ORIGINAL ARTICLE

Decreased bone mineral density and associated risk factors in hospital visiting people of Islamabad

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Abstract

Objective: Besides aging there are multiple factors involved in decreasing Bone Mineral Density. Knowing the burden of the diseaseand its related factors in our population can help better treat this. Therefore, our objective was to identify subjects with low Bone Mineral Density (BMD) and its risk factors in hospital visiting people in Islamabad

Material & Methods: Descriptive cross sectional study was conducted atRawal Institute of Health Sciences, Islamabad in 3rd week of June, 2014. Total 300 persons including patients, attendants and hospital staff were selected.Calcaneus BMD was measured usingultrasound bone densitometer. T-score was calculated.Specific questionnaire form was filled to identify risk factors. Prevalence and prevalence ratio was calculated.

Results: Out of 300 study sample, 178 (59.3%) are females. Mean age of the study population is 37.34 (SD=12.93). Overall, prevalence of osteopaenia and osteoporosis in the study population is 107 (35.7%) and 5 (1.7%) respectively. Prevalence of osteopaenia is seen more in elderly subjects, females, people with low Body Mass Index (BMI), people who are usually not exposed to sunlight and who are mostly bound to houses.

Conclusion: Decreased BMD is associated with increasing age, female gender, low BMI, little exposure to sun light and being restrained to homes. It is not affected by daily milk intake, parity of females, cola drinking and smoking in our part of the world.

Keywords: Bone mineral density, Osteopaenia, Osteoporosis, Risk factors. (JPMA 64: S-11 (Suppl. 2); 2014)

Introduction

If 20th century was the century of population growth, then 21st century is that of ageing population. With ageing, Bone Mineral Density (BMD) decreases tremendously to the extent that 97% of women at the age of 75-84 years suffer osteoporosis and 55% at the age of 45-54 are osteopaeniac.[1] Decreased bone mineral density is the known cause of bone aches and predisposes bones to low energy fractures. Osteoporosis has become a world-wide health as well as economic problem. In Pakistan, 40 million people both male and females suffer from osteopaenia. This prevalence is expected to raise osteoporotic patients to 11.3 million in 2020.[2]

Vast numbers of factors affectthe BMD. These include genetic, biologic, smoking habits, sun exposure, dietary habits, serum calcium and vitamin D 3 levels, hormonal changes, pregnancy, physical activity, space travel etc. Ogur et al. concluded that carbonated drinks intake is significantly associated with decreased bone mineral density.[3] Sowerset al. concluded that fetal demand in pregnancy has no negative effect on bone mineral density of mother.[4] Cauley and associates while studying factors affecting BMD in older men, found that African American had better BMD as compared to Caucasians. Hip BMD declined and lumbar spine BMD increased with increasing age. Use of antidepressants, coffee, family history of osteoporotic fractures, history of chronic lung disease, prostate cancer and kidney stones were also associated with low BMD. However, alcohol use, osteoarthritis, physical activity, grip strength, dietary calcium intake were related with increased BMD. Interestingly,smoking, caffeine, thiazide diuretics had no negative effect.[5]

Okubo et al. found that dietary pattern with high intakes of fish, fruit, and vegetables and low intakes of meat and processed meat may have a beneficial effect on BMD in premenopausal Japanese farm women.[6] Allali et al. suggested that multi parity, history of familial osteoporotic fractures and observing veilwas associated with increased risk of osteoporosis in post-menopausal women of Morocco.[7] Kempton et al. noted that risk factors for low BMD in below 50 years haemophiliac males were haemophiliac arthropathy, low or normal BMI and HIV.[8] In Saudi women, it was found that low BMD is associated with low milk intake, previous history of fracture and low education level.[9]

Knowing the normal bone mineral density of our community is very important in the sense that BMD values change region wise. As proved by Ranu et al. that

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BMD values differ significantly for Indian and Western populations for the same age groups.[10]

