



OSTEOPENIA AND OSTEOPOROSIS; Frequency among females

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ABSTRACT... Objective: Osteopenia and osteoporosis are one of the main health concerns of Pakistani females now days. Our objective was to study the frequency of osteopenia and osteoporosis among females in the Faisalabad and its suburbs. **Material and Methods:** Study was initiated after approval of Ethical Review Committee. It was an observational cross sectional study conducted by the Department of Community Medicine, University Medical & Dental College Faisalabad in a private sector university of Faisalabad city and a private clinic in People's colony, Faisalabad. Study included a total of 600 women. Convenient sampling was done. Study was conducted from 1st January 2013 to 30th September 2013 in six different sessions. Age, marital status, education, socio-economic status (SES), occupation, parity and residence were variables of interest. Bone Mineral Density (BMD) was tested using calcaneal quantitative ultrasound machine and right heel of participant. Machine converted the BMD values into T-Score. According to the recommendations of World Health Organization (WHO) participant was considered normal, osteopenic and osteoporotic. SPSS version 16 for windows was used to analyze data. Results were considered significant if p - value was < 0.05. **Results:** Our results reflected that 72.9% of study participants were osteopenic while 2.4 % were osteoporotic and 24.7% were normal. By place of residence no significant difference was observed, 48% of rural population and 47% of urban population was osteopenic and insignificant correlation was found ($p=0.438$). However, 46.77% and 10% of urban participants were normal and osteoporotic respectively. Education in relation to osteopenia and osteoporosis revealed that 42% of educated females were osteopenic while 31.33% of illiterate females were osteopenic ($p > 0.05$). 69.88% married females were osteopenic and 43.22% unmarried females were osteopenic ($p < 0.001$). **Conclusions:** In our study frequency of osteopenia and osteoporosis was significantly high in all age groups. There is need for large-scale population-based studies using calcaneal quantitative ultrasound or DEXA scan to assess the prevalence of osteopenia and osteoporosis in the community. Further health education with special reference to balanced diet should be imparted to target population.

Key words: Bone Mineral Density, Females, Faisalabad, Frequency, Osteopenia

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INTRODUCTION

Increasing health facilities and availability of latest technology has resulted in increased life expectancy of both men and women in many developing countries like Pakistan¹. Half of the women over the age of 60 years live in the developing countries. It is estimated that 4% of the Pakistani population is over 65 years of age². Women living in developing countries and their health care providers are unable to understand

unique health risks associated with aging process^{3,4}. The increased life expectancy is associated with increased burden of age-related diseases like osteoporosis. Osteopenia and osteoporosis are one of the main health concerns of Pakistani females now a days^{4,5}. Osteopenia and osteoporosis both are multi factorial in origin as there are many determinants of bone health including nutrition and physical activity. Sedentary life style and lack of calcium rich food and

popularity of fast food are main reasons of high prevalence of osteopenia in Pakistani females⁵. According to a population based study, millions of Pakistani population is suffering from osteopenia and osteoporosis. In an ultrasound based study on women aged 45-70 years, overall prevalence of osteopenia and osteoporosis was 34% and 16% respectively⁶. A study in KPK then Frontier Province showed prevalence of osteopenia and osteoporosis 42% and 29% respectively⁷. Holistically, this issue even reflects similar results, a study in Saudi Arabia on females of mean age of 35 years had lower BMD than US counterparts due to high parity and prolonged lactation⁸. A study in India reported that osteoporotic fractures in Indian occur 10-20 years earlier as compared to the Caucasians in the West⁹.

Osteopenia refers to bone mineral density (BMD) that is lower than normal peak bone mineral density but not low enough to be classified as osteoporosis. Osteopenia increases the risk of osteoporosis and osteoporotic fractures as the person advances to old age. Osteoporosis is a disease of skeletal system which is characterized by low bone density and deterioration of bone architect and bone tissue. This results in bone fragility and increased risk of bone fractures. 10 Osteoporosis is three times more common in women as compared to men¹¹. This high burden of disease, its delirious effects on health and lack of awareness among public and primary health care providers motivated us to study the prevalence of osteopenia and osteoporosis in our local population.

Measurement of bone mass during adult life provides information about bone accumulated from prenatal stage until maturity, also amount of bone loss during aging. Around 30 years of age an individual can achieve peak bone mass¹². 'Heredity' is considered to be the most important determinant of peak bone mass and other determinants include nutrition, physical activity, hormonal status, smoking and general health of an individual¹³. The imperative risk factors for osteoporosis are Asian race and female sex. Low dietary calcium intake, vitamin D deficiency,

multiparity and prolonged lactation are mainly accountable for this high risk in Asian women¹⁴. The main purpose of study was to determine the prevalence of osteopenia and osteoporosis in Pakistani females in 19 to 65years of age group and to compare the BMD in different age groups, by place of residence, socioeconomic status, education, parity and occupation.

