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The effects of fall prevention program on risk of fall in elderly living at old age home

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Abstract

Background: Studies suggest that unexpected falls are the main cause of mortality and morbidity, especially for old aged people. The main causes of these falls are poor balance and reduced strength of the lower limb muscles. Exercise has a greater role to improve balance and strength. There are many approaches to design good group therapy programmes.

Objectives: The purpose of this study is to evaluate the effects of fall prevention program on risk of fall in elderly living at old age home.

Design: Pretest posttest experimental design.

Methods: Pre-test, post-test experimental design was conducted on 30 old aged individuals. They were divided into 2 groups of 15 each informed concern was obtained from all individuals. Group A received fall prevention programme including balance exercise strengthening exercise of lower limb, education about fear of fall. The total treatment duration is 30 minutes gradually it was increased. The group B is a control group they did not undergone any fall prevention programs.

Results: The 6 Week fall prevention program is effective in improving balance and reducing fear of falling among elder individuals living in an old age home.

Keywords: Old age home, poor balance, lower limb

1. Introduction

Our world is experiencing a major and unprecedented demographic change that is the raise in the percentage of elderly population. The main reason for this substantial demographic change is higher life expectancy and declining birth rates. With the change in demographics, is related the change in the focus of health care^[1]. The increase in life span has come with limitation in physical abilities and related dysfunctions. Apart from the diseases the tendency to falls is now recognized as a major health challenge in the elderly community.

A fall is defined as an event which results in a person coming to rest inadvertently on the ground or floor or other lower level. Falls occur due to various causes and the study of this multifactorial problem has lead to describing a number of factors which are called the risk factors for fall. The risk factors of falling may be divided into intrinsic factors and extrinsic factors. Intrinsic factors include muscle weakness, gait and balance dysfunction, visual impairment, cognitive impairment, depression, medications, and postural hypotension. Extrinsic factors include environmental obstacles such as poor lighting, unsuitable foot ware and cluttered rooms^[2].

Falls and related injuries in older people are common causes of morbidity and mortality, loss of independence and poor quality of life. Approximately one half of elder adults hospitalized have link with fall related injuries, And those who have experienced fall have a tendency for recurrent fall^[3].

Fall of an elderly individual can lead to morbidity, death, immobility, hospitalization or early entry to long term care. The common site of fall related fractures in patients older than 65 have been reported to the femur, tibia& radius^[2]. Falls among elderly causes physical & psychological effects in their life. Limiting their activities of daily living and also restricting social activities which lead to further promotion in fall recurrence^[4].

The elders who have fallen often tend to develop psychological problems such as fear of falling, loss of self-confidence and depression due to previous experience of falling. There is ample literature¹and research which recommends education of fall prevention strategies and

exercises to enhance and maintain physical fitness and reduce fear of fall [5].

Physical therapist being mobility experts in the medical field are uniquely placed to implement the fall prevention programs in this population however, it is necessary to provide not only an exercise program to increase their muscle strength and balance, but also an educational program to reduce their fear of falling and improve the self-confidence for preventing fall recurrence [6]. There are a number of studies on this subject in first world countries, however there is little research on fall prevention programme in Indian population. Kerala being a state which has high life expectancy the need for exploring effectiveness of such a program is essentially required [7]. Balance is important for maintaining postural equilibrium and thus for the avoidance of falls. Aging may affect central nervous system (i.e., changes in brain volume) and Neuromuscular system properties (i.e., loss of sensory and motor neurons) leading to deficits in balance and gait performance [10].

The aim of this study is to find out the effect of a fall prevention program including educational sessions, among elderly living at an old age home in a rural community in Kottayam district of Kerala.

2. Materials and Method

1. Stop watch (fastrack)
2. Locally available furniture such as Bed and Chair
3. Inch tape.
4. Weight cuff-1kg
5. A Laptop Computer with Audio Visual Aids for education using Power Point Presentations, showing videos about various aspects of fall

3. Procedure

The study population included 30 patients fulfilling both inclusion & exclusion criteria. They were divided into 2 groups in which Group A [experimental] and Group B [control]. Informed consent was obtained from each subject prior to participation. A description about the procedures was given to the subjects before commencing the study. A total of 30 subjects were divided equally into two groups by random sampling method, Group A [n=15] & Group B [n=15].

