ORIGINAL ARTICLE

Bone mineral density in patients with chronic backache

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Abstract

Objective: To evaluate the association of bone mass density with chronic backache.

Methods: The case-control observational study was conducted at Bone Mass Density Assessment Unit, Liaquat University of Medical & Health Sciences Jamshoro from January 2011 to December 2013. Adult patients of either gender having chronic backache were studied alongside subjects without backache who served as the control group. Bone mass density of all patients was measured at the lumbar spine (L1-L4) and hip using a dual-energy X-ray absorptiometry scan. Association of chronic backache with age, gender, body mass index and bone mass density was assessed by performing multiple regression analysis.

Results: Of the 482 subjects in the study, 162(33.6%) were cases and 320(66.3%) were the controls. Overall age range was 20-78 years with a mean of 48.5±12.36. The mean age of the controls was 38.87±13.55, while for the cases it was 36.26±9.41. Bone mass density in the cases was significantly low compared to the controls (p-0.028).

Conclusion: Severity of chronic backache could be predicted by low bone mass density.

Keywords: Chronic backache, Bone mass density. (JPMA 64: S-119 (Suppl. 2); 2014)

Introduction

Chronic backache (CBA) in itself is not considered a disease yet it is a health problem that causes significant morbidity in terms of work-loss. Patients seek repeated medical advice, which results in increased costs paid by patients in our country where system of medical and health insurance is still in its infancy.

The point and life prevalence of CBA is variedly reported across the world. This is obvious from studies carried out in Hong Kong, Denmark, Australia, Germany, England and Canada where lifetime prevalence of CBA ranges between 40% and 86%.[1-8] The economic and social burden of CBA can easily be estimated by such high prevalence. National data regarding cost of management is not available, but a study has shown that annual cost to manage backache in the United States exceeds $100 billion.[9] The results of a latest systemic review is more alarming which showed that global prevalence of CBA is still rising[10] with consequent increase in management cost. Although CBA is not a cause of unemployment, but in a recent report from UK it is shown that 37% of unemployed considered backache as the cause of their unemployment,[11] which makes the scenario gloomier.

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Spinal osteoporosis results in reduced bone mass density (BMD) of the spinal vertebrae, which is considered a major factor in provocation of backache and its recurrence. Various studies done to find relationship between reduced bone density and backache has concluded different results. Some[12-14] showed that reduced BMD was not associated with backache. The results of those studies that found association between BMD and backache are also conflicting. Some reported that in backache, BMD[15,16] was higher, while others showed that it was reduced.[17,18] We therefore designed this study to investigate the association between BMD and CBA in the local setting.

Subjects and Methods

The case-control observational study was conducted at Bone Mass Density Assessment Unit, Liaquat University of Medical & Health Sciences Jmashoro from January 2011 to December 2013. It comprised adult patients having CBA for more than 12 weeks. Healthy subjects without CBA were employed to act as the control group. The patients were adults subjects of either gender having CBA; without any endocrine (parathyroid, thyroid), skeletal, metabolic disorders (rheumatoid arthritis) and vitamin D deficiency. Informed consent was obtained from all of them. Those taking steroids, had radiotherapy done for any reasons were excluded.

For the purpose of this study, CBA was classified according to the severity as: No pain (Control Group); CBA, not interfering with daily activities; CBA, interfering with daily activities; CBA, cannot perform daily activities for 3

days/week; CBA, cannot perform daily activities for 3 days/week.

BMD of all the subjects was measured at lumbar spine L1-L4 and total hip using a dual-energy X-ray absorptiometry (DEXA) from posterio-anterior projections. Demographic variables recorded included age, gender, occupation and vitamin D level for each patient, body weight measured in kg to the nearest 0.2, height in cm and body mass index (BMI) was calculated by dividing weight (kg) from height in meter squared (m^2). To categorise patients as normal, overweight and obese, cut off points suggested by the World Health Organisation (WHO) were used as: Normal weight: BMI <24.9kg/m^2; Overweight: BMI >25 to <29.9kg/m^2; and Obesity: BMI >30kg/m^2.

For statistical analysis, we used MedCalc version 12.5.0.0. Demographical variables were presented as mean± standard deviation or as frequencies and percentages percentage whichever was appropriate. Student's t-test was used to assess the statistical significance of difference between the subjects with CBA and without CBA. Association between CBA, age, gender, BMI and BMD was assessed by performing multiple regression analysis. P<0.05 was considered statistically significant.

Results

Of the 482 patients in the study, 162(33.6%) had CBA, while 320(66.3%) were the controls. Overall age range was 20-78 years with a mean of 48.5±12.36 years. Within the patients group, 92 (56.7%) were female and 70(43.2%) were male. Among the controls, there were 172(53.75%) were male and 148(46.25%) were female. The mean age of the controls was 38.87±13.55 years, while it was 36.26±9.41 years among the patients. The comparison of height, weight, BMI, serum vitamin D level and BMD was also done between the two groups. Those with CBA were of short stature (p=0.0001), and heavier (p<0.0001) compared to the controls. BMD was significantly low (p-0.0287) compared to controls (Table-1).

Table-1: Group Comparison.