METHODOLOGY

Study was initiated after approval of Ethical Review Committee. This observational cross sectional study was conducted by the Department of Community Medicine at University Medical & Dental College Faisalabad in a private sector university and a private clinic in People's colony, Faisalabad. Study included a total of 600 women. Convenient sampling was done. Study was conducted from January 2013 to September 2013 in six different sessions.

Procedure was explained to the participants and pre-test informed consent was taken from the participants. Females of age group 19-65 were included in the study while females above and below this age-group were excluded. Pregnant ladies and females with history of chronic use of steroids and rheumatoid arthritis were also excluded from the study. Data was collected by graduate and post-graduate doctors on pre-tested structured questionnaire. Age, marital status, education, socio-economic status (SES), occupation, parity and residence were variables of interest. Subject were divided into three sub age groups i.e. age less than 30 years, then between 30 to 45 years and more than 45 years. Dual Energy Absorptiometry (DEXA) is the Gold Standard for bone mineral density; however, Quantitative Ultrasound (QUS) is reliable and cost-effective alternative, which was used in this study and many other similar studies^{15,16,17}.

BMD was tested using calcaneal quantitative ultrasound (BMD SONOST 3000) machine(Fig-1). Quantitative Ultrasound of Calcaneus was used to calculate the BMD (Bone Mineral Density) of right heel. Machine converted the BMD values into T-Score. According to the recommendations of



Fig-1. BMD testing apparatus

World Health Organization (WHO), T-Score < -1 was considered normal; -1 to -2.5 was considered osteopenia; and T-Score > -2.5 was considered osteoporosis¹⁸ (Fig-2). SPSS version 16 for windows was used to analyze data. Frequencies and percentages were calculated for age-groups, occupation, residence, parity marital status education for osteopenia and osteoporosis. Chi Square test was used to compare various groups. Results were considered significant if p value was < 0.05.

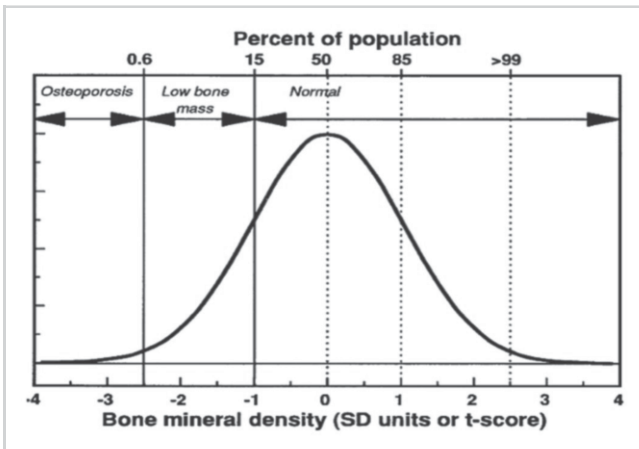


Fig-2. WHO criteria for bone mineral density

RESULTS

Study included a total of 600 women, 334 were <30 years, 189 were between 30-45years, and 77 were >45 years of age. Our results reflected that 72.9% of study participants were osteopenic while 24.7% and 2.4% were normal and osteoporosis

respectively. By place of residence no significant difference was observed, 48.18% of rural population and 47.14% of urban population was osteopenic and insignificant correlation was found ($p=0.438$). However, 46.77% and 10% of urban participants were normal and osteoporotic respectively. By occupation we divided our study participants into 3 groups; student, housewife and working women. Our study showed that 50.8% of students were osteopenic while 56.12% and 52.5% of housewife and working women were osteopenic respectively ($p < 0.001$) (Fig-3). Moreover, 41.33% of females belonging to high class were osteopenic compared to 50% of middle class. In addition to this, 51.04% females of lower class were osteopenic ($p < 0.001$). Education in relation to osteopenia and osteoporosis depicted that 42% of educated females were osteopenic while 31.33% of illiterate females were osteopenic ($p > 0.05$). 43.22% unmarried females and 69.88% of married females were osteopenic ($p < 0.001$).

