



ASSESSMENT OF OSTEOPOROSIS INCIDENCE AMONG ADULTS IN A TERTIARY HEALTHCARE SETTING: A DESCRIPTIVE CROSS-SECTIONAL ANALYSIS

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ABSTRACT

Introduction: Osteoporosis is a systemic skeletal disorder characterized by reduced bone mass and microarchitectural deterioration, leading to increased fracture risk. In India, osteoporosis prevalence is high, influenced by dietary habits, vitamin D deficiency, and lifestyle factors. **Methodology:** A hospital-based observational study was conducted in the Department of Orthopaedics over one year, including 104 adults. Bone mineral density was assessed using DXA, and T-scores were classified as normal, osteopenia, or osteoporosis. Statistical analysis was performed using Epi-Info 7.2.1, with a p-value < 0.05 considered significant. **Results:** Among 104 participants, 46 were females (44.2%) and 58 males (55.8%). The most affected age group was 51–60 years (35.6%). Osteopenia was the most prevalent category (76.92%), followed by osteoporosis (8.65%), with a significant gender difference ($p = 0.02$). Mean age was 36.13 years for normal T-scores, 54.98 years for osteopenia, and 68.66 years for osteoporosis ($p < 0.001$). **Conclusion:** Osteopenia is highly prevalent, with osteoporosis being more common in older individuals and females. Early screening and targeted interventions are essential to prevent disease progression.

KEYWORDS : Osteoporosis, Bone mineral density, DXA, Osteopenia, T-score

INTRODUCTION:

Osteoporosis, a systemic skeletal disorder characterized by low bone mass and microarchitectural deterioration of bone tissue, is a significant public health concern globally. In India, the prevalence of osteoporosis among adults is alarmingly high, with estimates ranging from 8% to 62% in women. This wide range is attributed to various factors, including poor dietary calcium intake, low vitamin D levels, and lifestyle changes. [1, 2]

The incidence of osteoporosis increases with age, particularly among postmenopausal women and older adults. Studies indicate that 26.3% of Indian women aged 50 and above suffer from osteoporosis, compared to 10.9% of men in the same age group. The age-wise distribution shows a higher prevalence in the elderly population, with nearly 37% of women over 60 years experiencing osteoporosis. Contraceptive usage in women also leads to osteoporosis. [3, 4]

Understanding the epidemiology of osteoporosis in India is crucial for developing effective prevention and treatment strategies. Many sociodemographic factors affect the osteoporosis in India, including geographical location, job profile, indoor or outdoor work, working hours etc. [5, 6]

This study aims to assess the prevalence of osteoporosis among adults in a tertiary care hospital, providing valuable insights into the age-wise distribution and contributing factors. By addressing these aspects, the study seeks to enhance healthcare policies and improve the quality of life for individuals affected by this "silent disease."

Methodology:

The present study was conducted in the Department of Orthopaedics at our tertiary care hospital, over a one-year period from January 2024 to December 2024. A total of 104 patients, aged over 30 years and of either sex, attending the outpatient departments and wards, were included based on specific inclusion criteria of 1) All adults Railway beneficiaries more than 30 years who consented for participation in

an outpatient department. exclusion criteria of 1) age below 30 years of age 2) prolonged immobility like hemiplegia , paraplegia, quadriplegia, 3) prior use of antiresorptive and anabolic steroids The sample size was determined using PASS-16 software, with a minimum of 100 patients required in the study to detect a moderate effect size with 95% confidence and 80% power. Patients included in the study had clinical, radiological, and biochemical evidence of osteoporosis. Each patient underwent detailed history taking, general physical examination, and localized skeletal assessment. Dual-energy X-ray absorptiometry (DXA) was used to measure bone mineral density (BMD) at the lumbar spine, femoral neck, and total hip.

T-scores were calculated to detect osteoporosis. Routine laboratory investigations, including serum calcium, phosphate, and vitamin D levels, were performed. In addition, serum markers of bone turnover, such as alkaline phosphatase, and biochemical analysis, including serum protein and LDH levels, were conducted.

Participants with suspected secondary causes of osteoporosis underwent further testing, which included thyroid function tests, parathyroid hormone levels, and 24-hour urinary calcium excretion. Individuals with T-scores of ≤ -2.5 were diagnosed with osteoporosis, while those with T-scores between -1.0 and -2.5 were considered to have osteopenia. All findings were systematically recorded and analyzed to determine the prevalence and distribution of osteoporosis among the study population.