Group A: Experimental group

Fifteen subjects randomly selected from the willing participants formed the experimental group. The subjects were allowed to continue with their ongoing physical activities.

After taking the base line values on the outcome tools, subjects were initiated into the Fall Prevention Program (FPP). The final score was taken after the training programme.

The FPP included strengthening exercise [fig 1], balance exercise [fig 2, 3, 4]. The strengthening exercise to the ankle and lower extremities and static and dynamic balance exercise took 20 minutes in first week. Time was gradually increased up to 40 minutes. The educational session includes information about the causes of recurrent fall, the results of recurrent falls, and strategies to avoid recurrent fall. The fall prevention program was of 6 week duration; there were 2 sessions of training in each week.



Fig 1: SLR-strengthening lower limb



Fig 2: standing feet together eyes closed



Fig 3: Side line walking



Fig 4: Tandem walking

Group B: Control group

Fifteen subjects randomly selected from the willing participants formed the Control group. These subjects continued with their usual activities, and they

were not trained in any aspect of fall prevention program. The base line value on the outcome tools was recorded and followed up by second reading after 6 weeks

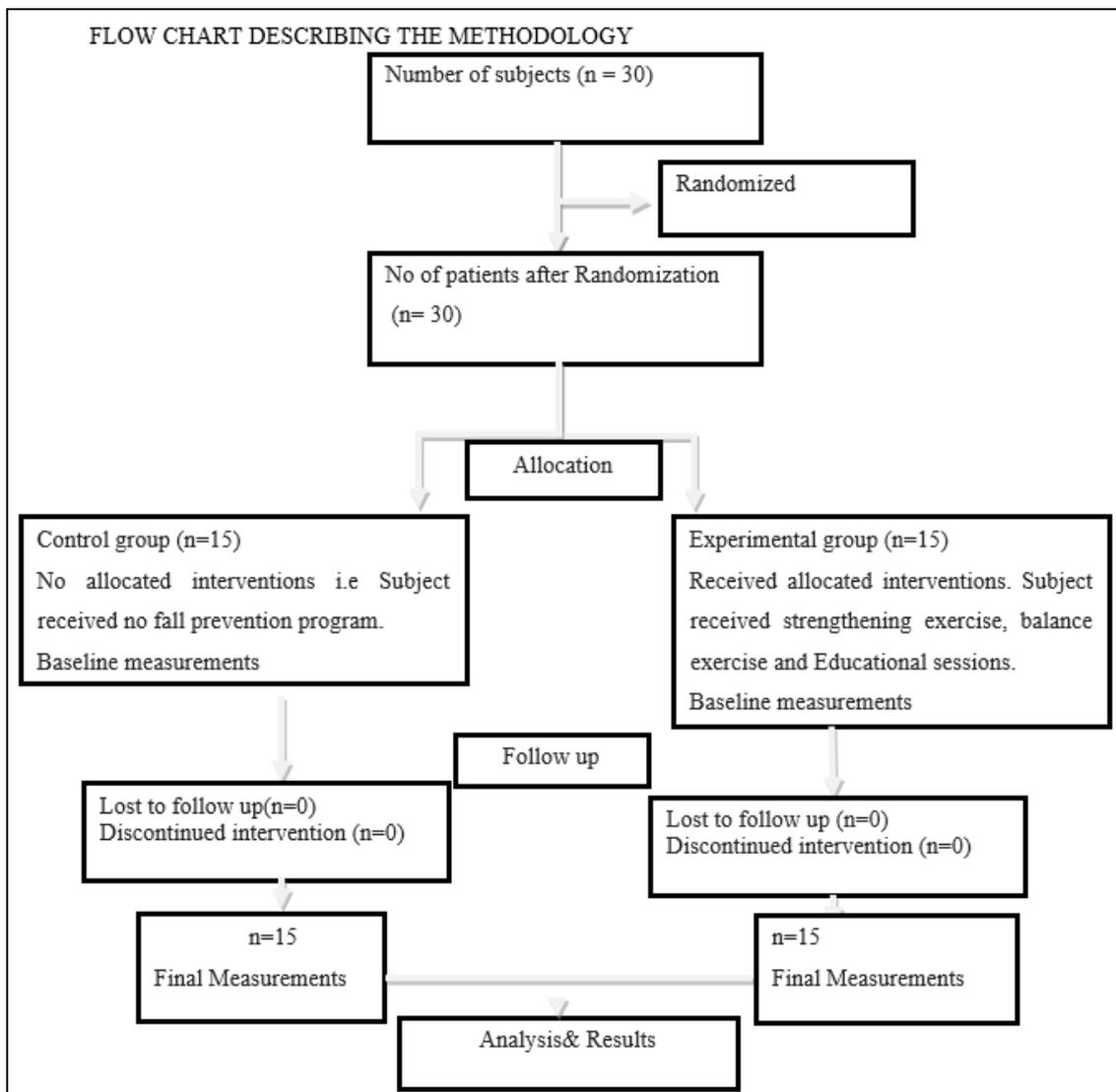


Fig 5.

4. Statistical Analysis

4.1 Age distribution of elder individuals

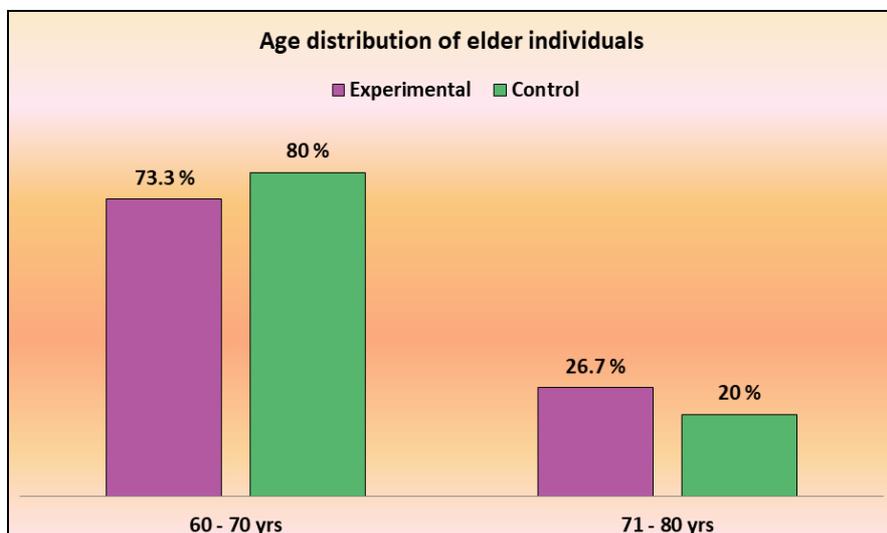


Fig 6.

4.2 Height distribution of elder individuals

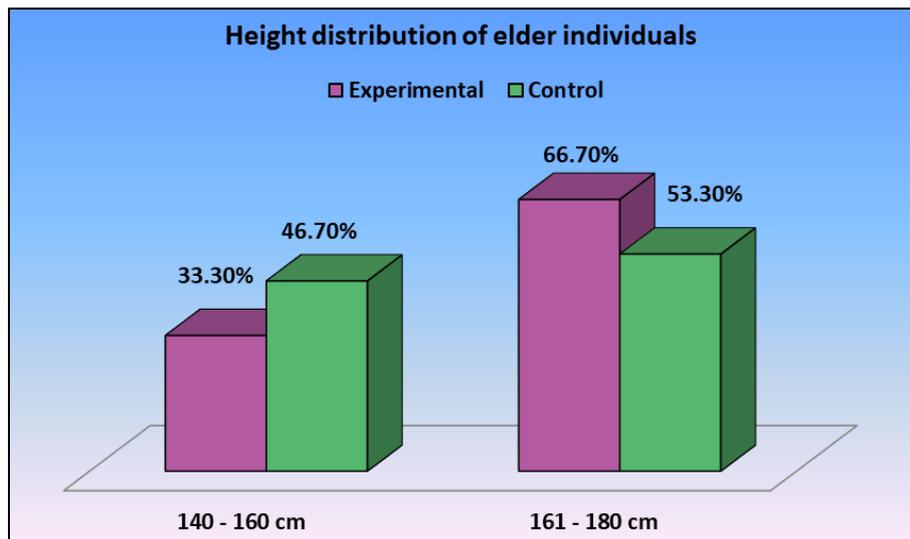


Fig 7.

