Indian Journal of Basic and Applied Medical Research; June 2019: Vol.-8, Issue- 3, P. 52 -56

Original article:

Correlation of bone mineral density with severity of pain in patients of low back ache

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Abstract

Introduction-Low back ache is a common complaint amongst the middle aged and elderly and is an important public health issue. Though poor bone health is associated with several musculoskeletal disorders, a causal relationship between low Bone Mineral Density (BMD) and chronic low back ache (CLBA) is not well established.

Aim- The present study was conducted to evaluate the impact of bone health on chronic idiopathic low back ache.

Materials and Methods- This prospective observational study was done on 50 patients of idiopathic CLBA seen at Northern Railway Central Hospital between January to December 2018. All patients were evaluated for their pain by Visual Analogue Scale (VAS) score and for their BMD by Dexa-scan. The highest score amongst all episodes of pain in the last 3 months and the lowest T-score amongst all sites were chosen for evaluation and the data obtained was statistically evaluated.

Observation and Results- CLBA was significantly more in females (35 out of 50). The average age was 55.65 with a standard deviation (SD) of 10.09 and a range from 29 to 71 years. However, males were significantly older than females. The severity of backache ranged from 4 to 8 on VAS with females having significantly more pain than males. . The T-scores ranged from -0.5 to -2.9 with males having significantly higher levels than females. Patients with lower t-scores had more pain with the co-efficient of correlation being 0.51. Older patients had significantly lower t-scores and higher severity of pain.

Conclusion Patients with lower T-scores are more prone to develop chronic low back ache and that too of higher intensity. Female sex and increased age are risk factors for poor bone health.

Key Words- Bone Mineral Density , chronic low back ache, Osteoporosis, T-score, Visual Analogue Scale

Introduction

Low back ache (LBA) is one of the most frequently encountered complaints especially amongst the middle-aged and the elderly [1]. The lifetime prevalence of LBA is around 80% [2, 3]. It is an important public health issue as its associated cost for the society are high and are steadily increasing [4]. In most cases LBA is benign and most people regain functional capacity, [5]. In 10-20% individuals LBA persists for longer than 3 months either as continuous or episodic pain to be labelled as chronic LBA [6].

Though a large number of epidemiological surveys have been done on the prevalence of LBA and bone mineral density (BMD) the relationship between the two has not been well documented. Several studies have demonstrated a positive association between vertebral deformity and LBA in the elderly. However, a relationship between BMD and LBA has not been clear, and the authors of several studies have even concluded that they were unable to find any evidence for such a relationship. Others have found BMD to be higher or lower in individuals suffering from LBA than in controls. [7, 8 & 9].

The present study was conducted to evaluate the impact of bone health on chronic idiopathic low back ache.

Materials and methods

This was a prospective observational study conducted at Northern Railway Central hospital between January to December 2018. The subject population consisted of all patients with idiopathic chronic low backache, which was defined as persistence of continuous or episodic low back pain persisting over 3 months or more without obvious traumatic, metabolic or inflammatory causes. Patients with obvious trauma, deformity or inflammatory conditions of the spine were excluded from the study. A total of 50 consecutive patients from both sexes and all age-groups who fulfilled the inclusion criterion were included in the study. All patients underwent a careful and detailed clinical evaluation with specific reference to pain scoring. The visual analogue scale was used to record pain and the highest score amongst all episodes of pain in the last 3 months was chosen for evaluation. Patients with a score of 4 or more were included in the study. All patients underwent X-ray of the spine AP and Lateral views and a Dexa scan to evaluate bone mineral density. Any other investigations like MRI, RA factor, CRP etc., were guided by the results obtained. All scans were reviewed by the same radiologist. The Dexa scan was performed on – GE lunar full fan beam whole body Dexa system. The T-scores were calculated at the hip and spine and the lowest score amongst them was taken for evaluation. T scores of upto -1 were taken as normal, between -1 to -2.5 were labelled as osteopaenia and below =2.5 were diagnosed as osteoporosis. Appropriate statistical tests were applied to ascertain the correlation and significance of the parameters evaluated.

