

# Study of T-score in sedentary adult workers

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## Abstract

Bone homeostasis is maintained by cellular and molecular events. To meet the requirements of skeletal growth and mechanical function, bone undergoes dynamic remodelling by a coupled process of bone resorption by osteoclasts and reformation by osteoblasts<sup>1</sup>. 700 Bank employees of age between 30 years and 60 years were subjected to Quantitative ultrasound screening of calcaneum to assess the bone mineral density. The values thus obtained were tabulated and subjected to chi square test to assess the incidence of osteopenia and osteoporosis. The results were subjected to Chi-square test and the results were found to be statistically not significant which means the incidence of this morbidity can be at any age group. The statistical derivation supports the theory of osteopenia and osteoporosis affecting the younger age group as against the theory of it being a disease of elderly. Thus the need for screening bone mineral density during health checkups is stressed.

**Key Word:** Osteopenia, Osteoporosis, Bone mineral density, T-Score

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Received Date: 05/06/2018 Revised Date: 09/07/2018 Accepted Date: 13/08/2018

DOI: <https://doi.org/10.26611/103723>

## Access this article online

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Accessed Date:  
18 August 2018

## INTRODUCTION

Osteoporosis is a systemic disease of the bone characterized by low bone mineral density which affects millions of people and causes burden for both the affected individual and health systems worldwide<sup>2</sup>. There are no significant complaints or early manifestations in patients having this problem. General debility, decrease in functional activity, co-morbidities in the elderly and lack of oestrogen in menopausal women leads to osteoporosis, thus fragility fractures. Keeping in mind the morbidity it produces in the course of life, early detection of this problem will help in relieving the burden on the patients physically, functionally and economically. Socially the health canvas also will look brighter. We have been witnessing change of life style periodically since early

days due to industrial revolution, scientific advancements and economic reforms. The change in life style has affected the bone health of younger population as against the belief that it affects usually the elderly. WHO has observed the last decade that is 2000 – 2010 as bone and joint decade and encouraged health care bodies to create awareness and give importance to alleviate this problem<sup>3</sup>. Hence we have chosen the persons between the ages of 30-60 years as our study group. Bone mineral density is being assessed by DEXA (Dual Emission X-ray Absorptiometry) and ultrasound screening with an exclusive machine. DEXA method is costlier and question of affordability arises but the results are more informative and site specific (vertebral bones especially cervical and lumbar regions, hip bone and other long bones). By ultrasound method which is cost effective we get information of either distal radius or calcaneum, uncommonly proximal tibia and the T-Scores obtained are taken as guidelines only.

## AIM

Screening of Bone Mineral Density to assess bone health by ultrasound method for early detection of osteoporosis in younger age group and to create awareness about the presence of this morbidity in younger age as against the belief that it is the problem of elderly.

## OBJECTIVES

1. Evaluation of T-Scores in sedentary workers between 30-60years of age.
2. Early detection of osteopenia/osteoporosis.

## MATERIALS AND METHODS

We have conducted bone mineral density screening camps at few centres of IOB (Indian Overseas Bank) Officers association for their members. More than 20 camps have been conducted across the breadth and length of Tamil Nadu. Out of the available data we have randomly selected few centres totalling over 700 participants. Subjects above thirty years of age and below sixty only were included for the study. Subjects with gross co-morbidities and skeletal abnormalities were excluded. In all our subjects we have measured T-scores from calcaneum by using quantitative ultrasound method (QUS). T-Scores thus obtained were taken into consideration for assessing the status of bone mineral density. Results were tabulated and appropriate statistical formulae used and analysed.

### Pathophysiology of osteoporosis

Until recently osteoporosis was an under recognized disease and considered to be an inevitable consequence of ageing<sup>4</sup>. In the early 1980's Riggs and Melton proposed the existence of two discrete types of involuntional osteoporosis - postmenopausal, senile osteoporosis<sup>5</sup>. It is a systemic disease characterized by low bone mass with

micro architectural deterioration of bone tissue leading to enhanced bone fragility thus increasing the susceptibility to fracture<sup>6</sup>. Due to its asymptomatic nature, these fragility fractures draw attention to this morbidity. In the biogenesis of human life role of homeostasis is very important. The skeletal system which is the structural core of the human body is regulated by a process called osteogenesis and osteolysis, in simple words bone formation and bone resorption. In childhood and adolescent period bone formation exceeds bone resorption. This trend is in the ascending direction till the age of 30years. After 30years of age, bone resorption begins to exceed bone formation gradually. Bone loss depends on various factors like hereditary, environment, nutrition and physical activity. In addition to these factors there is fixed rate of bone loss periodically which could not be assessed or rated<sup>7</sup>. This bone loss affects the peak bone mass and causes fragility of the bones leading to fragility fractures. The common sites prone for the fragility fractures are hip, vertebra, distal radius and proximal tibia. Earlier understanding of the exclusivity of this problem in elderly is being disproved by various recent studies. The causes of osteoporosis other than ageing are inactivity (sedentary life), alcohol consumption, smoking and lack of vitamin D. These additional factors are the reasons for bringing in younger population into the osteoporotic net.

