

## Effectiveness of low impact versus high impact exercises to improving the functional ability in osteoporotic females

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### Abstract

**Background:** Osteoporosis is a condition characterized by a decrease in the density of bone, decreasing its strength and resulting in fragile bones. Physical activity helps reduce the rate of bone mineral loss that occurs as we age and which results in osteoporosis. This study states that the high and low impact exercises were improve the functional ability.

**Objective:** To prove the effectiveness of low impact to high impact exercises in improving the functional ability in osteoporotic females.

**Subjects and Methods:** 40 subjects with osteoporosis of age group between 50-60years were recruited for the study and were randomly assigned to either one training group. randomly assigned into group A and group B. Subjects of Group A were taught low impact Exercises like exercises that use own body weight such as squats, toe standing, step aerobics and walking 3 – 5 days a week 20 to 30 minutes per day with a rest period of 30 seconds between each exercise. Subjects of Group B were taught high impact Exercises like running, stair climbing, jumping rope, and high impact aerobics like step up aerobics using dumbbells (2kg) 3 – 5 days a week 20 to 30 minutes per day with a rest period of 30 seconds between each exercise.

**Out Come Measures:** Katz Index of Independence of activities of Daily Living

**Study Design:** Experimental Design

**Results:** The collected data was tabulated and analysed using inferential statistics to assess all the parameters mean and standard deviation was used. To find out significant changes within the group of pre and post-test by unpaired t-test was used. The two-tailed P value is less than 0.0001 by conventional criteria; this difference is considered to be extremely statistically significant.

**Conclusion:** People with existing osteoporosis can also benefit from exercise. This is because a sedentary lifestyle (little exercise) encourages the loss of bone mass. Exercising regularly can reduce the rate of bone loss. This study proves the effect of low impact exercises can improve the functional ability among osteoporotic females.

**Keywords:** high impact, low impact, functional ability, osteoporosis

### Introduction

Osteoporosis is a condition characterized by a decrease in the density of bone, decreasing its strength and resulting in fragile bones. It literally leads to abnormally porous bone that is compressible like a sponge. This results in reduced bone density thereby resulting in fracture and frequent falls. The fracture can be either in the form of cracking or collapsing (as in a compression fracture). The spine, hips, ribs and wrists are the common area of fracture. Physical activity helps reduce the rate of bone mineral loss that occurs as we age and which results in osteoporosis. The strength training and balance exercises prescribed in this study are relevant for healthy middle aged and older people and also for those with osteoporosis and other medical conditions. Physical activity is considered to be any muscular involvement beyond resting levels. It is an encompassing concept that includes any functional activity of daily living. Exercise is typically a planned and /or structured physical activity that has an aim. The aim is usually to satisfy physical, psychological or social needs or often a mixture of all. Bone is a living tissue that reacts to increases in loads and forces by growing stronger. It does this all the time, so exercises will only increase bone strength if it increases the loading above the normal. Weight-bearing

exercises are one of the most effective remedies against osteoporosis because more tension on the muscles it puts more pressure on the bone, which then respond by continuously creating fresh and new bone. There's no one-size-fits-all prescription. Choose gentle or low impact weight bearing exercises like walking, low impact aerobics and gardening. Beware of exercises that involve bending and twisting activities at the waist. Weight bearing exercise does not have to be high impact. Running, jogging, jumping may put stress on your spine thereby leading to fracture. High impact exercises may not be suitable if you are new to exercise or have not exercised for some time. Avoid them if you have osteoarthritis in weight-bearing joints and/or have back, knee or hip pain. Each year, more than one-third of people age 65 or older fall. Falls and fall-related injuries, such as hip fracture, can have a serious impact on an older person's life. This study states that the high and low impact exercises were improve the functional ability.

### Objective of the Study

To prove the effectiveness of low impact to high impact exercises in improving the functional ability in osteoporotic females.

**Methodology**

40 subjects with osteoporosis of age group between 50-60years were recruited for the study and were randomly assigned to either one training group. Katz Index of Independence of activities of Daily Living was the assessment tool used. The Katz ADL index is used to assess the basic activities of daily living. randomly assigned into group A and group B. Subjects of Group A were taught low impact Exercises like exercises that use own body weight such as squats, toe standing, step aerobics and walking 3 – 5 days a week 20 to 30 minutes per day with a rest period of 30 seconds between each exercise for a period of 12 weeks. Subjects of Group B were taught high impact Exercises like running, stair climbing, jumping rope, high impact aerobics like step up aerobics using dumbbells (2kg) 3 – 5 days a week 20 to 30 minutes per day with a rest period of 30 seconds between each exercise for a period of 12 weeks.

**Study Design:** Experimental Design

**Population:** Individuals with clinical diagnosis of osteoporosis who were referred to the Department of Physiotherapy Saveetha Medical college Hospital, Chennai.

**Procedure**

Purposive Random Sampling, Subjects were selected in accordance to a predetermined inclusion and exclusion criteria to ensure homogeneity of the subjects. The subjects were then randomly assigned into two groups, Group A and Group B. 40 Subjects. Group A: 20 Subjects low impact exercises. Group B: 20 Subjects high impact exercises.

**Inclusion Criteria**

Age: 50-60 Years Females who are at low risk of fracture, atleast one time fracture in their lifetime after diagnosis.4 indicating moderate impairment on the Katz ADL index.

