services and fitness programme to the individuals and help them in successful aging and live an independent life.

MATERIALS AND METHODOLOGY

Type of Study: Cross-sectional study

Population: Institutionalised elderly above 60 years of age

Duration of study: Six months

Sample Design

Type of Sampling: Convenience Sampling

Sample Size: 30

Location: Manav Seva Sangh, Sion, India

Selection Criteria

Inclusion Criteria

- Males and Females of age 60 years or more
- Asymptomatic
- Ambulatory individuals
- Being institutionalised for more than 6 months

Exclusion Criteria

- Subjects with chest pain or discomfort
- Recent myocardial infarction
- Severe Musculoskeletal conditions [grade4 osteoarthritis knee, unhealed fracture, etc.]
- Uncontrolled arterial blood pressure exceeding 180/100 mmHg
- Neurological conditions [stroke, parkinson's disease, etc)

Materials Used

- Pen
- Data record sheet
- Measuring tape
- 2kg and 3.5kg weight cuffs
- Chair without armrest
- Stopwatch
- Senior fitness test scoring sheet
- Older people's quality of life questionnaire

Procedure

- Institutional Ethical approval was taken before undertaking the study. The procedure of the study was explained to subjects in the language they understood and an informed written consent was obtained from them.

- This cross-sectional study included 30 institutionalised elderly subjects fulfilling the inclusion criteria. The subjects were divided into two groups - Group 1 included 15 exercising and Group 2 included 15 non-exercising elderly.
- Outcome Measures used were:

Senior Fitness Test

The following components are included in the test

1. Arm curl test for assessment of Upper body strength
2. Back scratch test for assessment of Upper body flexibility
3. 30 second chair stand test for assessment of Lower body strength
4. Chair sit and reach test for assessment of Lower body flexibility
5. 8 feet up & go test for assessment of Agility/Dynamic balance
6. 2 minute step test for assessment of Aerobic endurance

Older People's Quality of Life Questionnaire for assessing Quality of Life

Validity and Reliability: Cronbach's α value $0.70 < 0.90$ for each QoL measure. Intra-class test-retest correlation ranges between 0.403 and 0.782⁷

The Senior Fitness Test

The fitness of the elderly subjects was assessed using the Senior fitness test. The procedure of the senior fitness test was as follows:

1. Arm curl test: Upper body strength was assessed using the Arm Curl test. The subject was sitting on a chair without arm rest. 2kg and 3.5kg weight cuffs for females and males respectively were tied at the subject's wrist with elbow straightened. Then the subject was asked to bend the elbow completely and then straighten it. The number of times the subject could this in 30 seconds was counted and noted.



Starting position

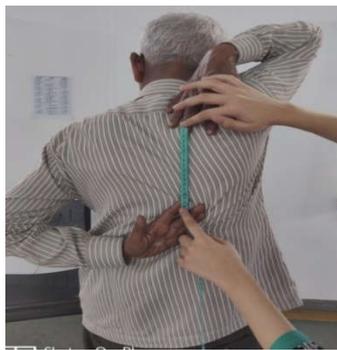


Performing the test
Picture 1: Arm curl test



Performing the test
Picture 3: 30 Second chair stand test

2. Back scratch test: Back scratch test was done to assess the upper body flexibility. The subject was in standing position. One arm was placed over the same shoulder with the palms facing the body and fingers outstretched. The other hand was placed behind the back, palm facing towards and fingers outstretched. The subjects were told to approximate the three digits of both the hands. The distance between the digits of both the hands was calculated in inches using a measure tape.



Performing the test
Picture 2: Back scratch test

4. Chair sit and reach test: This test was to measure the lower body flexibility. The subject was seated at the edge of the chair and was asked to keep one leg flexed with foot resting on the floor while the other leg was outstretched with the heel of that leg resting on the floor. The test included bending forward flexion from the hip. Arms were outstretched and placed on each other with the subject trying to touch the toes with the fingers. The distance between the fingers of hand and toes was measured in inches using a measuring tape.



Starting position

3. 30 second chair stand test: This test was to assess the lower body strength. The subject was asked to sit on the chair with elbows bent such that fingers of one hand touch the opposite shoulder. Then the subject had to stand up from a chair and again sit back on the chair. The number of times the subject could stand and sit back on the chair in 30 seconds was counted.