Observation and results

Out of the 50 cases enrolled in the study 35 were females. This female preponderance amongst patients of idiopathic low backache was statistically significant. The average age was 55.65 with a standard deviation (SD) of 10.09 and a range from 29 to 71 years. However, males in the study had significantly higher age than females (Table 1). The severity of backache ranged from 4 to 8 on VAS with females having significantly more pain than males. (Table 1). The T-scores ranged from -0.5 to -2.9 with males having significantly higher levels than females. (Table 1). Patients with lower t-scores had more pain with the co-efficient of correlation being 0.51. Patients with age more than 60 had significantly lower t-scores and higher severity of pain than patients younger than 60 years (Table 2).

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	Male	Female	Total	P-value
Number	15	35	50	
Av Age	63.8	52.31	55.65	p<0.01
SD (age)	5.35	9.6	10.09	
Range (age)	53 to 71	29 to 71	29 to 71	
mean VAS	4.53	5.31	5.08	p<0.05
SD (VAS)	0.92	1.53	1.41	
range (VAS)	4 to 6	4 to 8	4 to 8	
T-score mean	-1.47	-1.7	-1.63	p<0.01
SD (T)	0.61	0.63	0.62	
Range (T)	-0.5 to -2.6	-0.5 to -2.9	-0.5 to -2.9	

Table-1 Relation of Severity of pain and Bone health with Sex

	Age < 60 years	Age > 60 years	P-value
mean VAS	4.9	5.37	p<0.05
SD (VAS)	1.25	1.64	
range (VAS)	4 to 8	4 to 8	
T-score mean	-1.47	-1.9	p<0.01
SD (T)	0.52	0.69	
Range (T)	-0.5 to -2.6	-0.6 to -2.6	

Table-2 Relation of Severity of pain and Bone health with Age

Discussion

Osteoporosis is a condition of diminishing bone content and increasing damage to the bone architecture [10]. It affects more than 75 million people in Europe, Japan and the USA, and causes more than 2.3 million fractures annually in Europe and the USA alone. The lifetime risk for which is approximately 40%. Osteoporosis also causes back pain and loss of height It also causes people to become bedridden with secondary complications that may be

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life threatening. Its prevention is therefore essential for maintaining health and quality of life and has serious implication on social and financial burden in a community One method of evaluating bone health is Dexa-scan which measures bone mineral density. It reports results as T-score and Z-score. The T-score is the relevant measure when screening for osteoporosis. It is the bone mineral density (BMD) at the site when compared to the **young normal reference mean**. It is a comparison of a patient's BMD to that of a healthy 30-year-old. The US standard is to use data for a 30-year-old of the same sex and ethnicity, but the WHO recommends using data for a 30-year-old white female for everyone. The criteria of the World Health Organization are: [11]

- Normal is a T-score of −1.0 or higher
- Osteopenia is defined as between −1.0 and −2.5
- Osteoporosis is defined as −2.5 or lower, meaning a bone density that is two and a half standard deviations below the mean of a 30-year-old man/woman.

The Z-score is the comparison to the age-matched normal and is usually used in cases of severe osteoporosis. This is the number of standard deviations a patient's BMD differs from the average BMD of their age, sex, and ethnicity. This value is used in premenopausal women, men under the age of 50, and in children. It is most useful when the score is less than 2 standard deviations below this normal.

A relationship between poor bone health and low back ache is well established in inflammatory and degenerative conditions of the spine. The causative trigger is usually a fracture or deformity [12-15]. However, the same causal relationship is not well explored between bone health and CLBA

In their study, Kuroda et al. postmenopausal women with CLBA had significantly lower BMD values. [9] In a similar population, Park et al. found that women with low BMD values had higher pain scores and longer hospital stays than those with normal BMD values [16].

In our study also we found that lower BMD tended to be associated with increased severity of pain, more so in females and the elderly.

Conclusion

Patients with lower T-scores, i.e., poorer bone health are more prone to develop chronic low back ache and that too of higher intensity. Female sex and increased age are risk factors for poor bone health.

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