Volume 4, Issue 3, 2026

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

FREQUENCY OF FINDINGS IN CASE OF CERVICAL SPONDYLOSIS ON X-RAY

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DOI: https://doi.org/10.5281/zenodo.21295556

Keywords
Cervical vertebrae, Spondylosis, BMI, myeloradiculopathy, osteophytes

Article History
Received: 01 February 2026
Accepted: 17 March 2026
Published: 31 March 2026

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Abstract

Introduction:
Cervical spondylosis is a degenerative skeletal disorder that is becoming more prevalent all over the world with time. Poor neck posture puts excessive strain on the cervical spine which leads to significant morbidity. The disease presents on X-ray films in the form of various radiological patterns creating diagnostic difficulty among clinicians. Identifying the patterns prevalent in our society along with their age and sex distribution can help clinicians to diagnose cervical spondylosis early to start prompt treatment and decrease the morbidity associated with the disease.

Method:
It was a prospective cross-sectional study conducted at Surraya Azeem Waqf Teaching Hospital Chuburji, Lahore. X-rays of 252 patients diagnosed with cervical spondylosis on radiology during the duration of our study were included in the study. Age, Gender, Clinical history, and radiological findings on Anteroposterior or lateral cervical spine X-rays were documented. Data was analyzed using Med-CALC. The chi-square test was used to explore the p-value of significance for various radiological parameters among females and males.

Results:
Of these 252 patients, 48% patients had a moderate degree of cervical spondylosis, and 37.7% had straightening of the cervical spine. All the patients had anterior marginal osteophytes. The most frequently observed level of anterior marginal osteophytes was C5 (96.4%). The most frequently affected cervical intervertebral disc space was C5-C6 (81.7%). Bilateral cervical ribs were present in 1.5% of patients. The degree of cervical spondylosis showed a significant association with the age of patients ($p<0.001$) while there was no significant difference in frequency of cervical curvature abnormalities, anterior marginal osteophytes, presence of disc-space reduction, and degree of cervical spondylosis between males and females ($p>0.05$).

Conclusion:
Cervical curvature abnormality was equally prevalent in both genders suffering from cervical spondylosis but the severity of cervical spondylosis was more in elder patients. The most frequently involved vertebra in cervical spondylosis was C5 and the least affected vertebra was C3.

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1. INTRODUCTION

Cervical spondylosis is a skeletal disease occurring due to degeneration of the cervical spine in which a patient may present with a variety of symptoms like localized pain in the neck, cervical radiculopathy, cervical myelopathy, or cervical myeloradiculopathy [1][2]. The most common etiological factor for the disease is excessive cervical motion that leads to repetitive trauma to the cervical spine and cervical intervertebral disc leading to their early degeneration [3][4][5][6]. In this era of globalization, and rapid development of the economy, the world has undergone a deep transition from active physical activity to passive machine-based jobs[7][8][9]. Our lives have been centralized mostly around computers and Android phones [10][11]. Most people prefer to work on their laptops by becoming freelancers as the mode of earning provides them with the facility to work at home [12][13][14]. The recent epidemiological surveys on cervical spondylosis have shown increased morbidity of the disease which was quite rare in the past. A global survey in 2017 reported a neck pain prevalence of 3551.1 per 100000 people and an incidence of 806.6 per 100,000 population [15]. Many recent studies in the literature have projected the rising statistics of cervical spondylosis globally hence turning it into a hot topic to study as the morbidity associated with the disease has poor life outcomes [16][17][18][19].

Although the diagnosis of cervical spondylosis largely depends on the clinical history of the patient, the diagnosis is further confirmed by using various new imaging findings including X-rays, CT-scan, and MRIs [20][21]. Among all these novel radiological imaging techniques that provide deep insight into disease, X-ray is still considered the best initial imaging modality of choice worldwide as the mode of imaging is cheap, safe in terms of low radiation dose and short procedure timings hence doesn't create a sense of anxiety among patients [22][23].

The variation in radiological findings of X-rays in patients with cervical spondylosis makes the interpretation difficult. It has been seen in many studies that there is a disparity in diagnoses made by clinicians who correlate radiology with clinical symptoms and radiologists who report on the same film [24][25]. The aim of my study is therefore to highlight the basic radiological patterns of cervical spondylosis and compare their frequency of distribution in both males and females. Further, the results will identify whether certain radiological patterns are more prevalent in the older age group or not.

