

A Study to Screen the Risk of Osteoporosis in the Population of Pilani, a Semi Urban Town Located in Rajasthan, North India

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Abstract: Background: Osteoporosis is a major public health problem associated with substantial morbidity and socio-economic burden worldwide. Globally the proportion of elderly population afflicted with osteoporosis is rapidly increasing which raises concerns about disability, dependence, and social costs that are caused by osteoporosis. Objective: The objective of the study was to screen the risk of osteoporosis in the population of Pilani, a semi urban town located in Rajasthan. Method: A cross sectional study was conducted to screen adults in between the age group of 25 to 70 years. The sample that was screened comprised 510 adults (217 males and 293 females). Purposive sampling technique was used to select the sample from residents of Vidya Vihar campus and adjoining areas in Pilani. Bone Mineral Density was assessed by the speed of the sound using ultrasound device and standardized questionnaire. (Portable ultrasonic device, Quantitative Ultrasound (QUS) and a standardized questionnaire was administered to assess the cause of osteoporosis.) Results: The incidence of osteoporosis in the present study was 9% and osteopenia 45.33% with maximum number of both osteoporotic and osteopenic recorded in age group of 41-50 years. Significant correlation has been found between prevalence of osteoporosis and various risk factors at $p < 0.05$. About 62% of subjects who consumed cow milk and 65% of respondents consuming more than 3 cups of tea/coffee in a day were found to be osteopenic. The incidence of osteoporosis was found statistically significant with other risk factors like smoking, alcohol consumption and steroid medication. In women, low T scores were found statistically significant with hysterectomy and who experienced menopause before the age of 45 years. Conclusion: The prevalence of osteopenia is high in the sample screened in Pilani. Thus, simple osteoporosis screening programs using Quantitative Ultrasound (QUS) method utilizing WHO T score will be a valuable tool to screen the population because it could potentially help identify those at risk of osteoporosis and appropriate intervention could be offered.

Keywords: Osteoporosis, Osteopenia, Bone Mineral Density, Ultrasound, Diet

1. Introduction

Osteoporosis is a major public health problem associated with substantial morbidity and socio-economic burden worldwide¹. It is a disease characterized by reduction in the bone mass and disruption of bone architecture leading to impaired skeletal strength and an increased susceptibility to fractures. Globally the proportion of elderly population afflicted with osteoporosis is rapidly increasing which raises concerns about disability, dependence, and social costs caused by osteoporosis².

Osteoporosis does not have a remarkable clinical presentation except when fractures result. As age advances, the incidence of osteopenia and osteoporosis increases.

Measuring the bone density remains the only important tool in the early diagnosis of osteoporosis, so that effective preventive and therapeutic measures can be initiated at the earliest. The gold standard for measuring bone density however, is the Dual Energy X-ray Absorptiometry (DEXA), which is useful tool for both the axial and appendicular skeleton as it lacks deleterious effect of radiation and is portable¹.

Osteoporosis is defined using WHO criteria: a T score is the number of standard deviations which separate the patient from the mean value of a healthy young population and a Z

score is the number of standard deviations which separate the patient from an age-matched healthy population³.

The WHO (1994) definition characterizes:

- Osteopenia as a T score between -1 and -2.5 SD;
- Osteoporosis as a T score of -2.5 SD or below.

2. Methodology

A cross-sectional study was conducted to screen adults in the age group of 25 to 70 years. Bone Mineral Density was assessed by portable ultrasonic device, Quantitative Ultrasound (QUS) and a standardized questionnaire to assess the causes of osteoporosis.

The present study is an exploratory attempt to screen the risk of osteoporosis in the population of Pilani.

- **Sample Design:** The sample that was screened comprised 510 adults (217 males and 293 females) who had participated in the camps organized in Vidya Vihar campus and adjoining areas in Pilani. All the participants of the camp were included in the study. The study period was from February 2010—November 2010.
- **Ethical Approval:** Ethical approval for the study was obtained from Human Ethical committee of BITS, Pilani. People were interviewed after taking their consent, to assess the level of awareness and risk for osteoporosis. This was followed by Bone Mineral Density screening.

- **Procedure for data analysis:** Data was analyzed using SPSS 16.0 software. The responses obtained were coded, tabulated and then percentages were drawn, followed by content analysis and application of correlation at 5% level of significance.

Table 1: Basic socio-demographic characteristics and other variables

Variables	Number (%)
Gender	
Males	117(39%)
Females	183(61%)
Diet	
Vegetarian	427(83.7%)
Non vegetarian	83(16.2%)
Type of milk consumed	
Cow	313(61.30%)
Buffalo	144(28.20%)
Packet	53(10.30%)
Exercise/walk	
Yes	227(44.5%)
No	283(55.49%)
Smoking Status(males)	
Yes	40(19%)
No	167(81%)
Family history of osteoporosis	
Yes	103(20.19%)
No	407(79.81%)
Use of calcium supplements	
Yes	123(24%)
No	387(76%)

An initial pilot questionnaire was tested on a representative sample to ensure if the subjects faced any difficulty with any part of it. The final version was prepared according to the feedback received from the pilot study. The interview also included an assessment of the subjects' basic socio-demographic characteristics, medical and family history. Their history of fracture was also obtained. The family history was elucidated by asking for the occurrence of osteoporosis or low-trauma fracture among the patients' first-degree relatives. Steroid use was also noted¹.

3. Result

The incidence of osteoporosis in the present study was 9% and that of osteopenia was 45.33% with maximum number of both osteoporotic and osteopenic recorded in age group of 41-50 years. In the study, 510 men and women in the age group of 25 to 70 years were screened (Figure: 1). Among these respondents, majority were in the age group of 31-50 years.