Starting position



Performing the test

Picture 4: Chair sit and reach test

- 8 feet up and go test: This test was used to measure the dynamic balance of the subject. The subject was seated on a chair. On examiner's commands the subject had to stand up quickly from the chair, walk the said distance and come back and sit on the chair again. The time taken to complete this task was calculated in seconds and that was the result of the test.



Picture 5: Performing the 8 feet up and go test

- 2 minute step test: This test was conducted to calculate the aerobic endurance of the individuals. Subject's pre vitals were checked. The subject was told to raise each knee to a point midway between the patella and iliac crest. Score is calculated on the basis number of full steps that is number of times right knee reaches the required height in 2 minutes time. Post test vitals were also calculated.



Picture 6: Performing the 2 minute step test

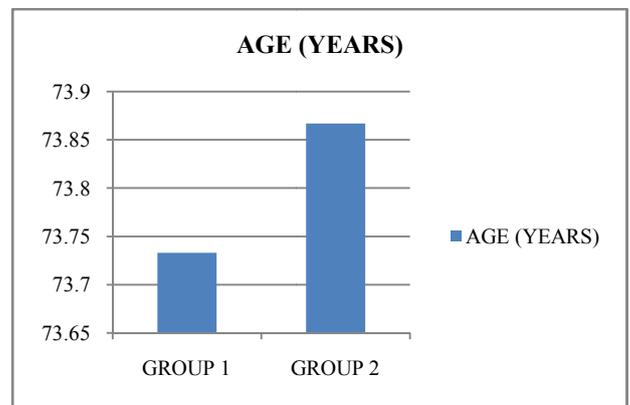
After the senior fitness test was completed the subjects were told to fill the older people's quality of life questionnaire and the total score of the questionnaire was calculated.

RESULTS

Data was analysed using the Graph Pad Instat Version 3.10. Demographic characteristics like Age and Gender were matched. All components of Senior Fitness Test and OPQOL were checked for normality and the components that passed the normality test were further tested using the Unpaired t-test and for the components which did not pass the normality test were analysed using the Mann-Whitney test.

Table 1: Comparison of age in both the groups

Groups	Mean	Standard deviation	p value	Significance
Group 1	73.733	6.352		
Group 2	73.867	7.708	0.959	Not Significant



Graph 1: Comparison of age in both the groups

Inference: The above graph shows no significant difference of age in both the groups (p value = 0.959)

Table 2: Distribution of gender in both the groups

Gender	Group 1		Group 2	
	Frequency	Percentage	Frequency	Percentage
Males	7	46.66	8	53.33
Females	8	53.33	7	46.66
Total	15	100	15	100

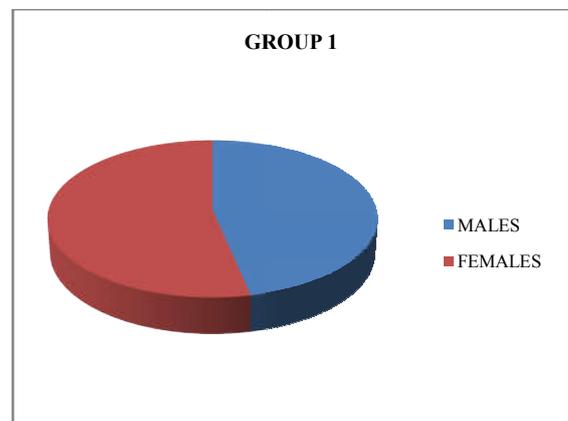
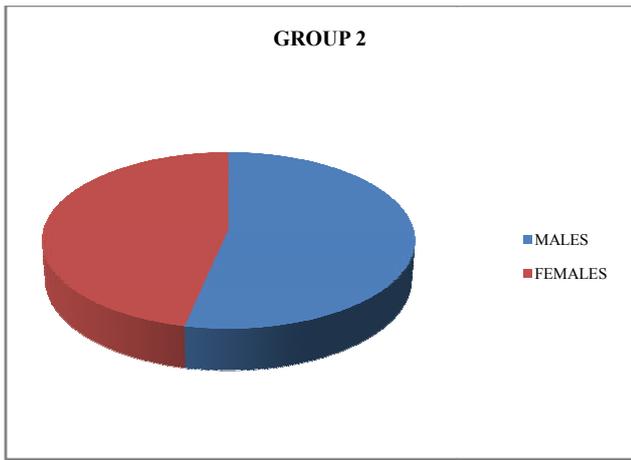