4.3 Weight distribution of elder individuals

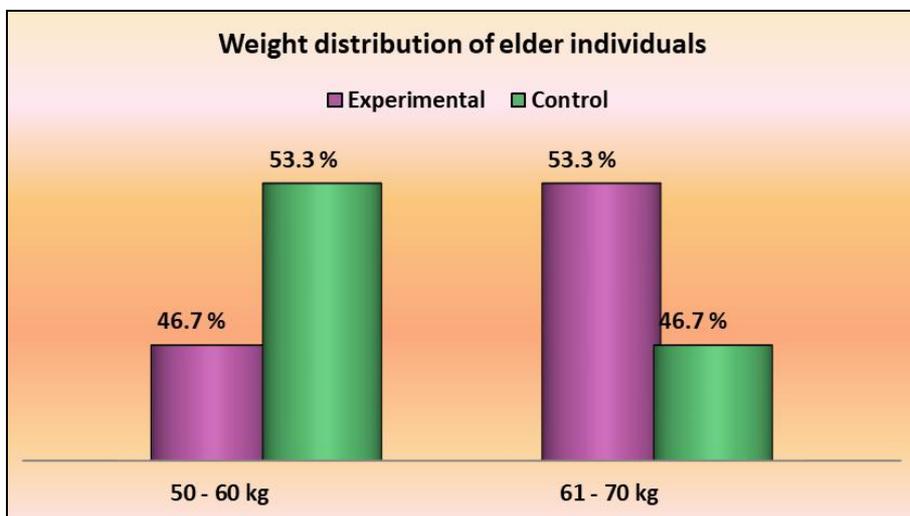


Fig 8.

4.4 Statistical analysis of berg balance scale using t tests

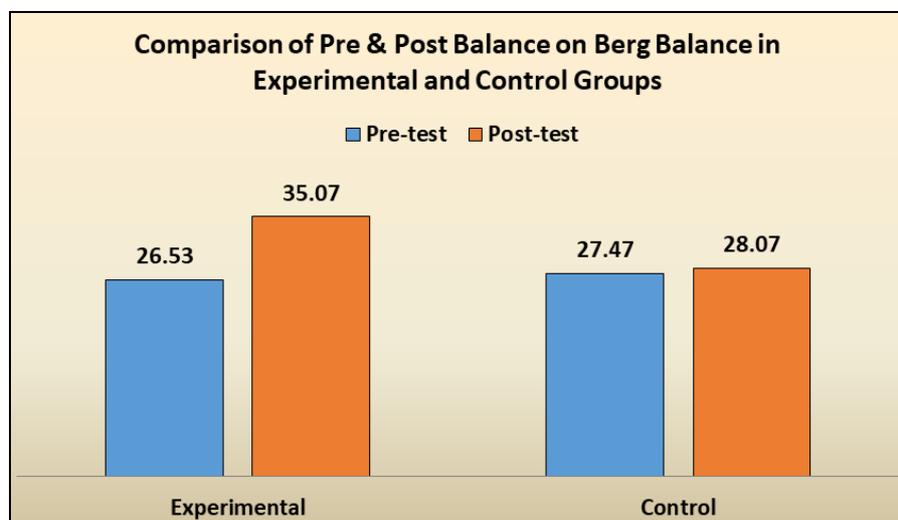


Fig 9.

Mean, S.D. and t-value to compare the post-test Balance scores between Experimental and Control Groups using t-test

Table 1.

Group	Mean	S.D.	Difference in mean	n	t	df	Table value	p-value
Experimental	35.07	7.39	7.0	30	4.71	28	2.05	$p < 0.05$
Control	28.07	6.02						

The column in the t test table displays the mean post-test balance scores in experimental and control group respectively. The standard deviation column displays the standard deviation of the scores in two groups. The difference (7.0) shows the difference between mean in two groups (28.07&35.07). Since the *t-value* 4.71, is greater than the *table value* 2.05, *p-value* < 0.05, there is a significant difference in

post-test balance scores between the experimental and the control groups.

Hence in can be concluded that fall prevention program is effective in improving balance among elder individuals.