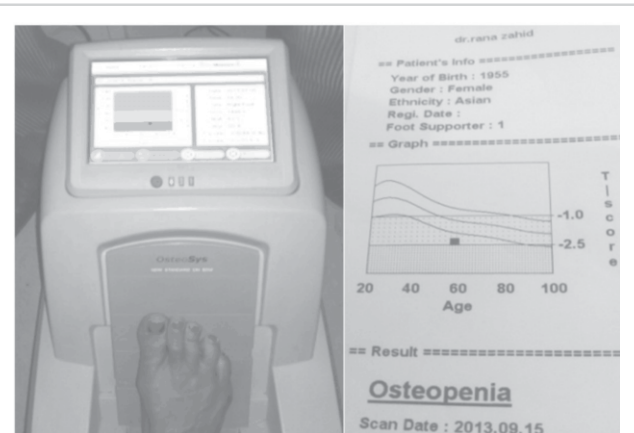


Fig-3. showing patient with osteopenia

DISCUSSION

In our study frequency of osteopenia and osteoporosis was high among all age groups. 77.77% females were osteopenic in age group of 31-45 years while 38.96% were osteopenic in age group >45 years($p<0.001$). A study conducted in Tehran is comparable with our results. It depicts that prevalence of osteopenia was 17.4% in females of age-group 20-29 years and was 8.3% in 30-39 years of females. In this study, they also compared mean BMD of their study population

Characteristics	Variable affecting bone mineral density (n=600)	Bone mineral density (BMD)			p-value
		Normal	Osteopenia	Osteoporosis	
		n(%)	n(%)	n(%)	
Age	Woman <30 years of age (n=334)	89(26.64)	238(71.25)	07(2.09)	<0.001
	Woman 31-45 years of age (n=189)	38(20.10)	147(77.77)	04(2.11)	
	Woman >45 years of age (n=77)	27(35.06)	30(38.96)	20(14)	
Parity	0 (n=55)	48(30.96)	98(63.22)	9(5.80)	<0.001
	1—4 (n=270)	115(42.59)	129(47.77)	26(9.62)	
	>4 (n=175)	35(20)	110(62.85)	30(17.14)	
Occupation	Working Woman (n=310)	15(37.5)	21(52.5)	4(10)	<0.001
	Non-working woman (n=40)	101(32.58)	174(56.12)	35(11.29)	
	Students (n=250)	119(47.6)	127(50.8)	4(1.6)	
Education	Literate (n=450)	251(55.77)	189(42)	10(2.22)	>0.05
	Illiterate (n=150)	89(59.33)	47(31.33)	14(9.33)	
SES	High (n=75)	39(52)	31(41.33)	5(6.66)	<0.001
	Middle (n=190)	91(47.89)	95(50)	4(2.10)	
	Lower (n=335)	135(40.29)	171(51.04)	29(8.65)	
Marital status	Married (n=445)	99(22.24)	311(69.88)	35(7.86)	<0.001
	Unmarried (n=155)	77(49.67)	69(43.22)	9(5.80)	
Residence	Urban (n=490)	210(46.77)	231(47.14)	49(10)	0.438
	Rural (n=110)	49(44.54)	53(48.18)	8(7.27)	

Table-I. Showing variables, their correlation with osteopenia and osteoporosis

PS: It is evident from above table that overall frequency of osteopenia in study participants was 72.9 percent. However, 2.4 percent were osteoporotic and 24.7 percent participants were normal

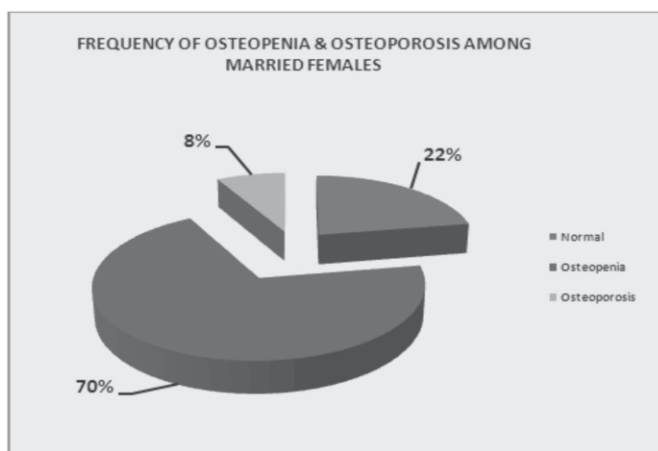


Fig-4 Chart showing frequency of osteopenia & osteoporosis among married females

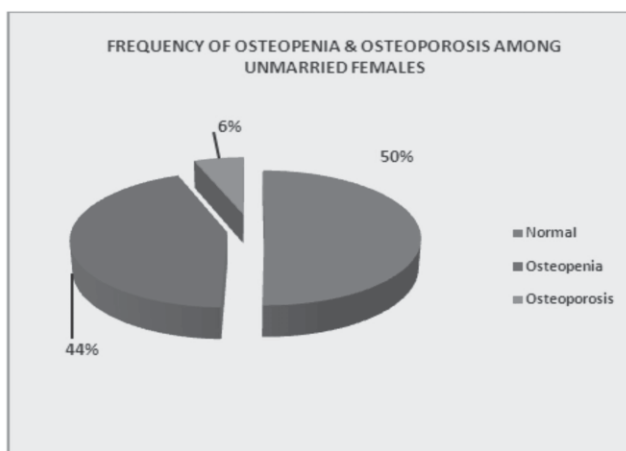


Fig-5 Chart showing frequency of osteopenia & osteoporosis among unmarried females

