

## Comparison of the Effect of Vitamin D on Osteoporosis and Osteoporotic Patients with Healthy Individuals

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### Abstract

**Background:** Osteoporosis is metabolic disease of the bone and creating heavy burden on the community. The cost of treatment for the patient facing the problem of the osteoporosis is high as well as imposes irreparable costs on the health system. The prior screening can be helpful for reducing the cost of the treatment. According to clinical studies, as the living age increased the prevalence of Osteoporosis is increasing among the elder people. The older bones periodically absorbed by Osteoporosis in resorption site and replaced by new bone made by the Osteoporosis. This kind of process in body called as remodeling.

**Aim:** The study aims to make comparison of the effect of vitamin D on osteoporosis and osteoporotic patients with healthy individuals.

**Method:** The study was conducted in clinical trial on individual who were referred to bone destiny clinic of M.K.C.G Medical College and Hospital, Berhampur from January 2019 to April 2022.

For the study, the participants were selected considering the age of 30-60 years and willing to take part in the study. For the current study, 400 individual who were taking the treatment related to bone. The primary data of the participants were collected using the checklist about the demographic information considering the age, gender, clinical examination and para clinical. For collecting and analyzing the data SPSS software version 23 was used.

**Results:** The higher level of vitamin D was identified among the subjects aged between 31 to 40 years 64.2% and lowest was among the 51 to 60 years 6.2%. Apart from this, the bone density was higher among the 31 to 40 years 53.2% and lowest among the 20 to 30 years 13.2%. Moreover, the percentage of vitamin D was higher in female in normal category 51.4%. Additionally, the level of bone density was also higher in female 54.5%. However, the percentage of bone density considering the inadequate level and shortage was higher for male 53.5% and 52.7% respectively. Additionally, the prevalence of Osteoporosis was found to be lower in the intervention group compared to the control. Here,  $P < 0.01$  and showing a statistically positive relationship between Osteoporosis and vitamin D deficiency.

**Conclusion:** Prevalence of Osteoporosis is higher among the individual who has the deficiency of vitamin D and shows the significant relationship with gender and age. Therefore, the treatment of these patients with intake of vitamin D is helping to improve bone density.

**Keywords:** *Vitamin D Deficiency, Osteoporosis, Bone Density*

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## Background

There are different types of issues that influence the health of the individual and lead to complex problems. Osteoporosis is a physical health issue that lead to fracture caused by the reeducation in bone density [1]. According to clinical studies, Osteoporosis is the most common metabolic disease of the bone and creating heavy burden on the community [2]. The cost of treatment for the patient facing the problem of the osteoporosis is high as well as increases the financial burden on the health system [3]. In the current scenario, the old age fractures are increasing around the world and major reason for this is industrialization. According to study, the lack of activities and high level of comfort is influencing the body structure and density of the bone [4].

Femoral area (hip) fracture is one of the most common causes of mortality and morbidity in aged population. This kind of health issues are having a significant impact on the financial planning of the society [5]. The prior screening can be helpful for reducing the cost of the treatment. According to clinical studies, as the living age increased the prevalence of Osteoporosis is increasing among the elder people [6]. The older bones from time to time engrossed by Osteoporosis in resorption site and replaced by new bone made by the Osteoporosis [7]. This kind of process in body called as remodeling. As per the analysis, the impairment of regeneration is one of the major causes of pathophysiolgy Osteoporosis [8].

In addition to this, there are various factors causing the issues related to the

Osteoporosis such as genetic, low weight, history of broken bones, age and family history of fractured hip after the minor fall [9]. Apart from this, the disease such as rheumatoid arthritis, inflammatory bowel disease, hyperparathyroidism and type 1 and 2 diabetes. According to clinical research, the deficiency of calcium and vitamin D is also playing a critical role in developing the Osteoporosis. The intake of supplement of calcium and vitamin D is helping in treatment of Osteoporosis for elderly people [10]. The meta-analysis has shown that intake of calcium with vitamin D is helpful for reducing the risk of fracture in old age people and increases the bone mineral density. However, for analyzing the prevalence of Osteoporosis, screening is one of the best methods of treatment [11]. Apart from this, there are two methods used for treatment of Osteoporosis. One is changes in the lifestyle considering the regular exposure of sun, nutrition and sufficient physical activities [12,13].