Figure 1: Distribution of gender in both the groups

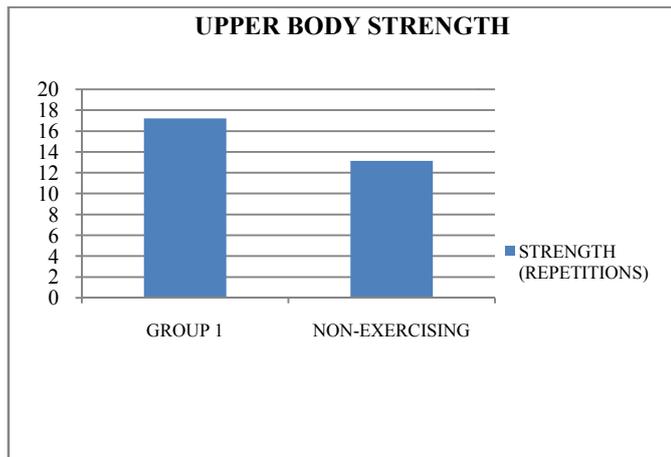


Inference: The above pie-charts shows there are 46.66% males and 53.33% females in Group 1; 53.33% males and 46.66% females in Group 2

Components of Senior Fitness Test in Both Groups

Table 3.1: Comparison of upper body strength (repetitions) in both the groups

Groups	Mean	Standard deviation	p value	Significance
Group 1	17.200	6.847	0.0418	Significant
Group 2	13.133	2.774		

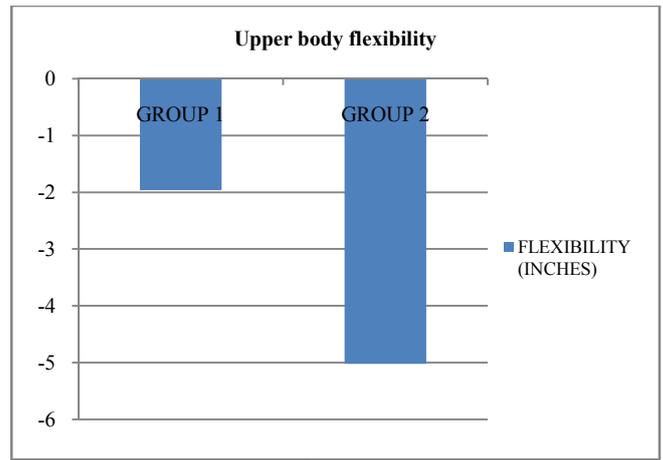


Graph 3.1 Comparison of upper body strength (repetitions) in both the groups

Inference: The above graph shows Significant difference between Upper body strength of both the groups (p value = 0.0418)

Table 3.2: Comparison of upper body flexibility (in inches) in both the groups

Groups	Mean	Standard deviation	p value	Significance
Group 1	-1.960	6.297		
Group 2	-5.020	2.779	0.0481	Significant

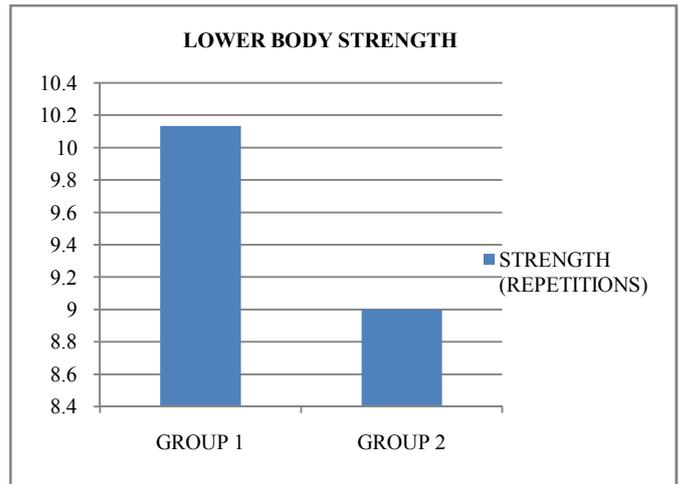


Graph 3.2 Comparison of upper body flexibility (in inches) in both the groups

Inference: The above graph shows Significant difference between Upper body flexibility of both the groups (p value = 0.0481)