Continuous variables were expressed as mean $\pm$ SD for normally distributed data or as median (IQR) for non-normally distributed data. Differences between groups were analyzed using Student's t-test for normally distributed continuous variables and the Mann-Whitney test for non-normally distributed variables. Proportions were compared using the Pearson Chi-square test or Fisher's exact test where appropriate. A p-value of < 0.05 was considered statistically significant. All statistical analyses were conducted using Epi-

Info 7.2.1.

OBSERVATIONS AND RESULTS:

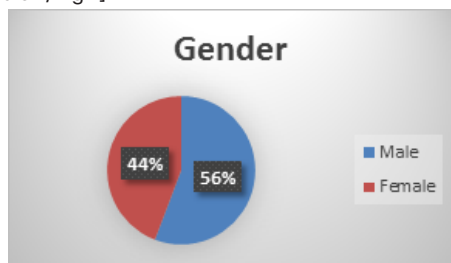
We evaluated total 104 cases which reported to our department of orthopaedics.

Table 1: Age And Gender Distribution

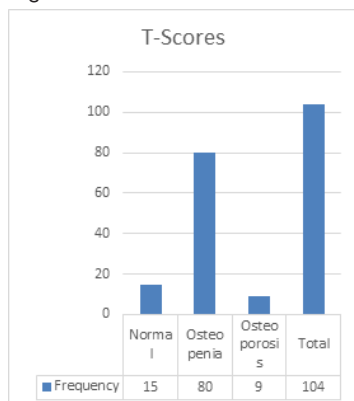
Age Group	Female	Male	Total
21 to 30	0	4	4
31 to 40	6	6	12
41 to 50	9	11	20
51 to 60	25	12	37
61 to 70	5	17	22
71 to 80	1	5	6
81 to 90	0	3	3
Total	46	58	104

The study population consisted of 104 patients, with 46 females (44.2%) and 58 males (55.8%). The age distribution varied across different groups. The majority were in the 51 to 60 age group, accounting for 35.6% of the total population, with 25 females and 12 males. The 61 to 70 age group comprised 5 females and 17 males, representing 21.2% of the total. In the 41 to 50 age group, there were 9 females and 11 males, making up 19.2%. The 31 to 40 age group included 6 females and 6 males, totalling 11.5%. The younger age group of 21 to 30 had only 4 males (3.8%), while the older age groups of 71 to 80 and 81 to 90 had fewer participants, with a total of 6 (5.8%) and 3 (2.9%) respectively.

This distribution highlights a higher prevalence of osteoporosis in males aged 61 to 70 and females aged 51 to 60. [Table 1, Fig 1]

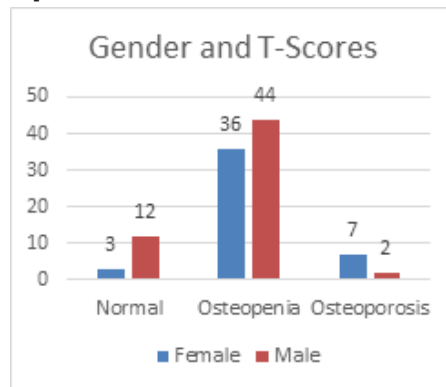
**Figure 1: Gender Distribution**

We studied incidence of osteoporosis. In our study, out of a total of 104 individuals, 80 (76.92%) were classified as having osteopenia, making it the most common category. 15 (14.42%) individuals had normal T-scores, indicating good bone density. The least frequent category was osteoporosis, with 9 (8.65%) individuals affected. This distribution suggests that osteopenia is significantly more prevalent in the studied population. [Fig 2]

**Fig 2: Bone Mineral Density by T-Scores**

In our study, among females, only 3 (6.38%) had normal T-

scores, whereas 36 (76.60%) were classified as having osteopenia, and 7 (14.89%) had osteoporosis. In contrast, among males, 12 (20.34%) had normal bone density, 44 (74.58%) had osteopenia, and only 2 (3.39%) had osteoporosis. The difference between male and female bone density distribution was statistically significant ($p = 0.02$), indicating that females had a higher prevalence of osteoporosis compared to males. This suggests a potential gender-based disparity in bone health, which may be influenced by factors such as hormonal differences and postmenopausal bone loss in females.