2. LITERATURE REVIEW

Xinghu Yu and Liangbi Xiang reported that the conventional evaluation of X-ray radiographs aiming at diagnosing cervical spondylosis (CS) often depends on clinical experiences, visual reading of radiography, and analysis of certain regions of interest (ROIs). These steps are not only time-consuming and subjective but also prone to error for inexperienced clinicians due to the low resolution of X-rays. This paper proposed an approach based on fuzzy calculation to classify CS. From the X-ray of CS manifestations, we extracted 10 effective ROIs to establish the X-ray symptom-disease table of CS. A fuzzy calculation model based on the table can be carried out to classify CS and improve the diagnosis accuracy Analysis of X-ray signs of cervical spondylosis between vertebral artery type and radiculopathy. The X-ray signs of both 60 patients with VCS and 60 patients with cervical spondylotic radiculopathy were collected from January 2011 to November 2012. There were 36 males and 84 females, aged from 25 to 65 years old with an average of (48.4 ± 12.3) years old. Cervical curvature, atlantooccipital joint angle, atlantoaxial joint angle, C2/C3 joint angle lower cervical instability condition, and segmental distribution were measured and recorded by X-rays. These data were analyzed and compared between the two groups after unblended. Combined with clinical manifestations, the X-ray imaging features of VCS were further analyzed [12].

Machino M. et.al. established the clinical cut-off values of the 10-s grip and release (G&R) and 10-s step quantitative tests for the diagnosis of cervical spondylotic myelopathy (CSM) and to elucidate the aging variation and gender difference of those values in a large cohort of healthy subjects.[13].

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ISSN: (e) 3007-1607 (p) 3007-1593

Cervical spine X-rays are done using different views i.e. AP, Oblique, and LAT to evaluate cervical spondylosis with accuracy. In their research they have shown the traditional diagnosis method of cervical spondylosis is based on X-ray reading and given some radiographic findings such as Plain radiographs of the cervical spine may show a loss of normal cervical curvature, possibly due to muscle spasm, degenerative changes of uncovertebral and facet joints, presence of osteophytes formation on cervical vertebrae, presence of disc space reduction in LAT view, presence of endplate sclerosis, presence and absence of cervical rib which is directly not related to cervical spondylosis but it also found on x-ray. [14-16].

3. MATERIAL AND METHOD

3.1. Ethical Approval

Approval of the study was acquired from the departmental Board of Studies of the Department of Radiological Sciences and Medical Imaging (DRSMI).

3.2. Study Design

Prospective cross-sectional study.

3.3. Sampling Technique

It was a convenient sampling technique in which all the cervical radiographs were included which were performed during the study duration.

3.4. Settings

The study was carried out in the Radiology Department of Surraya Azeem Waqf Teaching Hospital Chuburji, Lahore.

3.5. Duration

The study duration was 10 months from December 2019 to September 2020.

3.6. Sample Size and Detail

A total of 252 cervical radiographs of 131 females and 121 males were included in the study. The age range and mean of the patients were 27-92 years, and 54.4 years respectively.

4. RESULTS:

X-rays of 252 patients presenting at Surraya Azeem Waqf Teaching Hospital diagnosed with cervical spondylosis based on radiology were enrolled in our study. Of these 252 patients, there were 131 females and 121 males. The degree of cervical spondylosis of enrolled patients was graded by Kallgrens Criteria. Almost 9.5% of patients had an early degree, 23% had a marked degree, 19.4% had a mild degree and 48% of patients had a moderate degree of cervical spondylosis. The grading of severity of cervical spondylosis stratified by age is given in Figure 1. On detailed radiological review, 62.3% of patients had normal curvature of the cervical spine whereas 37.7% had straightening of the cervical spine. Anterior Marginal Osteophytes were present in all the patients enrolled in our study. About 5.6% of patients had one, 25% had two, and 48.8% had more than two anterior marginal osteophytes. Only 20% had anterior marginal osteophytes at all levels. The most frequently observed level of anterior marginal osteophytes was C5 (96.4%) followed by C6 (81.7%), C4 (76.6%), C3 (51.2%), C7 (41.3%) and C2 (23%). Almost 46% of the enrolled patients experienced disc space reduction at more than two levels of cervical vertebrae. The most frequently affected cervical intervertebral disc space was C5-C6 (81.7%) followed by C4-C5 (78.2%), C6-C7 (52%), C3-C4 (27.4%) and C2-C3 (23%). Bilateral cervical ribs were present in 1.5% of patients whereas unilateral cervical ribs were present in 3.9% of patients. Most of the unilateral cervical ribs were right-sided (70%).