4.5 Statistical analysis of fall efficacy scale using t test

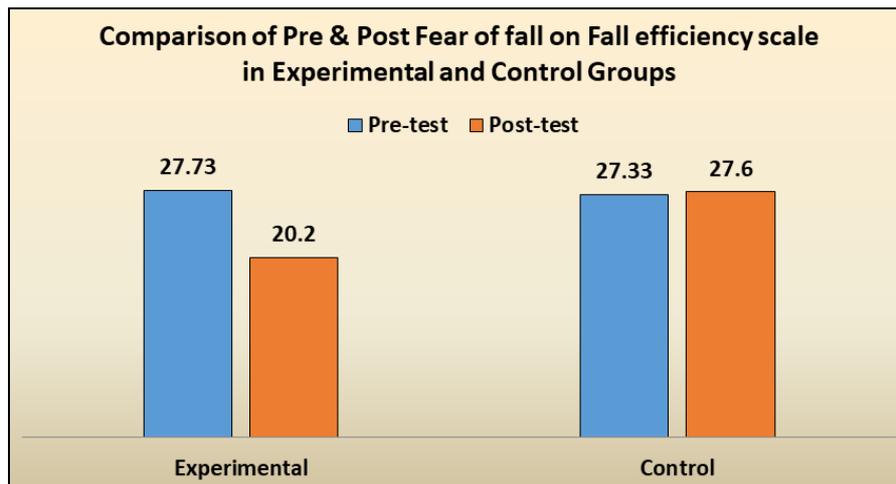


Fig 10.

Mean, S.D. and t-value to compare the pre-test fall efficiency scores between Experimental and Control Groups using t-test

Table 2.

Group	Pre-test Mean	S.D.	Difference in mean	n	t	df	Table value	p-value
Experimental	27.73	6.64	0.4	30	0.199	28	2.05	$p = 0.84$
Control	27.33	4.03						

The column in the t test table displays the mean pre-test fall efficiency scores in experimental and control group respectively. The standard deviation column displays the standard deviation of the scores in two groups. The difference (0.4) shows the difference between mean in two groups (27.73&27.33). Since the *t-value* 0.199, is less than the *table value* 2.05, *p-value* > 0.05, there is no significant difference in

pre-test fall efficiency scores between the experimental and the control groups. So we can consider the groups as homogenous in the baseline level.

Mean, S.D. and t-value to compare the post-test Fall efficiency scores between Experimental and Control Groups using t-test

Table 3.

Group	Mean	S.D.	Difference in mean	n	t	df	Table value	p-value
Experimental	20.2	4.16	7.4	30	5.32	28	2.05	$p < 0.05$
Control	27.6	3.42						

The column in the t test table displays the mean post-test fall efficiency scores in experimental and control group respectively. The standard deviation column displays the standard deviation of the scores in two groups. The difference (7.4) shows the difference between mean in two groups (20.2&27.6). Since the *t-value* 5.32, is greater than the *table value* 2.05, *p-value* < 0.05, there is a significant difference in post-test fall efficiency scores between the experimental and the control groups.

Hence it can be concluded that fall prevention program is effective in reducing fear of fall among elder individuals.

6. Results

6.1 Experimental Group

6.1.1 Evaluation of Berg-Balance Scale

By comparing the pre-test and post-test Balance scores is the standard of older adults in the Experimental group.

It was found that the Mean change 8.54 is the difference

between pre-test and post-test (26.53&35.07). Since the *t-value*, 8.71 is greater than the *table value* 2.15, $p < 0.05$, there is a significant difference existing between the pre-test and post-test balance scores among elder individuals in the experimental group. This proves the effect of fall prevention program to improve the balance.

6.1.2 Evaluation of fall efficacy scale

By comparing the pre-test and post-test fall efficacy score in older adults in the experimental group Mean change 7.53 is the difference between pre-test and post-test (27.73&20.2). Since the *t-value*, 7.05 is greater than the *table value* 2.15, $p < 0.05$, there is a significant difference existing between the pre-test and post-test fall efficiency scores among elder individuals in the experimental group. It can be assumed that the effect of education in fall prevention program contributes to reduce the fear of fall. Overall it proves that the fall prevention program to improve balance.