## RESULTS AND ANALYSIS

**Table 1:** Distribution of study subjects by age

| Age (in years) | Frequency(n) | Percent (%) |
|----------------|--------------|-------------|
| 30-39          | 69           | 9.9         |
| 40-49          | 307          | 43.9        |
| 50-59          | 324          | 46.3        |
| Total          | 700          | 100.0       |

**Table 2:** Distribution of study subjects by gender

| Gender | Frequency(n) | Percent (%) |
|--------|--------------|-------------|
| Male   | 491          | 70.1        |
| Female | 209          | 29.9        |
| Total  | 700          | 100.0       |

**Table 3:** Distribution of study subjects by T-score

| T score    | Frequency(n) | Percent (%) |
|------------|--------------|-------------|
| < -2.5     | 103          | 14.7        |
| -2.4 to -1 | 295          | 42.1        |
| >-1        | 302          | 43.1        |
| Total      | 700          | 100.0       |

**Table 4:** Association of gender with T-score

| Gender       | T-score category                                    |                  |                    |
|--------------|---|------------------|--------------------|
|              | < -2.5  | -2.4 to -1       | >-1 n(%) n(%) n(%) |
| Male         | %within T-score category 81(78.6)                   | 208(70.5)        | 202(66.9)          |
| Female       | %within T-score category 22 (21.4)                  | 87(29.5)         | 100(33.1)          |
| <b>Total</b> | <b>% of total within T-score category 103(14.7)</b> | <b>295(42.1)</b> | <b>302(43.1)</b>   |

Chi-Square = 5.099, df = 2, P = 0.078 (not statistically significant)

**Table 5:** Association of age with T-score

| Age category<br>(in years) | T-score category                          |                  |                            |
|----------------------------|---|------------------|----------------------------|
|                            | < -2.5                                    | -2.4 to -1       | > -1 n(%) n(%) n(%)        |
| 30-39                      | %within T-score category                  | 4(3.9)           | 28(9.5) 37(12.3)           |
| 40-49                      | %within T-score category                  | 51(49.5)         | 127(43.1) 129(42.7)        |
| 50-60                      | %within T-score category                  | 48(46.6)         | 140(47.5) 136(45.0)        |
| <b>Total</b>               | <b>% of total within T-score category</b> | <b>103(14.7)</b> | <b>295(42.1) 302(43.1)</b> |

Chi-Square = 6.603, df = 4, P = 0.158 (not statistically significant)

## DISCUSSION

Hitherto osteoporosis was believed to be a disease of elderly but now due to the evolution of life style and social behaviour, other causes which have been mentioned earlier have taken their role to play in causing osteoporosis in younger age group. In this scenario the incidence of osteopenia among younger age group has become a common occurrence. We have few studies to support our claim<sup>8</sup> In our study we have reiterated this hypothesis by screening more than seven hundred executives of the bank. Out of 700 we have screened, only 302 were normal individuals and the rest were having either osteoporosis or osteopenia. The age difference for the entire group was 29 years and the mean age was 48.26 years (SD±6.37). As for gender variation out of 491 males the mean age was 49.31(SD±6.01) and out of 209 females the mean age was 45.78(SD±6.53). In our study, male (491), female (209) ratio was 70.1 and 29.9 respectively. Out of which 16.5% males and 10.5% females were having osteoporosis. With regard to osteopenia, 42.4% males and 41.6% females were affected. The results also have shown that in the age group of 30-39 years 0.6% and 4.0% were affected with osteoporosis and osteopenia respectively and also in the age group between 40-49 years 7.3% and 18.1% were affected with osteoporosis and osteopenia respectively. Table IV and V describes the frequency of T score with reference to age and gender as osteoporotic, osteopenic and normal state. Subjecting these values to chi square tests we got the result of statistically not significant, which means that this morbidity can be seen irrespective of the age among the selected group. Hence the theory of osteoporosis and osteopenia affecting only the elderly and post menopausal is to be considered with a thread of suspicion. These results established the prevalence of this silent disease among people above 30 years. Since the ugly face of osteoporosis /osteopenia is made known only after a fracture, leading to morbidity physically and economically, its incidence should be in the category of high suspicion. Hence our aim of screening sedentary workers throws light on the prevalence of this morbidity among people above the age of 30 years. Thus the early detection of this morbidity can be used to prevent/treat as the case may be.

## CONCLUSION

Statistical analysis of our results revealed that it is statistically not significant which reiterates our aim and objective of our study. Hence we strongly feel that health check up schemes can have a space for assessment of bone mineral density, which may help in creating awareness and formulate general guidelines to combat the problem at community level and spread the message of living fit.

## LIMITATIONS

The study results can be taken only as the indicator and further definitive investigations like DEXA scan and biochemical markers will help in planning the treatment. In certain cases where we have large frame individuals our QUS method will be on the error side

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Source of Support: None Declared  
Conflict of Interest: None Declared