A Comparative Study Of Age Vs Sex On Bone Mineral Density In General Population Kanchipuram District

Ursula Sampson[1*], Sumanth Kumar. B[1], Ponnazhagn.K[2] and Pratheeba[3]

1* Professor and HOD, Department of Biochemistry, Meenakshi Medical College Hospital and Research Institute, MAHER University, Chennai.

1 Assistant Professor, Department of Biochemistry, Meenakshi Medical College Hospital and Research Institute, MAHER University, Chennai.

2 Research Scholar, Department of Biochemistry, Meenakshi Medical College Hospital and Research Institute, MAHER University, Chennai.

3 Assistant Professor, Department of Biochemistry, Meenakshi Medical College Hospital and Research Institute, MAHER University, Chennai.

Corresponding author:

Dr. Ursula Sampson, Professor and HOD, Department of Biochemistry, Meenakshi Medical College Hospital and Research Institute, MAHER University, Chennai.

Mobile: +91-9789949519, Email: ursula.sampson@gmail.com

Abstract

Objectives: The aim of the present study was to investigate BMD levels indifferent age group between 30 to 75year old subjects and to assess the relationship between age, sex and BMD in general population. **Design:** An observational cross sectional study of randomly selected in kanchipuram district aged from 30–75 years. **Material and methods:** The study was conducted at Meenakshi Medical College Hospital and Research Institute, Kanchipuram. Under this cross-sectional comparative study. 70 subjects of both sexes were subjected to the study. And subjects are divided into group 1(Age Group between 30-45), group 2 (Age Group between 46-60), and group 3 (Age Group between 61-75). **Result:** Seventy adults between 30 to 75 years of both sexes, 36 male and 34 female were subjected to this study. 21 males in this group (0.22 ± 0.9) and 18 females in this group (0.73 ± 1.3) were found to be normal. 15 males in this group (-1.68 ± 0.38) and 12 females in this group (-1.7 ± 0.37) were found to be osteopenic.4 females in this group (-2.85 ± 0.36) were found to be osteoporotic. Age subjects are divided into three categories; first group 30-45 years (Table 2), People in this age group of 30-45 years were found to be more osteopenic (males -1.1 ± 0.8 and females -1.2 ± 1.1) $(P < 0.01)$. Second group 46-60 years (Table 3) People in the age group 46-60 years, were found to be normal (male 0.17 ± 1.2, female $-0.0.36 \pm 1.4$) $(P < 0.05)$ and third group 61-75 years (Table 4), Females in the age group 61 to 75 years, were found to be osteoporotic (males -0.7 ± 0.9, females -2.6 ± 0.6) $(P> 0.4)$. **Conclusion:** This study has proved that irrespective of the age, females are found to have lower BMD when compared to males. Highlight of this study is "Osteopenia is more prevalent in the younger age group which necessitates earlier intervention".

1. Introduction

Osteoporosis is a systemic skeletal disease characterized by low bone density and micro architectural deterioration of bone tissue with a consequent increase in bone fragility[1]. Measurement of BMD can be used to determine fracture risk and monitor the effects of treatment. Early detection of bone loss is essential to preventing osteoporosis. Worldwide, osteoporosis causes more than 8.9 million fractures annually, resulting in an osteoporotic

fracture every 3 seconds[2]. 1 in 3 women over age 50 will experience osteoporotic fractures as well 1 in 5 men aged over 50[3-5].

The lifetime risk for hip, vertebral, and forearm (wrist) fractures has been estimated to be around 40%, very close to that for coronary heart disease. Osteoporosis does not only cause fractures, but also causes people to become bedridden and causes back pain and loss of height. Prevention of the disease and its associated fractures is important for maintaining health, quality of life, and independence among the elderly.

A profound change in bone mineral compositions occurs with advancing age and rates of fracture increase with age, giving rise to significant morbidity and mortality[6]. Aging leads to the loss of bone mass which is associated with structural and metabolic deterioration[7]. The degree of bone mineralization is governed by hormonal, nutritional and mechanical factors.

Generally, osteoporosis is three times more common in women than in men and this gap widens with increase in age. Additionally, women have a lower peak bone mass and hormonal changes occur at the menopause. . This accelerated loss is associated with the withdrawal of estrogen which begins at about age 40 years in both genders. Thus, in females and males, estrogen has both a catabolic and anabolic effect on bone throughout life, even at 80 to 90 years of age[8].