Material and Methods

Three hundred people were enrolled for a cross sectional study during 3rd week of June, 2014, from Out Patients Departments of Rawal Institute of Health Sciences, Islamabad. Informed consent was taken. Study sample included patients, attendants and hospital staff. Sample size was calculated by using WHO sample size calculator with confidence level 95%, absolute precision 0.05 and P=95%. All of these were enquired about their bio-data, BMI, daily milk intake, daily sun exposure, frequent carbonated drink use, smoking habit, parity and in case of females, if they were bound to homes most of the times or not. Their calcaneus bone mineral density was measured by using Sonost 3000-Ultrasound Bone Densitometer. T score was calculated and categorized into normal, osteopaeniac and osteoporotic according to WHO guidelines.[11] By using SPSS version 20, frequencies and percentages were calculated for categorical variables and mean and standard deviations were calculated for numerical data. Prevalence and prevalence ratio was calculated to know correlation between disease and risk factors.

Results

Out of 300 study sample, 178 (59.3%) are females and 122 (40.7) males. Mean age of the study population is 37.34 (SD=12.93). Mean Body Mass Index is 25.91 (SD=5.31).Overall, prevalence of osteopaenia and osteoporosis in the study population is 107 (35.7%) and 5 (1.7%) respectively (Figure-1). Average T score of the osteopaeniac group is -1.41 (SD; 0.354). Prevalence of osteopaenia is seen more in people who are more than 50 years of age, females, people with low BMI, people who are usually not exposed to sunlight and who are mostly

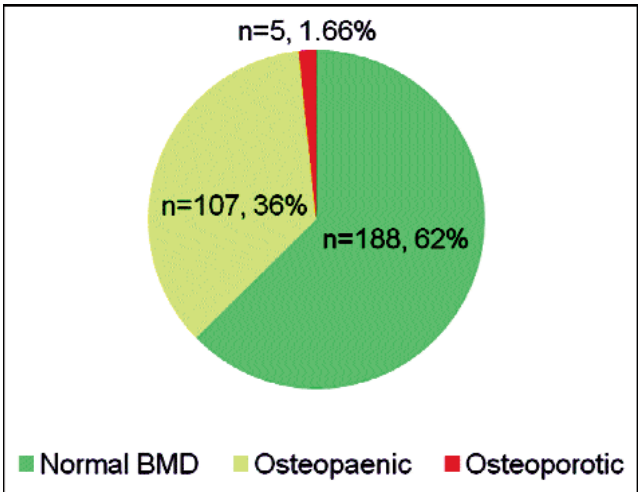

Figure: Prevalence of Osteopaenia and Osteoporosis (n=300).

Table: Prevalence of osteopaenia and its associations.

Groups		Normal BMD (n=188)	Osteopaenic (n=107)	Osteoporotic (n=5)	Total (n=300)	Prevalence of osteopaenia	Prevalence Ratio	P-value
Age	< 30 years	70	32	1	103	31.07%		
	30-50 years	98	47	1	146	32.19%		
	>50 years	20	28	3	51	54.90%	1.78	< 0.05
Gender	Male	86	36	0	122	29.51%		
	Female	102	71	5	178	39.89%	1.35	< 0.05
Body Mass Index	Under weight	10	8	1	19	42.10%	1.43	< 0.05
	Normal weight	67	51	3	121	42.15%		
	Over weight	63	28	1	92	30.43%		
	Obese	48	20	0	68	29.41%		
Daily milk intake	Milk taker	66	38	3	107	35.51%		
	Not taker	122	69	2	193	35.75%	1.01	> 0.05
Parity of females	Three or less	62	44	4	110	40%		
	More than 3	40	27	1	68	39.70%	0.99	> 0.05
	Total	102	71	5	178			
Routine exposure to sunlight	Yes	76	31	0	107	28.97%		
	No	112	76	5	193	39.38%	1.36	< 0.05
Routine Cola drinking	Yes	110	58	0	168	32.52%		
	No	78	49	5	132	37.12%	1.07	> 0.05
Living habits	House bound	73	56	3	132	42.42%	1.40	< 0.05
	Not bound	115	51	2	168	36.36%		
Smoking habit	Smoker	24	10	0	34	29.41%		
	Non smoker	164	97	5	266	36.47%	1.24	> 0.05

