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Original Research Article

Anatomical Changes of Thoracic Vertebrae in Asymptomatic Adults: A Ct Based Study

Anjali Rai[1], Arvinder Pal Singh Batra[2], Shalini Choudhary[3], Chiranjeev Gathwal[4]

[1]PG-Student, Department of Anatomy, BPS GMC Khanpur Kalan, Sonipat, Haryana, India.

[2]Professor and HOD, Department of Anatomy, BPS GMC Khanpur Kalan, Sonipat, Haryana, India.

[3]Professor, Department of Anatomy, BPS GMC Khanpur Kalan, Sonipat, Haryana, India.

[4]Associate Professor and HOD, Department of Radio Diagnosis, BPS GMC Khanpur Kalan, Sonipat, Haryana, India

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Corresponding Author: Dr. Arvinder Pal Singh Batra
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Abstract

Background: The knowledge and occurrence of osteophytes in thoracic spine in human population is one of concern topics for anatomists, clinicians, anthropologists, and radiologist. These studies gave idea about normal and pathological changes in thoracic spine.

Aim: The aim of the present study is to investigate frequency and severity of osteophytes and its correlation with age and BMI in thoracic vertebrae in adults.

Study design & Setting: Cross sectional study was done in premises of department of Anatomy and department of Radiodiagnosis at BPS GMC (W), Khanpur Kalan, District Sonipat, Haryana.

Materials and Methods: A total of 100 adult patient aged between (18-60) year, undergoing CT scan for chest were examined over a period of one year.

Results: Statistically significant co-relation was found between age, BMI and osteophytes. The study showed that there are many degenerative changes seen in the thoracic spine at thoracic levels T4 to T10. The maximum number of osteophytes is seen with increase in age and BMI. The frequency of osteophytes increases by 60 percent and 80 percent in patients above the age of 40 and 60 years, respectively.

Conclusion: Thus, the present study showed that prevalence and severity of osteophytes increases with advancement of age and it was found that prevalence and severity of osteophytes increase regardless of the age in obese patient.

Keywords: Osteophytes, computed tomography, osteoarthritis, age, Body mass index.

Introduction

The Degenerative changes of the musculoskeletal system poses great challenges to both health care system and clinician. [1] Due to sedentary life style and lack of physical activity more people in our society are having locomotor disorders. This has increased the burden of musculoskeletal system disorder. [2] In future due to increase number of ageing people in western societies the expert care of locomotor disorder must be given more attention. Today we have numerous diagnostic imaging tools which provide precise information about the condition of bones, joints, cartilages and soft tissues. [3]

Several studies have been done which has shown relation between age, sex, BMI and spinal degeneration. [4] It was observed that in advance ages prevalence of bone deformity, disc narrowing, facet joint osteoarthritis and degenerative spondylitis increases. [5] There is a direct correlation between old age and osteophytes development.

Materials and Methods

Cross sectional study in premises of department of Anatomy and department of Radiodiagnosis at BPS GMC (W), Khanpur Kalan, District Sonipat, Haryana. The study was carried over one year period .100 adults between age group 18-60 years were included. The study was started after taking ethical clearance.

Inclusion Criteria

1-Adults between age group 18-60 years coming for routine chest CT scan radiodiagnosis department

BPS GMC (W), Khanpur Kalan, District Sonipat, Haryana.

2- Consent for research.

Exclusion Criteria

1-Incomplete questionnaire from

2-Detected tumor

3-Space occupying lesions of thoracic Spine

4-Rheumatic disease of Spine

5-History of spinal surgery

6-Significant congenital spinal deformity

7-Osteoporotic fracture of thoracic Spine

Sample size was 100.volunteers were requested to read patient information sheet and consent was taken thereafter. Subjects were examined for osteophytes with help of computed tomography. Measurement was done for frequency of osteophytes by grading system.