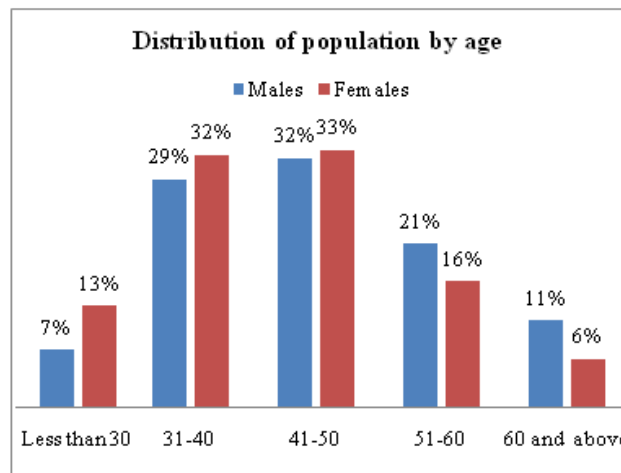


Figure 1: Distribution of sample according to age

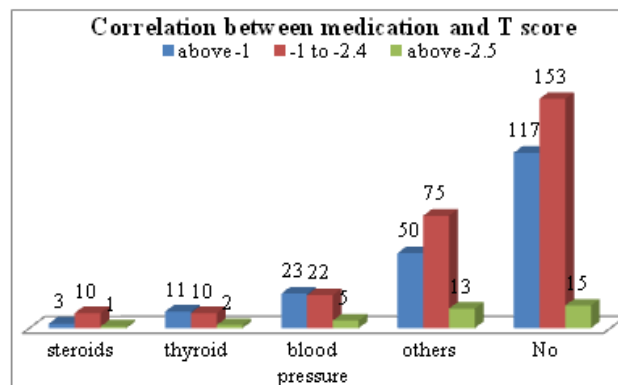


Figure 2: Correlation between medication and T score

As per WHO criteria 205 (40.29%) subjects had normal T score, whereas 268 subjects (52.50%) had osteopenia and 37(7.21%) were recorded with osteoporosis(Table:2). Among total osteopenic population in the study, most of the osteopenic were recorded in the age group of (41-50 years). While studying the age wise trend, after the age of 65 years, there was an almost 100% incidence of either osteopenia or osteoporosis with 50% being osteopenic and 50% osteoporotic. Incidence of osteopenia and osteoporosis increased significantly after the age of 50 years.

Table 2: Distribution of population according to T Score values

Criteria	Percentage	Number of respondents
Normal	40.29%	205
Osteopenic	52.50%	268
Osteoporotic	7.21%	37
Total	100%	510

4. Discussion

While studying the relation between osteopenia/osteoporosis and other variables, it was revealed that 62% of the subjects who consumed cow's milk were found to be osteopenic. It was observed that 52% of respondents consumed 1 glass of milk everyday, 30% took 2 glasses of milk everyday while 4% consumed 3 glasses of milk. Only 8% of subjects consumed more than 3glasses of milk while 5% took none (Table: 3). It was found that 84% subjects were vegetarians while remaining 16% were non vegetarians.

Table 3: Distribution of subjects on the basis of milk consumption pattern

Milk consumption pattern	Number of respondents (in percentage)
1 glass	266(52%)
2 glass	155(30%)
3 glass	22(4%)
More than 3 glass	42(8%)
No glass	25(5%)
Total	510

About 65% of the subjects who were consuming more than 3 cups of tea/coffee per day were found to be osteopenic. ($r=0.087$, $p<0.05$).

Responses were also recorded for the smoking pattern in which 19% of the males were smokers, of which 66.6% were found to be osteopenic. Similarly 63% of alcoholics were recorded with low T scores. Relationship was also established with physical activity; 56% of respondents who exercise regularly were found to be osteopenic.

Past history of fractures was also significantly correlated ($r=0.094$, $p<0.05$) with the osteopenic status of patients. Out of 8.2% respondents who had previous history of fracture, 47.6% were found to be osteopenic. Similar findings have been reported in a study⁶.

A history of steroid use was significantly associated with osteopenia as 11 subjects out of 114 who were on steroids in our study, were found to be osteopenic. A similar trend was noticed in a study conducted in Pakistan¹. Thus, cautious use of steroids must be encouraged to avoid bone loss¹. Subjects were also studied for other medications they were on, 12 subjects out of 23 who were taking thyroid medications were osteopenic whereas 168 subjects out of 285 were osteopenic and did not take any medication (Figure: 2). It was also found that 24% of respondents were taking calcium tablets and were found to be osteopenic.

Among the 293 women who were screened, 17.70% had undergone hysterectomy and out of these 77% recorded low T score ($r=0.112$, $p<0.05$). About 21% women who were reported positive for attaining menopause before the age of 45 years, 70.4% were found to be osteopenic. ($r =0.098$, $p<0.05$)

As the age advances, the incidence of osteopenia and osteoporosis (the silent disease) increases with a resultant increase in osteoporotic fractures⁴. This could be due to an increased imbalance between bone resorption and formation with aging, which is an important cause of osteoporosis in the elderly.

The present study has some limitations as ultrasonography method is not a gold standard for screening of osteoporosis but it is an attractive screening tool because of the low cost and feasibility¹. It also helps in identifying osteopenia and osteoporosis in a population which otherwise shall remain undiagnosed and face the complications and menace of osteoporosis. Thus confirmation of osteoporosis may be done on the basis of DEXA.

5. Conclusion

The prevalence of osteoporosis and osteopenia is high in the sample screened in Pilani .Thus, simple screening programs for osteoporosis will be a valuable tool to screen the population because it could potentially help identify those at risk of osteoporosis and proper intervention or recommendation could be offered².

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