bound to houses (Table). Prevalence of osteopaenia is less common in younger age groups, males, obese, those who are exposed to sunlight daily, those who are not bound to houses and those who are smoker. No statistical significant difference was seen in women who carry three children or less as compared to women who have more than 3 children. Likewise, no statistical significant difference was noticed in over weight and obese people, in daily milk drinker and non-milk drinkers, between cola drinkers and non-cola drinkers. Osteoporosis was seen in only 1.66 % study population (n=5). All of these were females, routinely not exposed to sun light, not in the habit of taking cola drinks and non-smokers.

Discussion

Our study population mean age is 37.34 (SD=12.93) and 36 % of these suffer from osteoporosis. This proves that burden of this diseases is tremendous even at younger age group. Likewise, this is also our finding from this study that people of higher ages are affected more (54.90% prevalence of osteopaenia in > 50 years age group people versus 31.07% in < 30 years age group). Liu et al. also suggested that with increasing age, bone mineral density decreases.[12]

Overall, prevalence of osteopaenia and osteoporosis was 64.1% and 18.6% in a study done by Nagi et al. which showed much higher rates as compared to our results (36% and 1.66% respectively).[13] It was possibly because of bigger sample size and different geographical region. But when only more than 50 years people are correlated, our results are comparable. Manystudies suggest that increasing the BMI decreases the BMD.[14,15] But the converse was true in our study as well as by Erlandson et al. They proved that lesser the lean body mass lesser the BMD.[16]

Increased prevalence of females osteopaeniac patient is an established fact. Women start with lower bone density than their male peers and they lose bone mass more quickly as they age, which leads to osteoporosis in some women. This is consistent with not only international studies but also national ones.[17] Many studies suggested an inverse relationship between daily intake of milk and occurrence of osteoporosis.[18] We could not find any difference regarding prevalence of osteopaenia in people who take milk on daily basis than those who do not. Probably study sample was short and questionnaire did not elaborate the amount of milk daily taken.

This is a common understanding that number of children or parity of women affect the bone mineral density negatively. This concept was refuted in our study as the prevalence ratio for women with 3 or less children was statistically insignificant than those with more than 3 kids. Heidariet al. concluded that Parity> 7 is linked with decreased BMD in younger postmenopausal women but it provides osteo-protective effect against age-related bone loss, which counteracts the early negative effect. Therefore, parity in aggregate is not a risk factor for postmenopausal osteoporosis.[19]

In our study, people with no routine sun exposure demonstrated more prevalence of osteopaenia (PR 1.36; P value < 0.05). One Korean clinical trial proved the worth of sunlight for vitamin D blood levels but disproved its role in improving BMD.[20] But the converse was true in another study where authors proved that less sun exposure is strongly linked with low vitamin D levels as well as low bone mineral density.[21] Cola drinking habit had no detrimental effects on BMD as no statistical significant difference was noted in prevalence of cola drinker and non-drinkers. One study in Mexico found negative correlation between cola drinking and prevalence of osteopaenia and osteoporosis. Reason for the difference in results could be the amount of cola used in two socio-economically different countries.[22]

Living inside the houses most of the time is strongly linked with vitamin D deficiency and decreased BMD. Here our results are consistent with the world outside.[20] Opposite was true for smokers in our study. They were less prone to get osteopaenia. In fact, all smokers were males in our study and they were less osteopaeniac because of other reasons. But Emaus et al. suggested that avoiding smoking can significantly increase the BMD.[23]

Conclusion

We can hypothesize from the study above that decreased BMD is associated with increasing age, female gender, low BMI, little exposure to sun light and being restrained to homes. It is not affected by daily milk intake, parity of females, cola drinking and smoking in our part of the world. Although, further studies with broad base data should be conducted to elaborate these associations, yet our population should be particularly targeted through community and health education programsto maintain their healthy life style and optimal BMD.

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