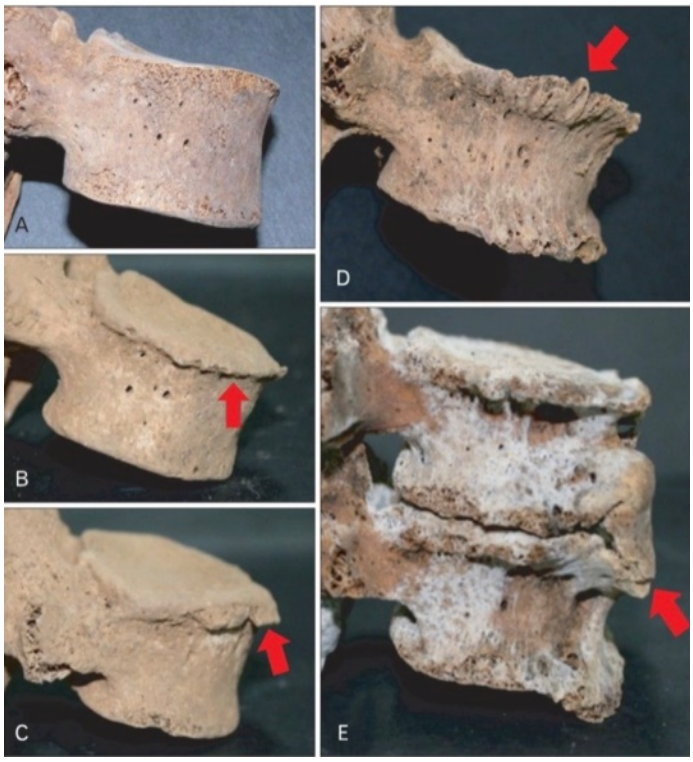

Figure 1. Shows grading of osteophytes

Nathan grading system

0- A. no osteophyte at all
1- B. only small isolated hyperostosis points appear.
2- C. osteophytes protrude horizontally from the vertebral bodies
3- D. the end of the osteophytes is curved to the intervertebral disc, often neighboring vertebrae,
4- E. real bony bridge between two vertebrae

Statistical Analysis

Descriptive statistics were used to present the characteristic data of patients (age, weight, height, and body mass index (BMI). To determine the association between age and osteophytes, as well as between BMI and osteophytes, Pearson correlation coefficient (p) was calculated, as this correlation is suitable to calculate both categorical and continuous data. The value of p and P were used to examine the value of degeneration in each segment.

Results

The sample comprised of 100 adults between age group (18-60) years. Table 1 shows the included patients of this study with (mean age 39.69+-12.316) participated with youngest participant was 18 years and oldest was 60 years old. Result of reliability test were as follows. As shown in table 2 correlation between BMI and bone degeneration. The corresponding p-value of the test statistic is less than 0.01.P value of less than 0.05 were consider significant. This represent that there is correlation between bone degeneration and BMI. The Pearson correlation between age and osteophytes is 0.311. Since the p-value is less than our chosen significance level 0.05. This represent that there is strong correlation between osteophytes and age as shown in table 3.

Table 1: study cohort

Male/Female; N (%)	46/54
Age;years,mean(SD)	39.69 (12.31)
Height;m,mean(SD)	1.65 (0.092)
Weight;kg,mean(SD)	60.18 (10.25)
BMI;kg/m^2,mean(SD)	22.26 (3.09)

Table 1. shows the demographic data of included participants.

Table 2: Correlation between BMI and degenerations(N=100)

	Segments of the thoracic spine											
	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	
Osteophytes ρ	0.072	0.175	0.154	0.030	0.125	0.112	0.160	0.066	0.102	0.234	0.131	0.05
P	0.477	0.081	0.125	0.766	0.214	0.286	0.112	0.515	0.312	0.019	0.195	0.72

Table 3: Correlation between age and degenerations(N=100)

	Segments of the thoracic spine											
	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	
Osteophytes ρ	0.069	0.251	0.421	0.295	0.303	0.273	0.403	0.388	0.299	0.366	0.228	0.04
P	0.495	0.012	0.000	0.003	0.001	0.006	0.000	0.000	0.002	0.00	0.022	0.18