**Exclusion Criteria**

- Age above 60 years
- Females who are at a risk of multiple fractures
- Score of 2 or less in Katz ADL index.
- History of frequent falls
- Vertebro-basilar problems
- Vertigo
- Any balance associated problems
- Cardio respiratory problems
- History of CVA

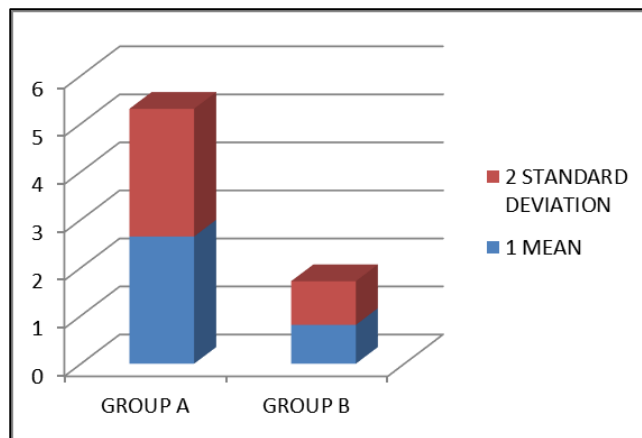
**Intervention**

- High Impact
- Low Impact Exercises

**Results**

**Table 1:** Pre Intervention

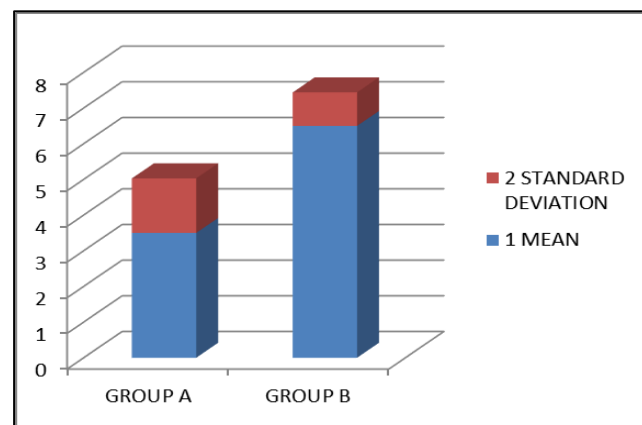
S. No.	Statistical Measurement	Group A	Group B
1.	MEAN	2.65	0.81
2	STANDARD DEVIATION	2.66	0.91



**Fig 1**

**Table 2:** Post Intervention

S. No.	Statistical Measurement	Group A	Group B
1.	MEAN	3.5	6.5
2	STANDARD DEVIATION	1.53	0.94



**Fig 2**

**Unpaired t test results**

**P value and statistical significance**

The two-tailed P value is less than 0.0001 By conventional criteria; this difference is considered to be extremely statistically significant.

**Confidence interval**

The mean of Group One minus Group Two equals -3.0000 95% confidence interval of this difference: From -3.8129 to -2.1871

**Intermediate values used in calculations**

t = 7.4715  
df = 38  
standard error of difference = 0.402

**Discussion**

The results showed that there is some evidence that low impact exercise is effective at slowing bone loss. Low-impact exercises were all shown to be more effective compared to high impact prescribed exercise program. These exercise programs were performed during the full follow-up period; therefore we cannot conclude that they are effective after the therapy was

discontinued. With these results, given both low impact and high impact exercises were effective however we can conclude that the low impact exercise is currently the best therapy to recommend for this age group (50-60) of population. Low impact exercises are simple exercises which need not be with a specific setting and may produce the greatest compliance. We also discuss that the structural basis underlying exercise-induced improvements in bone strength, as well as the characteristics of exercise loading that have been shown to be best associated with structural improvements in bone. The high prevalence of osteoporosis fractures in postmenopausal women means prevention of this disease is important and therefore, the prevention of fractures is the primary goal of intervention. Various factors influence the effectiveness of exercise therapy: 1) attendance 2) adherence to the program 3) accuracy of the assessment system 4) type of exercise 5) duration, intensity, frequency and length of exercise program. Katz ADL index the instrument was originally developed as a measure of function to be used in objective evaluations of chronically ill and aging populations and is now used to evaluate a wide range of groups and settings. At the end of 12 weeks of intervention it was shown that the comparison between the two groups, group B showed a highly significant with p value (0.0001) than that of group A. Since the low impact group shows a high significance towards postmenopausal women the chances of high risk fractures in these women is much minimal when compared to the high impact group of exercise performers. It is important for future research in this area to have standardized recommendations for conducting exercise interventions and reporting of exercise outcomes. The short time of the follow-up of all the studies limits our ability to predict the long-term effects exercise may or may not have on bone loss.

### Conclusion

These have important implications for preventing osteoporosis. It may be appropriate to advise women with intermediate bone density values to adopt the exercises which may be either low impact or high impact exercises. This information would be helpful as know that in the immediate postmenopausal period, there is an increased rate of bone loss. Treatment of osteoporosis involves use of either anti-resorptive (e.g. estrogen, biophosphates) or bone formation agents (e.g. fluoride, parathyroid hormone). The value of exercise as an intervention for the prevention of postmenopausal bone loss is a controversial subject (Kanis 1994). This study states that the high and low impact exercises were improve the functional ability. The two-tailed P value is less than 0.0001 by conventional criteria; this difference is considered to be extremely statistically significant. Low impact exercises was very effective than high impact exercises in osteoporotic females.

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