The aim of the present study was to investigate BMD levels indifferent age group between 30 to 75year old subjects and to assess the relationship between age, sex and BMD in general population.

2. Material and Methods

The study was conducted at Meenakshi Medical College Hospital and Research Institute, Kanchipuram. Under this cross-sectional comparative study. 70 subjects of both sexes were subjected to the study. And subjects are divided into group 1(Age Group between 30-45), group 2 (Age Group between 46-60), and group 3 (Age Group between 61-75).

2.1 Inclusion criteria:

1. Adults in the age group between 30 to 75 years.
2. People who are without any complication.

2.2 Exclusion criteria:

1. People who take Vitamin D and calcium supplements
2. People who suffer from acute or chronic conditions which interferes with calcium absorption.

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2.3 Methodology

After obtaining permission from institutional ethical committee and the study was conducted on 70 subjects of both sexes, selected for 30-75 yr age, by simple random sampling. Bone mineral density (BMD) was measured by ultrasound bone densitometer which included following steps.

2.4 Examination technique

Bone densitometry of the foot was done by PHOTON absorptiometry and BMD calculated. In describing the interaction of electromagnetic radiation with tissue, it is helpful to use an alternative to the wave representation. In this alternative quantum description, the radiation is regarded as small packets of energy called photons. At the energies used in bone densitometry. Thenormal T- score -1 and above, osteopenia between -1 and -2.5, osteoporosis -2.5 and below.

3. Statistical analysis

The calculation and statistical analysis were carried out using the Statistical Package for Social Sciences (SPSS) for Windows version 21.0 software, one-way ANOVA method and the group mean were compared by Duncan's Multiple Range Test (DMRT). Statistical probability P<0.05 was considered to be significant.

4. Results

Seventy adults between 30 to 75 years of both sexes, 36 male and 34 female were subjected to this study(table 1 & figure 1). 21 males in this group (0.22 ± 0.9) and 18 females in this group (0.73 ± 1.3) were found to be normal. 15 males in this group (-1.68 ± 0.38) and 12 females in this group (-1.7 ± 0.37) were found to be osteopenic.4 females in this group (-2.85 ± 0.36) were found to be osteoporotic.

Table 1: BMD distribution in relation to gender

BMD	Male	Female	Total
Normal	21	18	39
osteopenic	15	12	27
osteoporotic	-	4	4
Total	36	34	70

Figure 1: BMD distribution in relation to gender
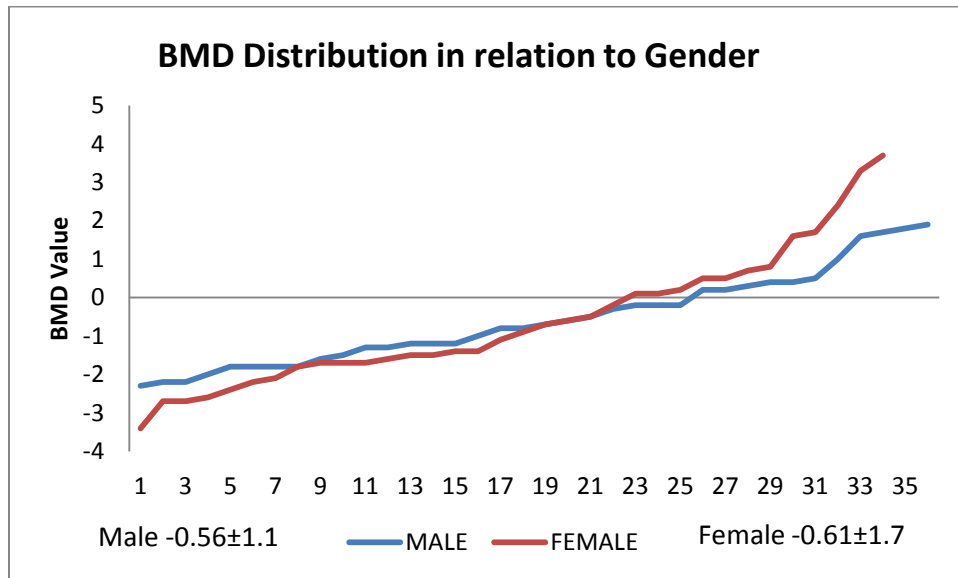
4.1 BMD distribution in relation to different age group