### Aim

The study aims to make comparison of the effect of vitamin D on osteoporosis and osteoporotic patients with healthy individuals

### Method and material

#### Design

The study was conducted in clinical trial on individual who were referred to bone destiny clinic of M.K.C.G Medical College and Hospital, Berhampur from January 2019 to April 2022.

Participants

For the study, the participants were selected considering the age of 30-60 years and willing to take part in the study. Apart from this, the exclusion criteria for the study include the people who have history of choric glucocorticoid excess. In addition to this, the inclusion criteria of study have added the patients who were involved in smoking, alcohol consumption, IBD and cystic fibrosis.

### Intervention

For the current study, 400 individuals selected from a bone density hospital. The primary data of the participants were collected related to age, gender, clinical examination and para-clinical. For the analysis of bone destiny test was conducted using the DEXA method as

well as the vitamin D level was measured by 25-hydroxy.

### Ethical approval

For conducting the study, the prior approval was taken from the ethics committee of the institute, and it was communicated to the participants that their personal information will remained confidential. Consent letters were obtained from the subjects.

### Statistical methods

For collecting and analyzing the data SPSS software version 23 was used. Apart from this, for description of numerical variables like mean and standard deviation were reported. The data analysis was done using Chi-square, T-test and ANOVA.

### Results

**Table 1: Age group and vitamin D distribution**

Age category	Ordinary level		Inadequate level		Deficiency	
	Vitamin D levels (%)	Bone density (%)	Vitamin D levels (%)	Vitamin D levels (%)	Bone Density (%)	Vitamin D levels (%)
20 to 30 years	17.0	13.2	6.7	-	-	-
31 to 40 years	64.2	53.2	33.4	6.5	2.5	2.7
41 to 50 years	12.7	16.2	21.4	23.5	33.5	33.8
51 to 60 years	6.2	17.4	38.5	70.0	64.0	63.5

Table 1 has provided the information related to the information related to the age and level of vitamin D and bone density. As per the outcome of the analysis, the higher level of vitamin D was identified among the subjects aged between 31 to 40 years 64.2% and lowest was among the 51 to 60 years 6.2%. Apart from this, the bone density was higher among the 31 to 40 years 53.2% and lowest among the 20 to 30 years 13.2%.

**Table 2: Gender and vitamin D distribution**

Sex	Ordinary level		Inadequate level		Deficiency	
	Vitamin D levels (%)	Bone density(%)	Vitamin D levels (%)	Bone Density(%)	Vitamin D levels (%)	Bone density(%)
Male	48.6	45.5	42.4	53.5	61.4	52.7
Female	51.4	54.5	57.6	44.5	38.6	47.3

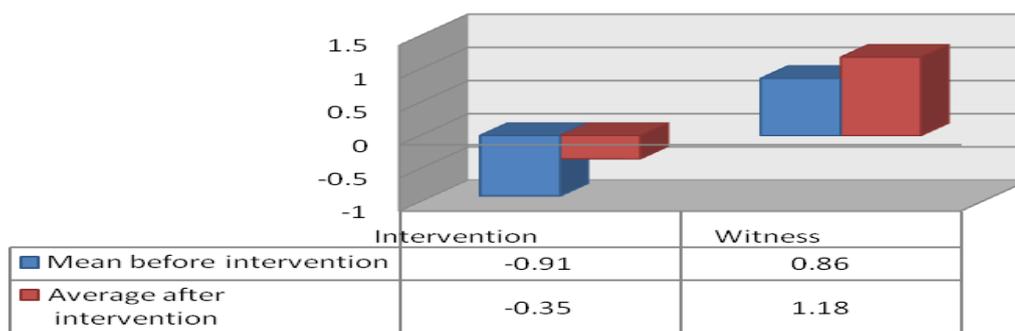
Table 2 has provided the information related to the gender and deficiency of vitamin D and bone density. As per the outcome, the percentage of vitamin D was higher in female in normal category 51.4%. Additionally, the level of bone density was also higher in female 54.5%. However, the percentage of bone density considering the inadequate level and shortage was higher for male 53.5% and 52.7% respectively.