with that their American counterparts, they found that mean BMD of their study population was 5.6% lower than that of American women¹⁹. Asian women were 1.56 times greater risk of developing osteoporosis as compared to Caucasian women, as suggested by The National Osteoporosis Risk Assessment Study²⁰. Calcium and vitamin D are required for normal bone growth and mineralization. According to the Institute of Medicine, United States, the recommended dietary allowance (RDA) of calcium for females is 1000-1300mg with increasing requirement in pregnancy and lactation²¹. A high percentage of Pakistani population has deficiency of calcium and vitamin D²². A hospital-based study from Karachi reported that 92% of the out-patients had vitamin D deficiency with female-to-male ratio of 5:1. Majority had severe deficiency (62%)²³. The daily calcium intake of an adult Pakistani is between 400mg and 600mg, in contrast to the recommended daily intake of 1000-1200mg²⁴.

Our study showed that multiparous females specially having more than 4 children were 62.85% ($p < 0.001$) osteopenic as compared to females having 1-4 children or nulliparous women. This is similar to studies which suggest that multiparity is a risk factor for osteopenia and osteoporosis^{9,14,25,26}.

However, two studies showed that high parity was associated with increased BMD. One study was conducted in Lancaster, Pennsylvania on Old Order Amish (OOA) women. These women are known to have less hip fractures as compared to non-Amish Caucasian women. Furthermore, these women have some unique characteristics. They abstain from smoking, alcohol intake and are physically very active²⁷. Authors are of opinion that detrainment from these environmental factors which influence BMD, might have confounded results. Second study conducted on Swedish postmenopausal women aged 50-81 years in duration of 2 years. It was population-based case-control study. They studied the relationship of parity with risk of hip fracture and they found that parity was modestly associated with reduced hip fracture risk among women who had not used oral contraceptives previously²⁸. Another study

compared nutrient intake of an adult Pakistani, European and Africo-Caribbean community residing in Manchester City, Britain. The study revealed that Pakistani females were obese and the calcium intake of the Pakistani community was lower than other communities²⁹. Decreased calcium intake leads to demineralization and mobilization of calcium from bones which decrease bone mass and results in osteoporosis³⁰.

Bone mineral density of urban and rural population reflected that 47.14% of urban population and 48.18% of the rural population was osteopenic ($p = 0.43$). However, 10% of the urban population was osteoporotic in comparison to rural population which was only 7.27% osteoporotic. Study results clearly point that both urban and rural population are osteopenic and urban population is at increased risk of osteoporosis as compared to rural population due to lack of balanced diet. This is similar to another study conducted in Eastern Poland and found no statistically significant difference in mean values of BMD between urban and rural population. In contrast to that, a study, conducted in Indian population, showed that prevalence of disease was more common in rural population compared with urban population³².

We found that working women, students and house wives were osteopenic. 56.12% of house wives, 52.5% of working women and 50.8% of students were osteopenic ($p < 0.001$). This is similar to a study conducted in Poland which showed that BMD values of farmers in rural areas and that of nurses, teachers and retired workers in urban areas, were similar with no statistically significant difference²⁰. These findings stress upon the role of genetic predisposition to osteopenia/osteoporosis but also suggest that life-style factors are secondary to them. Jaleel et al in her study, with no statistically significant difference, found higher frequency of osteopenia and osteoporosis in non-working women as compared to working women and students. Study findings strongly endorsed the importance of physical activity and balanced diet rich in calcium for the prevention of osteopenia and

osteoporosis⁵. We found that 69.88% of married females and 43.22% of unmarried females were osteopenic ($p < 0.001$). The higher frequency of osteopenia and osteoporosis among married females may be attributed to age; poor dietary practices, early marriages, high parity, short birth interval and prolonged lactation⁸.

LIMITATIONS

Our study has some limitations. Firstly, it was a cross-sectional study which might have over or under estimated the prevalence of osteopenia. Further, we used quantitative ultrasound of calcaneus to calculate BMD. Another limitation of the study was that, sampling frame was limited to only one city and suburbs, because of which the results of this study cannot be generalized for whole Pakistani population.

CONCLUSIONS

In our study frequency of osteopenia and osteoporosis was significantly high in all age groups. Therefore there is a need for careful consideration in determining risk factors as well as future course of action on scientific grounds. There is need for large-scale population-based studies using DEXA scan or Quantitative Ultrasound (QUS) to assess the prevalence of osteopenia and osteoporosis in the community. Furthermore, people should be educated about the morbidity associated with osteopenia and osteoporosis, the need for increased intake of calcium, especially for females, may be advocated.

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CORRECTION

The amendment of the Professional Vol: 21, No.02 (Prof-2367) on page 316 is as under;

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CORRECT

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