Age subjects are divided into three categories; first group 30-45 years (Table 2), People in this age group of 30-45 years were found to be more osteopenic (males -1.1 ± 0.8 and females -1.2 ± 1.1) ($P < 0.01$). Second group 46-60 years (Table 3) People in the age group 46-60 years, were found to be normal (male 0.17 ± 1.2, female $-0.0.36 \pm 1.4$) ($P < 0.05$) and third group 61-75 years (Table 4), Females in the age group 61 to 75 years, were found to be osteoporotic (males -0.7 ± 0.9, females -2.6 ± 0.6) ($P> 0.4$).

Table 2: BMD distribution in relation to age group between 30-45 years

GENDER	AGE GROUP (YEARS)	NUMBER OF SUBJECTS	MEAN AND SD VALUES	P -VALUE
MALE	30-45	21	-1.1 ± 0.8	< 0.01
FEMALE		21	-1.2 ± 1.1	

Table 3: BMD distribution in relation to age group between 46-60 years

GENDER	AGE GROUP (YEARS)	NUMBER OF SUBJECTS	MEAN AND SD VALUES	P-VALUE
MALE		8	0.17 ± 1.2	
FEMALE	46-60	10	0.36 ± 1.4	< 0.05

Table 4: BMD distribution in relation to age group between 61-75 years

GENDER	AGE GROUP (YEARS)	NUMBER OF SUBJECTS	MEAN AND SD VALUES	P-VALUE
MALE		4	-1.05 ± 0.9	
FEMALE	61-75	6	-2 .6 ± 0.6	> 0.4

5. Discussion

In the present study we observed BMD of 70 study subjects. We distributed study subjects according to age groups and according to sex to find association between them.

Burger H, et al shows that yearly percentage BMD reduction in women and men was -0.6% and -0.3% in the femoral neck, -0.8% and -0.5 in the Ward's triangle and -0.4% and -0.3% in the trochanter, respectively.

Warming L,et al suggested that in women after menopause and in men an age-related bone loss(0.002-0.006 g/cm2/year) was found at all sites.

Our study observed sex wise distribution of Bone mineral density and it is clearly shown that 21 males in this group (0.22 ± 0.9) and 18 females (0.73 ±0.4) were found to be normal.15 males (-1.68 ± 0.4) and 12 females (-1.7 ± 0.4) were found to be osteopnic. 4 females in this group (-2.85 ± 3.6) were found to be osteoporotic.

People in the age group of 30-45 years were found to be more osteopnic (males -1.1 ± 0.8, females -1.2 ± 1.1) (P < 0.01) when compared to people in the age group 46-60 years (males (0.17 ± 1.2, females 0.36 ± 1.4)

(P<0.05). Females in the age group 61-75 years were found to be more osteoporotic (males -1.05 ± 0.9, females -2.6 ± 0.6) (P >0.4).

Similarly Sharma et al[9] in their study found that out of 215 study subjects 24 with osteoporosis.121 with osteopenia and 70 were with normal BMD. There was a significant trend of decreasing bone density with an increase in age in both the gender groups. The percentage of osteoporotic female participants (58.8%) was more than male participants in the age group of <55 years whereas in the same age group, the percentage of osteopenic participants was more among males (46.7%) than females (27.5%). One case of osteoporosis was also reported in the age group of25–35 years among female participants. A significant association ($\chi2 = 18.64$, $P < 0.005$) was reported between the T-score and different age groups. Whereas non significant association exists between gender and the T-score.Packetal15 systematically measured the BMD of 130 consecutive patients, seen over a 6-month period in 2005 and found a higher than expected prevalence of clinically significant low BMD; 39% of patients had osteopenia and 16% had osteoporosis.

6. CONCLUSION

This study has proved that irrespective of the age, females are found to have lower BMD when compared to males.In the middle age group between 46 to 60 years, people are found to be normal. This study confirms that people of younger age group(30-45 years) are found to be more osteopenic when compared to the older age group(46-60 years). Highlight of this study is "Osteopenia is more prevalent in the younger age group which necessitates earlier intervention".

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