**Fig 3: Gender and T-Scores**

In our study, the mean age of individuals with **normal T-scores** was **36.13 years** ($SD = 11.24$), indicating that younger individuals were more likely to have normal bone density. Those classified as having **osteopenia** had a higher mean age of **54.98 years** ($SD = 14.42$), suggesting that bone mineral density declines with age. The **osteoporosis** group had the highest mean age of **68.66 years** ($SD = 18.67$), reinforcing the association between advanced age and increased risk of osteoporosis. The difference in mean age among the groups was statistically significant ($p < 0.001$), highlighting age as a key factor influencing bone health. [Table 2]

Table 2: Age Distribution Of The Cases

T-Scores	Mean Age	SD
Normal	36.13	11.24
Osteopenia	54.98	14.42
Osteoporosis	68.66	18.67
P < 0.001, Significant		

DISCUSSION:

In our study, we observed the incidence of osteoporosis among 104 individuals. The most prevalent category was osteopenia, found in 80 individuals (76.92%), followed by normal T-scores in 15 individuals (14.42%). The least frequent category was osteoporosis, affecting 9 individuals (8.65%). This distribution highlights that osteopenia is significantly more common in the studied population, while osteoporosis, though present, affects a smaller proportion. We observed that the mean age of individuals with normal T-scores was 36.13 years ($SD = 11.24$), indicating that younger individuals were more likely to have normal bone density. Those diagnosed with osteopenia had a mean age of 54.98 years ($SD = 14.42$), showing a decline in bone mineral density with increasing age. The osteoporosis group had the highest mean age of 68.66 years ($SD = 18.67$), reinforcing the well-established correlation between advanced age and increased osteoporosis risk. Our findings are consistent with previous studies that have examined osteoporosis and osteopenia prevalence across different populations.

A study by Vaishya et al. [7] in New Delhi reported 8.99% prevalence of osteoporosis, closely matching our findings of 8.65%. Haris et al. [8] reported 30.7% osteoporosis prevalence in the Pakistani population residing in Karachi, significantly

higher than our findings. Wright et al. [9] found that 10.3% of adults above 50 years in the United States had osteoporosis, which is slightly higher than our findings (8.65% overall).

We observed that among females, only 3 individuals (6.38%) had normal bone density, while 36 (76.60%) had osteopenia, and 7 (14.89%) had osteoporosis. In males, 12 individuals (20.34%) had normal T-scores, 44 (74.58%) were osteopenic, and only 2 (3.39%) had osteoporosis. The difference between male and female bone density distribution was statistically significant ($p = 0.02$), indicating that females had a higher prevalence of osteoporosis compared to males. This is in line with known risk factors, including hormonal changes, particularly postmenopausal estrogen deficiency, which contributes to increased bone loss in women.

A study by A Sharma et al. [10] included 231 individuals (147 females, 84 males) and reported osteopenia in 123 individuals (53.2%) and osteoporosis in 30 individuals (13.1%). In comparison, our study found a higher prevalence of osteopenia (76.92%) and a lower prevalence of osteoporosis (8.65%). Among females in A Sharma et al.'s study, 84 (57%) had osteopenia, and 27 (18%) had osteoporosis, whereas our study found osteopenia in 76.60% and osteoporosis in 14.89% of females. Among males, 39 (46%) were osteopenic, and 3 (4%) were osteoporotic in Sharma et al.'s study, compared to our findings of 74.58% and 3.39%, respectively. The slight variations could be attributed to differences in sample size, demographic characteristics, and inclusion criteria. [10]

A study by Marwaha et al. [11] focusing on women over 50 years found that 45% were osteopenic, while 42% were osteoporotic.

The significantly higher osteoporosis rate in this study, compared to our 14.89% prevalence in females, may be attributed to the older minimum age criterion. Gandhi et al. [12] conducted a study among 200 women over 40 years in Mumbai and found 34% prevalence of osteopenia and 8% prevalence of osteoporosis. Compared to our findings, osteopenia was much more prevalent (76.60%) in our study, possibly due to differences in geographic and dietary factors. Shetty et al. [13] found osteoporosis prevalence in South Indian males over 50 years at 10.7%, whereas our study found a lower rate (3.39% in males). However, Marwaha et al. [11] reported a higher osteoporosis prevalence in men (24.6%), which suggests variations based on regional and lifestyle factors. Osteoporosis leads to increased chances of fractures in these older adults and they should be prevented by proper bone health management. [14, 15]

CONCLUSION

Our study shows that osteopenia is the most common bone density abnormality, affecting 76.92% of individuals, with osteoporosis being significantly less prevalent (8.65%). Females had a higher prevalence of osteoporosis than males (14.89% vs. 3.39%), with a statistically significant difference ($p = 0.02$). Our findings align with studies conducted in India and globally, with some variations likely due to age selection, regional factors, and lifestyle influences. The significant correlation between age and decreasing bone density ($p < 0.001$) reinforces the need for early screening and preventive strategies like life style modifications including diet, exercise supplements, particularly in high-risk groups such as postmenopausal women and elderly individuals.

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Conflict Of Interest: None

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