Table 3.3: Comparison of lower body strength (30 second chair stand repetitions) in both the groups

Groups	Mean	Standard deviation	p value	Significance
Group 1	10.133	3.335	0.461	Not Significant
Group 2	9.000	2.171		Significant

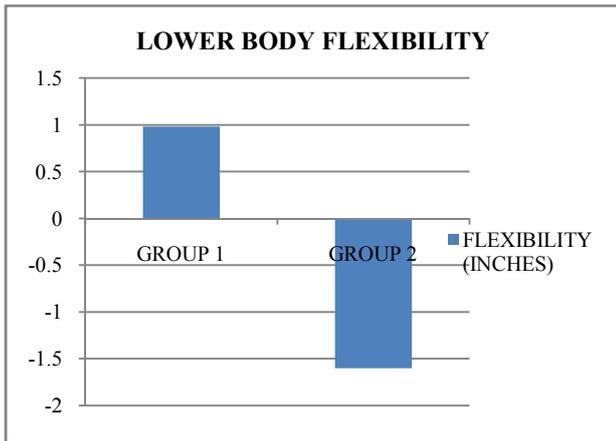


Graph 3.3: Comparison of lower body strength (30 second chair stand repetitions) in both the groups

Inference: The above graph shows no significant difference between Lower body strength of both the groups (p value = 0.461)

Table 3.4: Comparison of lower body flexibility (chair sit and reach in inches) in both the groups

Groups	Mean	Standard deviation	p value	Significance
Group 1	0.980	4.811		
Group 2	-1.600	4.684	0.243	Not Significant

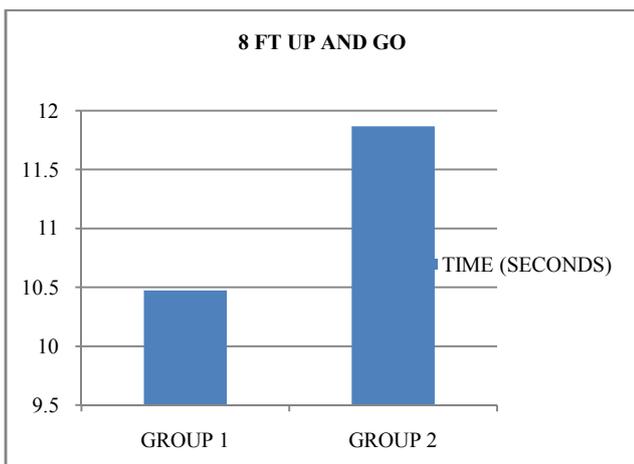


Graph 3.4: Comparison of lower body flexibility (chair sit and reach in inches) in both the groups

Inference: The above graph shows no significant difference between Lower body flexibility of both the groups (p value = 0.243)

Table 3.5 Comparison of lower body flexibility (chair sit and reach in inches) in both the groups

Groups	Mean	Standard deviation	p value	Significance
Group 1	10.473	3.538	0.336	Not Significant
Group 2	11.867	4.190		

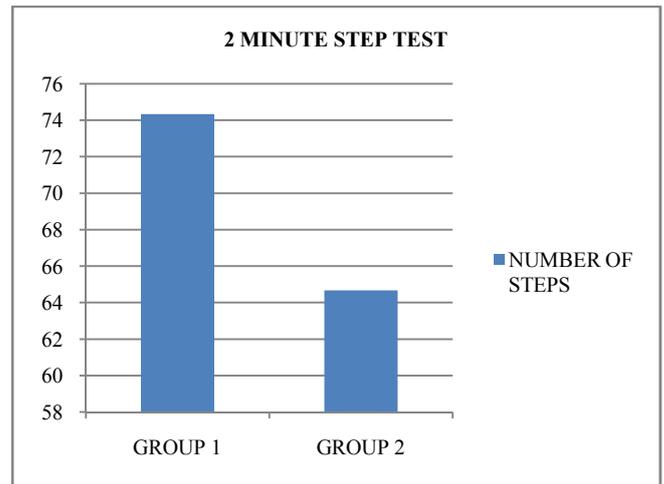


Graph 3.5 Comparison of lower body flexibility (chair sit and reach in inches) in both the groups