**Table 3: BMD test and intervention**

Bone density status: count (%)						
	Normal ( $\geq -1$ )		Osteopenia (-1 to -2.5)		Osteoporosis ( $\leq -2.5$ )	
Group	Before Intervention	After Intervention	Before Intervention	After Intervention	Before Intervention	After Intervention
Intervention	21 (7.2%)	36 (11.0%)	21 (36.8%)	22 (50.0%)	33 (60.0%)	11 (35.4%)
Control	270 (92.7%)	289 (88.9%)	36 (63.1%)	22 (50.0%)	19 (36.5%)	20 (64.5%)
Total	291 (100%)	325 (100%)	57 (100%)	44 (100%)	52 (100%)	31 (100%)

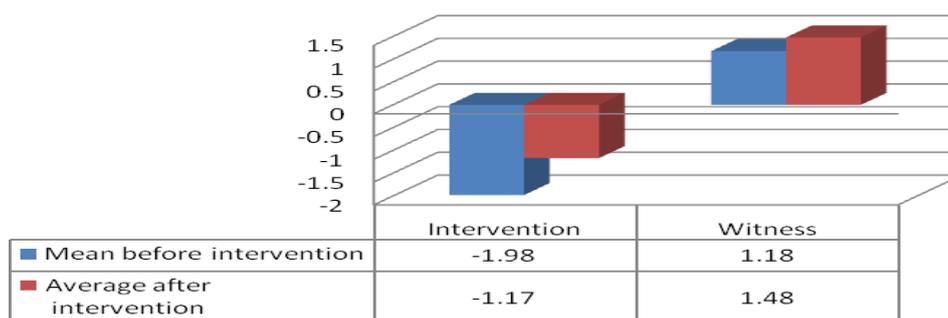
According to outcome of table 3, the prevalence of Osteoporosis was found lower in intervention group compared to control group. Here,  $P < 0.01$  and showing a statically positive relationship between Osteoporosis and vitamin D deficiency.

**Z- scores**



**Figure 1: Z test score**

**T - scores**



**Figure 2: T test score**

**Discussion**

Osteoporosis is metabolic disease of the bone and creating heavy burden on the community. The cost of treatment for the patient facing the problem of the osteoporosis is high. In the current scenario, the age-related fracture is

increasing around the world and major reason for this is industrialization.

This kind of process in body called as remodeling. As per the analysis, the impairment of regeneration is one of the major causes of pathophysiolgy Osteoporosis. The intake of supplement of

calcium and vitamin D is helping in treatment of Osteoporosis for elderly people. The meta-analysis has shown that intake of calcium with vitamin D is helpful for reducing the risk of fracture in old age people and increases the bone mineral density. However, for analyzing the prevalence of Osteoporosis, screening is one of the best methods of treatment.

As per the outcome of the analysis, the higher level of vitamin D was identified among the subjects aged between 31 to 40 years 65.0% and lowest was among the 51 to 60 years 7.1%. Apart from this, the bone density was higher among the 31 to 40 years 54.3% and lowest among the 20 to 30 years 12.1%. Additionally, the level of bone density was also higher in female 53.6%. However, the percentage of bone density considering the inadequate level and shortage was higher for male 54.4% and 53.8% respectively. Apart from this, as per the study of Wilkins and Birge (2005) [14] there was a significant difference between T-score and age groups and 51-60 years participants had lowest T-score. Similar outcomes were identified for bone density. Moreover, the outcome has suggested that deficiency of vitamin D is influencing the bone structure and leading to fracture while fall from short height [15,16].

### Conclusion

From the study analysis and comparison of the results with other studies, it has been carried out that prevalence of Osteoporosis is higher among the individual who has the deficiency of vitamin D and shows the significant relationship with gender and age. Therefore, the treatment of these patients with intake of vitamin D is helping to improve bone density.

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