Variable (Mean ± SD)	Without CBA (n= 320)	With CBA (n= 162)	P-value*
Age (years)	38.8719±13.55	36.2625±9.41	0.0286
Height (cm)	170.03±9.28	165.95±5.68	0.0001
Weight (Kg)	74.2±13.4	77.6±14.2	0.01
BMI	25.5025±2.9445	26.8765±2.6825	< 0.0001
Serum Vit D (ng/ml)	34.58±8.96	32.80±10.78	0.055
BMD Spine (gram/cm^2)	0.98±0.18	0.93±0.32	0.0287

* Student t test.
CBA: Chronic Backache.
BMI: Body mass index.
SD: Standard deviation.

The anthropometric data of subjects with CBA was further analysed by dividing them in 4 groups according to the age and gender. There were 77(47.53%) patients in the 18-35 years age group. There was female preponderance as 43 (55.84%) of the 77 were females and 34(44.15%) were males. The trend was true of all the remaining three age

Table-2: Age and Gender Characteristic.

Age Groups	18-35		36-50		51-65		>65	
CBA	Male (n= 34)	Female (n=43)	Male (n=21)	Female (n=28)	Male (n= 13)	Female (n= 15)	Male (n=02)	Female (n= 06)
Age	22.15	27.3	46.80	38.48	56.22	61.90	66.67	68.24
Height	169.4	158.6	178.4	165.8	174.8	168.6	178.4	168.7
Weight	68.4	65.6	74.8	69.6	73.8	68.6	76.2	71.4
BMI	23.4	25.2	24.2	28.2	25.6	26.2	25.8	26.8
BMD	0.978	0.857	0.953	0.878	0.927	0.857	0.927	0.837

CBA: Chronic Backache
BMI: Body mass index*
BMD: Bone mass density

Table-3: BMD & CBA Severity.

Age Groups	18-35		36-50		51-65		>65	
CBA	Male (n= 34)	Female (n=43)	Male (n=21)	Female (n=28)	Male (n= 13)	Female (n= 15)	Male (n=02)	Female (n= 06)
Grade II	0.975	0.851	0.959	0.817	0.934	0.786	0.908	0.766
Grade III	0.968	0.847	0.943	0.868	0.917	0.847	0.907	0.827
Grade IV	0.955	0.866	0.928	0.855	0.910	0.818	0.901	0.780
Grade V	0.925	0.839	0.898	0.836	0.884	0.799	0.886	0.768

Table-4: Linear Regression.

Predictor Variable	t-statistic	P-value
Gender	-0.276	0.783
Age	-1.243	0.216
BMI	-0.798	0.426
BMD (Male)	-2.336	0.021
BMD (Female	-6.113	0.0001

groups as well (Table-2).

The data of the patients was further analysed with respect to the severity of the CBA. Although there was no gross reduction of BMD to the level of osteoporosis, but decreased BMD was noticed with increasing severity of CBA (Table-3).

Simple linear regression was performed to identify the variable that may predict the severity of CBA. CBA was entered as the dependent variable, while age, gender, BMI and BMD were entered as predictor variables. BMD of males and females was considered separately. The severity of CBA could be predicted by reduction in BMD as the level of significance was very high in female patients compared to the male subjects (p=0.0001) (Table-4).

Discussion

The results showed that the severity of CBA was associated with reduction in BMD, independent of age, gender and BMI of the subjects. This is in contrast to the finding of Snider et al,[19] which showed that patients having backache had higher values of lumber BMD compared to those who did not have backache. They studied only 61 subjects and 16 had backache. Almost similar findings, with a very large sample size of female subjects, were reported by Manabe et al.[20] However, results of this study are identical to the study conducted by Osama Al-Saeed et al[21] and Andrew M Brigss,[22] and concluded that backache had a negative correlation with BMD measures at lumber region. This variability of results may be attributed to the incomparable gender and age groups, inconsistent classification of backache, different inclusion and exclusion criteria and study designs. The gender preponderance in this study with CBA was in favour of female (n=92) compared to male (n=70). Among the 92 female, 46% in reproductive age (≤35)) were affected by CBA. The backache is a common complaint during pregnancy as it is complained by 20-60% of pregnant women[23] with persistence of backache in 81% for 18 months after delivery,[24] with overall incidence of 21% up to 24 months after delivery.[23] The causes are multifactorial, but it has been shown that backache during pregnancy correlates with fall in BMD at lumber region.[24] We excluded all pregnant females, but most females were married and had history of childbirth in the recent past, a fact which explained highly significant correlation of the severity of CBA with reduced BMD. The results of this study showed, though weaker when compared to female, the association of CBA severity with BMD in male subjects as well; a finding which is in partial agreement with that of Hoozemans MJ[25] who showed that male subjects having reduced BMD at the age of 36 were likely to report with backache at the age of 42 years. We found osteopenia in male subjects with CBA even at age as low as 22 years. This indicates that some unknown factors contribute to the development of osteopenia that may reflect clinically as CBA.

In terms of limitations, we stratified only backache according to its severity, while other demographic data like lack of exercise, job demanding prolonged sitting, sitting posture, smoking and other environmental factors thought to provoke or contribute to the initiation/continuation of CBA were not considered.

Conclusion

Although there was no gross reduction of BMD to the level of osteoporosis in subjects with CBA, but a decreased BMD was noticed with increasing severity of CBA. CBA severity could be predicted by BMD reduction. The significance of association was very high in female patients compared to the male subjects.

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