Inference: The above graph shows no significant difference in agility/dynamic balance between both the groups (p value = 0.336)

Table 3.6: Comparison of 2 minute step test in both the groups

Groups	Mean	Standard deviation	p value	Significance
Group 1	74.33	16.308		
Group 2	64.667	7.678	0.0471	Significant

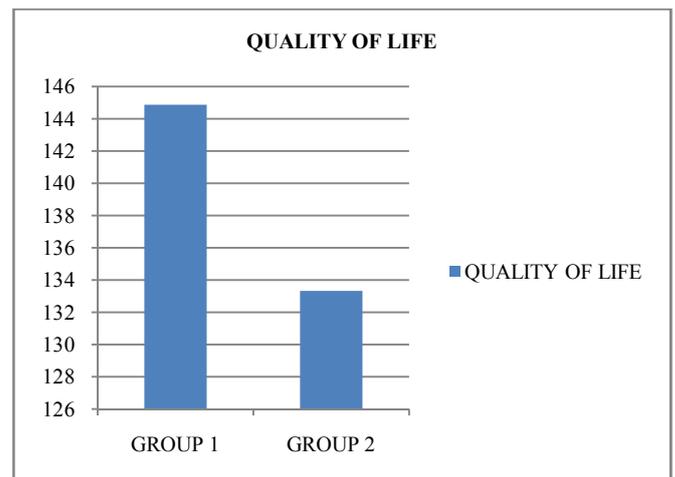


Graph 3.6: Comparison of 2 minute step test in both the groups

Inference: The above graph shows significant difference in Aerobic endurance between both the groups (p value = 0.0471)

Table 4 Comparison of quality of life in both the groups

Groups	Mean	Standard deviation	p value	Significance
Group 1	144.87	6.352		
Group 2	133.33	10.182	0.0153	Significant



Graph 4: Comparison of quality of life in both the groups

Inference: The above graph shows higher QOL in exercising group (p value = 0.0153)

DISCUSSION

This study was aimed at comparing the Physical fitness and Quality of Life in exercising and non-exercising Institutionalised elderly in the age group of 60-90 years of age. Institutional Ethical approval was taken. A sample size of 30 was included out of which Group 1 included 15 exercising elderly and the Group 2 had 15 non-exercising elderly. The mean age group for Group 1 was 73.733years and for Group 2 was 73.867 (Table1 and Graph 1). Age, Gender were matched to reduce any form of bias in this study.

The subjects were included as per the inclusion and exclusion criteria. A written consent was taken from the participants and the procedure of the study was explained to them. The outcome measures for the study were Senior Fitness Test for assessing the Physical Fitness and Older People's Quality of Life

Questionnaire. The six components of the Senior Fitness Test were

1. Arm curl test for upper body strength
2. Back scratch test for upper body flexibility
3. 30 second Chair stand test for lower body strength
4. Chair sit and reach test for lower body flexibility
5. 8 Feet up & go test for agility/dynamic balance
6. 2 minute step test for aerobic endurance

Strength, balance, flexibility, and endurance measurements were included because these are the prerequisites for good functional activity performance.

The routine practice of physical exercises not only has physical benefits but also has a direct connection with functional capacity, social interaction, emotional state, intellectual activity, self care and the health state.

Out of the 6 components of senior fitness test, there was a significant difference in 3 components that is Upper body strength, Upper body flexibility and 2 minute step test. There was also a significant difference in the quality of life of exercising and non-exercising elderly group. The results obtained were as follows:

1. Arm curl test for upper body strength : p value = 0.0418 (Table 3.1 and Graph 3.1)
2. Back scratch test for upper body flexibility: p value = 0.0481 (Table 3.2 and Graph 3.2)
3. 2 minute step test for aerobic endurance: p value = 0.0471 (Table 3.6 and Graph 3.6)
4. Quality of life: p value = 0.0153 (Table 4 and Graph 4)

The **Arm curl test** for assessing upper body strength showed significant difference (p value = 0.0418). This is because of the regular participation of Group 1 in exercise programme which included resistance training twice a week as compared to the Group 2 who led a sedentary lifestyle.