7. Control Group

7.1 Evaluation of Berg-Balance Scale

By comparing the pre-test and post-test Bergs Balance scores is the standard of older adults in the Control group, it was found that the mean change 0.6 is the difference between pre-test and post-test (27.47&28.07). Since the *t-value*, 1.55 is less than the *table value*, 2.15, $p > 0.05$, there is no significant difference existing between the pre-test and post-test balance scores among elder individuals in the control group.

So we have seen that there is significant change in balance score among the elder individuals in experimental group whereas there is no significant change in balance among individuals in control group. Hence it can be concluded that 6-weeks fall prevention program is very much effective in improving balance among elder individuals.

7.2 Evaluation of Fall Efficacy Scale

By comparing pre-test and post-test fall efficacy scale Mean change 0.6 is the difference between pre-test and post-test (27.33& 27.6). Since the *t-value*, 0.673 is less than the *table value*, 2.15, $p > 0.05$, there no significant difference existing between the pre-test and post-test fall efficiency scores among elder individuals in the control group.

So we have seen that there is significant change in fall efficiency score among the elder individuals in experimental group whereas there is no significant change in fall efficiency among individuals in control group. Hence, it can be concluded that 6-weeks fall prevention program is very much effective in reducing fear of fall among elder individuals.

8. Discussion

The purpose of this study was to find out the effectiveness of fall prevention program on elderly individual living in old age home. The fall prevention program includes balance exercise, strengthening exercise and the education about various aspects leading to fall and the fear of falling.

In this study institutional living older adults were taken into consideration. Subjects were selected by after screening for fulfillment of the Inclusion and Exclusion criteria. 30 elder Individual were selected randomly and equally divided into 2 groups-Control group and Experimental group.

Control group continued with their usual activities without the fall prevention program and experimental group underwent fall prevention program. The treatment duration was 20 minutes in first week. Time was gradually increased up to 40 minutes. The education included information about the causes

of recurrent fall, the results of recurrent falls, and strategies to avoid recurrent fall. The fall prevention program for 6 week duration with 4 sessions each week.

On statistical analysis, the mean pre-treatment Balance scores of control and experimental group is 27.47 and 26.53 and mean post treatment balance scores of control and experimental group is 35.7 and 28.07 respectively. This result shows that there is an increase of .06 in control group and 8.23 in experimental group; which indicates that there is a considerable increase in experimental group.

On statistical analysis, the mean pre-treatment fall efficacy scores of control and experimental group 27.33 and 27.73 and mean post treatment fall efficacy scores of control and experimental group 27.6 and 20.2 respectively. This result Mean change 7.53 is the difference between pre-test and post-test (27.73&20.2). Since there is a significant difference existing between the pre-test and post-test fall efficiency scores among elder individuals in the experimental group. This proves that the educational aspects contributed to reduce the fear of fall and the risk of fall.

Statistically, significant improvement in function is seen in both the groups and between the groups. However, the improvement in experimental group is greater than that of control group. Improvement in function may be attributed to the improvement of balance and the reduced fear of fall.

As advantages fall prevention program in elder individual have significant improve the balance and reducing the fear of fall by the education. All of these may have helped to decrease the Frequency of falls by improving the overall muscular activity and confidence level. Hence the study concludes that the fall prevention program has a significant role in improving balance, and reducing the fear of fall in institutional living older adults.

It is expected that particularly the supervised combination of balance and strength will improve performance in variables of balance, strength body composition, psychosocial well-being and falls self-efficacy of older adults. In addition, information regarding fall risk assessment. Further, training-induced health-relevant changes, such as improved performance in activities of daily living, and quality of life, as well as a reduced risk for falls may help to lower costs in the health care system^[11].

9. Limitations

Due to the lack of female participant in our study, we cannot generalize the findings of this study to female patient with balance problem.

10. Conclusion

It is observed that, 6 week fall prevention program leads to a significant improvement in balance, and reducing fear of fall in the elder individual living in old age home. This observation is supported by the statistical analysis. Based on the outcomes of this study, it can be concluded that fall prevention program can be performed as a mandatory routine to improve balance, reducing fear of fall and thus decrease the frequency of falls which leads to mortality and morbidity of old aged people living in institutions.

The fall prevention program including educational sessions conducted among elderly living at an old age home in a rural community in Kottayam district of Kerala has been found to be effective in reducing the risk of fall and changing the perception about fall among those participating in such a program.

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