Table 4: Frequency of the degenerations (N=100)

Segments of the thoracic spine												
Grade		1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12
Osteophytes	0	186	175	158	135	129	135	136	136	147	162	171
	1	6	7	13	22	24	16	12	13	13	13	9
	2	3	9	16	26	30	30	32	31	20	10	8
	3	5	7	9	10	6	9	14	14	11	9	4
	4	0	2	4	7	11	10	6	6	9	7	3

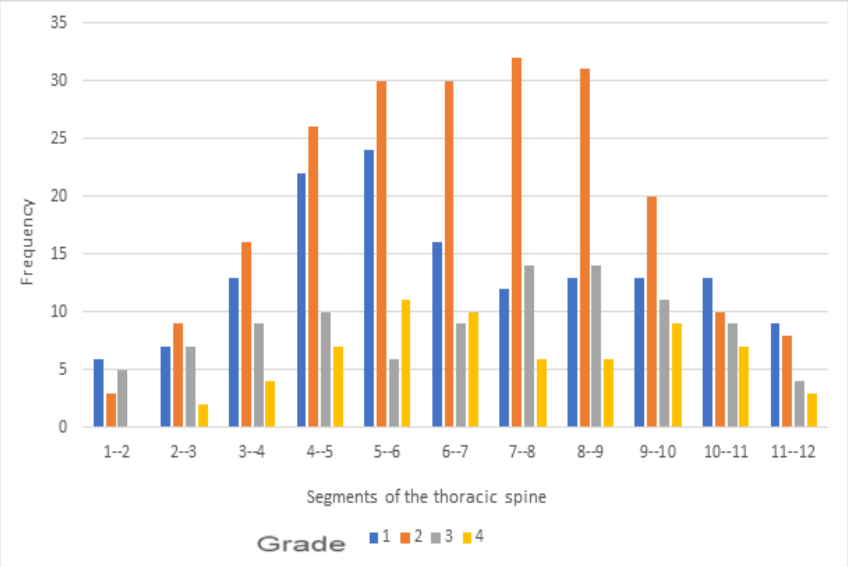

Figure 2. Frequency of osteophytes (N=100)

Discussion

This cross-sectional study using CT chest was used to confirm osteophytes in thoracic spine. Fig. 2 showed the prevalence and size of osteophytes increases with increase in age and most commonly seen in spinal segments T4-T10.Similar result were reported by O'Neill et al. (1999) and Nathan (1962) in his study on 400 cadaver. Previous studies done on osteophytes by Klaasen et al. (2011), and T.

Valasek et al. showed T9-T10 was the region most commonly affected by osteophytes. [7-11]

The development of osteophytes in thoracic region is also associated with clinical significance .one of study done by Cai, Rischmueller. Pile (2003) suggested that 9 and 10. Thoracic vertebrae could be associated with dysphagia. (1983) [12,13]

Consistent with previous reports and opinion, prevalence of osteophytes with BMI showed statistically significant association as shown in table 2. In sum present study showed patient can have extensive distribution of osteophytes at different thoracic level without any clinical symptoms. These results confirm that previous evidence which showed similar results in different parts of spine and whole body. [14,15]

Limitation of study

Nathan grading system was used for grading osteophytes which was done on cadavers. Present study has used this grading of osteophytes with help of CT scan of thoracic region. So, limitation of this study is that no accepted grading system for osteophytes grading of thoracic vertebrae with help of CT has been developed. [16,17]

Conclusion

Present study based on result and limitations showed a statistically significant co-relation of age and BMI with frequency and severity of osteophytes. This study showed that there are several degenerative bony anatomical changes in thoracic spine without clinical symptoms. With advance age and obese adult frequency and grades of osteophytes will be more. These are normal anatomical changes seen in asymptomatic healthy adults that should be considered by clinician while making diagnosis.

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