The **Back scratch test** for Upper body flexibility showed significant difference in both the groups (p value = 0.0481). Muscle shortening often occurs because of lack of movement through its full range, a common effect of reduced physical activity. Group 1 because of regularly performing stretching exercises, other flexibility, strengthening exercises and overhead activities had better upper body flexibility as compared to Group 2.

The **30 seconds Chair stand test** for assessing lower body strength showed statistically no significant difference between the two groups (p value = 0.4614). This result could be attributed to the fact that the Group 1 had subjects who were engaged in mild to moderate form of exercises such as lower body resistance training, aerobics while Group 2 had subjects who were independent in carrying out activities of daily routine like climbing stairs, going to the general stores and medical shops to buy personal things and medicines.

The **Chair sit and reach test** for measuring Lower body flexibility showed no statistical significant difference between both the groups (p value = 0.243). The Group 1 had higher mean value as compared to Group 2 but not statistically significant. It can be because of the fact that Group 1 had subjects involved in exercise program while Group 2 had subjects who were engaged in daily life activities like bending

down and picking up objects from the floor, pulling up shoes and socks, crossing an obstacle. Hence the result was not significant.

8 feet up and go test performed to assess the agility or dynamic balance of the subjects had no statistical significant difference in both the groups (p value = 0.336). Lower extremity strength plays a significant role in balance. Muscle mass and strength tend to reduce by 30%-50% between the ages of 30 and 80 years because of reduction in the number of muscle fibres and atrophy of type 2 muscle fibre.⁸ Group 1 subjects were involved in regular balance and strength training exercise sessions which was carried out twice a week while Group 2 had subjects who were engaged in activities like crossing obstacles, crossing roads, walking on uneven roads. That is why there was no statistically significant difference.

The **2 minute step test** to assess the aerobic endurance showed statistically significant difference between the two groups (p value = 0.0471). Group 1 had elderly doing aerobic exercises, strength and endurance training. Aerobic exercise increases body's capacity to absorb, deliver and utilize oxygen and hence improving individual's ability to sustain activity for a desired period of time because of increased cardiovascular efficiency. Group 2 individuals did not do this kind of exercises. This study's result coincided with the results of the study carried out by Naushin Q, Shweta M which also concluded that subjects doing more of physical activities and exercise had better aerobic endurance.⁴

The scores of the **Older People's Quality of Life Questionnaire** showed statistically significant difference between both the groups (p value = 0.0153).

Gioia Mura, *et al.* concluded that a higher intensity program of aerobic/anaerobic physical activity in elderly had better quality of life.⁹

The results obtained from the study done by Sang-Ho Oh, *et al.* also concluded that all types of exercisers showed higher QoL scores than non-exercisers.¹⁰

Thus, this study concludes that exercising group of elderly has better physical fitness and Quality of life as compared to the non-exercising group.

Poor muscle strength and physical functions have been associated with higher risk of hospitalisation and lower well-being among A study done by 'Alessandra de Carvalho Bastone' on effect of an exercise program on functional performance of institutionalised elderly (in 2004) were same as this study and concluded that an exercise program can produce benefits in functional improvement and prevention of decline in mental status in institutionalised elderly thus contributing to a better Quality of life.¹¹

Physical training increases muscle strength, endurance and physical functions as well as improves several features related to Quality of life. Higher Quality of life associated with better Physical fitness might be a protective factor against chronic conditions in old age.⁹ Therefore, appropriate measures should be taken to assess the physical fitness of the elderly and according to the requirement form an exercise program for them.

CONCLUSION

This study concludes that the Exercising Institutionalised Elderly group of individuals have better Upper body strength, Upper body flexibility, Aerobic Endurance and Quality of life as compared to Non-exercising Institutionalised Elderly group of individuals. Thus, it can be said that some components of Physical fitness have a role in improving the Quality of life.

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