

Effect of Long Standing Time on Bone Mineral Density in Middle Aged Males

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Background. Bone mineral density (BMD) is an important tool for assessing the risk of an individual for acquiring fractures. The determinants of bone mineral density are not well defined in men. The study aims at assessing the bone mass in middle aged men having occupations which required prolonged standing.

Methods. A cross sectional study was carried out comparing the T- score values of BMD of 100 men having a daily standing time of more than 8 hours to 100 men having a daily standing time of less than 3 hours.

Results. The results showed increased bone mass in men with jobs requiring prolonged standing as compared to men, which had a sedentary life style.

Conclusion. Middle aged men leading an active life style, having no other established risk factor for osteoporosis, have a less chance of developing decreased bone mass in future compared to men having jobs which require a lot of sitting, so that the lack of baseline physical activity predisposes them for an osteoporotic fracture in later life.

Keyword. Bone mineral density (BMD), middle aged male.

Introduction

Bone densitometry represents a major advancement in the clinical management of osteoporosis¹. The currently accepted definition of osteoporosis is "a systemic skeletal disorder characterized by low bone mass and micro architectural deterioration of bone tissue, with a consequent increase in bone fragility and susceptibility to fracture"². World Health Organization has defined osteoporosis as a bone mineral density of more than 2.5 standard deviations (T score <2.5) below the mean value for young adults³. It is well established that bone mineral density provides the best means of assessing an individual's risk of fracture⁴. Bone mass is a major determinant of bone strength, and prospective studies have shown an increasing gradient of risk of fracture with decreasing bone density, a decrease in the latter of 1SD being associated with a 1.5-fold to 3.0-fold increase in risk of fracture⁵⁻⁸.

Several techniques are now available for the assessment of bone density. These include single and dual photo absorbtionometry, dual energy x-ray absorbtionometry, quantitative computed tomography, and broadband ultrasound attenuation⁹. Recently, newer peripheral densitometry devices have been developed, which have the advantage of portability.

The determinants of bone mineral density (BMD) are well defined in women, but not in men¹⁰. Several

risk factors are thought to predispose to fractures in middle aged men such as: lower femoral neck BMD, quadriceps weakness, higher body sway, falls in the preceding 12 months, a history of fractures in the previous 5 years, lower body weight, and shorter current height¹¹.

The aim of this study was to find the effect of long standing time on the bone mineral density of men having occupations, which require prolonged standing per day. Identification of the determinants of BMD could lead to the development of interventions aimed at maximizing BMD in men and could potentially decrease the risk of hip fractures.

Material and Methods

A case control study was carried out with a sample comprising of 100 men aged 31 to 50 years, who were non smokers without any previous history of fractures and having a total of more than 8 hours of standing time per day. The control group also comprised of 100 men of the same socio economic group with a daily standing time of less then 3 hours (Table 1). All subjects provided informed consent, and the appropriate review committees approved the study.

BMD assessment was done on the calcaneum heel by waterless peripheral ultrasound bone densitometry (Sahara[®] clinical bone sonometer Hologic[®] Inc.).

Results

The study showed that out of 100 men fulfilling the above criteria with a long standing time none had a T score of ≤ 2.5 and only 3 had a T score within 2 to 2.4 and 3 had a T score of 1.5 to 1.9 while 16 had a T score

Table 1. Age distribution of the study population.

Age (yrs)	Cases	Control
31-35	16	16
36-40	23	23
41-45	40	40
46-50	21	21
Total	100	100

of above +1 and 10 had a T score between +1 and +0.6 and 18 had a T score between +0.5 to +0.1, as compared to men with a standing time of less than 3 hours who showed although none with a T score of ≤ 2.5 but showed 7 with a T score between 2 to 2.4 and 14 with a T score between 1.5 to 1.9 while there were only 6 above +2 and 13 between +1 and +0.6 and 6 with a T score between +0.5 and +0.1. (Table 2) (Figure 1).

The study results showed that men employed in jobs which require prolonged periods of standing had their BMD T-scores much better as compared to men of the same socio-economic group which had jobs

requiring them to sit most of the time (OR = 4.48, $p < 0.0001$).

Table 2. T-Score in the study subjects and controls.

T-SCORES	No. of subjects	No. of controls
Above + 1	16	6
+1 to +0.6	10	13
+0.5 to 0.1	18	6
0 to 0.4	16	20
-0.5 to 0.9	26	13
-1 to 1.4	8	21
-1.5 to 1.9	3	14
-2 to 2.4	3	7
≤ -2.5	0	0

Discussion

Bone mass is dependant on a variety of factors as shown by the Rotterdam study which concluded that the rate of bone loss is higher in women, progresses with age, and is further determined by several modifiable risk factors, particularly in men¹². Baseline physical activity is inversely proportional to future fracture risk in men¹³. Our study relates to the above-mentioned studies by establishing the fact that

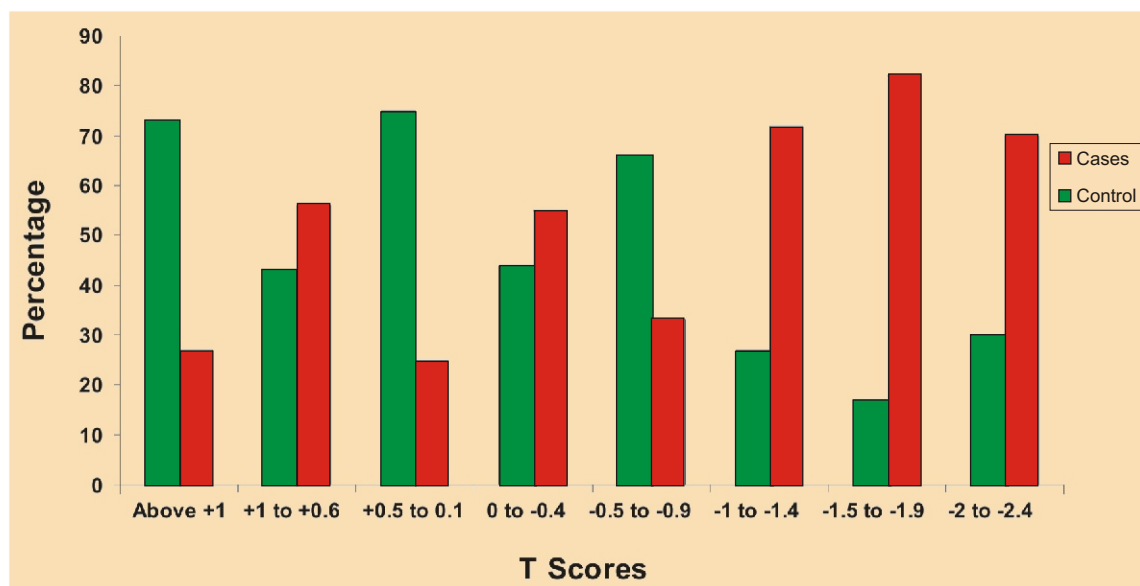


Figure 1: Distribution of BMD among subjects and controls

that long standing time actually improves bone mineral density as evident from the study results.

The risk factors are extensively studied for women but it is not true for men. Failure to find associations between BMD and some of the potential determinants may be due to lack of statistical power¹⁰.

However is it a well-established fact the physical activity actually improves bone health and decreases the risk of fractures, which is in accordance with our study results.

Conclusion

Middle aged men leading an active life style, having no other established risk factor for osteoporosis, have a less chance of developing decreased bone mass in future compared to men having jobs which require a lot of sitting, so that the lack of baseline physical activity predisposes them for an osteoporotic fracture in later life.

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