Table 1: Comparison of Radiological Features in Males and Females

Features	Male	Female
Cervical spine curvature	00	00
Normal	71	86
Straightening	50	45
Anterior Marginal Osteophytes Present Absent	 121 (100) 0 (0)	 131(100) 0 (0)

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ISSN: (e) 3007-1607 (p) 3007-1593

Disc Space Reduction		
Present	112	118
Absent	9	13

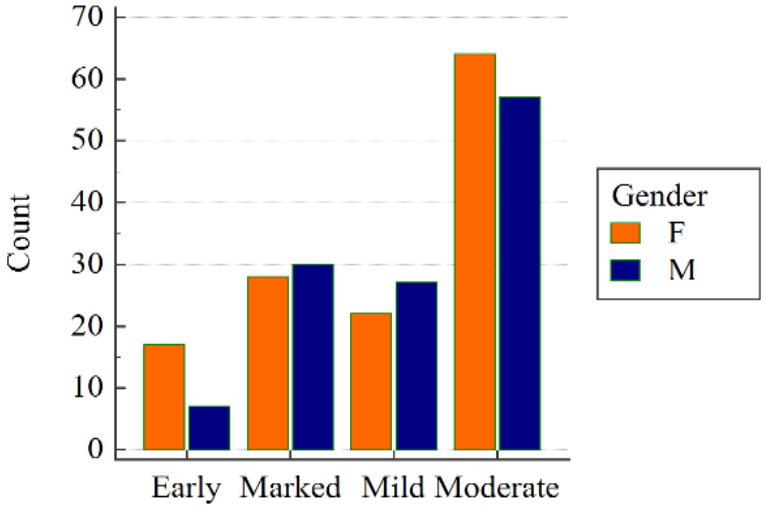


Figure 1: Degree of cervical spondylosis by gender

The significance of association of the study variable with gender was tested by Chi-square test. The test did not show any significant difference in the frequency of cervical curvature abnormalities, anterior marginal osteophytes, presence of disc-space reduction, and degree of cervical spondylosis between males and females ($p>0.05$). A significant degree of association ($p<0.001$) between the degree of cervical spondylosis with advancing age was observed. The relation between the degree of cervical spondylosis and the age of patients is given in the form of a graph in Figure 2.

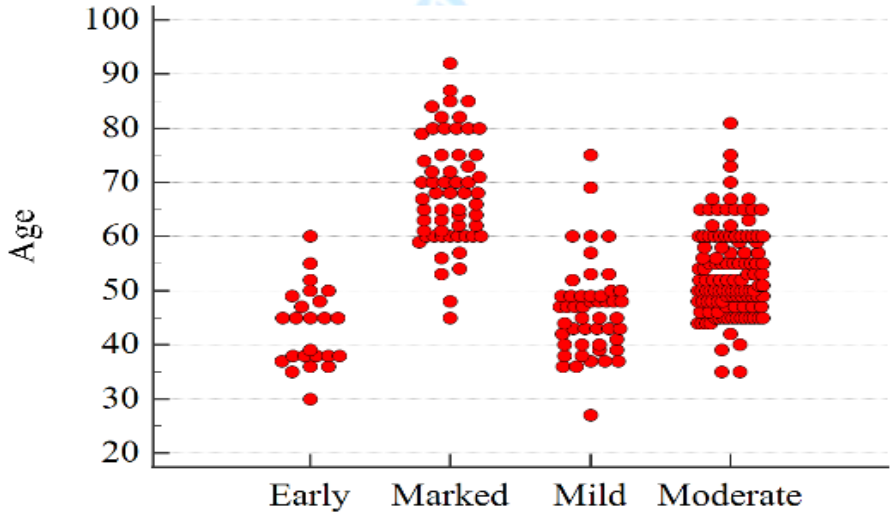


Figure 2: Degree of Cervical Spondylosis and Advancing Age

5. DISCUSSION

Cervical spondylosis is a degenerative disease of the cervical spine characterized by neck pain which may radiate in arms and shoulders along with tingling and numbness of fingers if nerve roots are involved [1]. The prevalence of cervical spondylosis is increasing with time owing to the increased use of mobile phones and laptops [26].

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ISSN: (e) 3007-1607 (p) 3007-1593

Further, poor sitting posture also results in malalignment of cervical vertebrae which makes an individual prone to develop cervical spondylosis [27][28]. The disease is more common in women though its incidence is also rising in males [29]. The diagnosis of cervical spondylosis is difficult as it requires a correlation of clinical presentation with the radiological features of cervical spine x-ray film [30]. The imaging findings vary from simple alteration in curvature of the cervical spine to formation of osteophytes and variation of intervertebral disc space [31]. It is therefore important for clinicians to identify radiological features that are more prevalent in patients with cervical spondylosis [21]. The radiological patterns identified in x-rays of patients suffering from cervical spondylosis in our study are alteration in cervical spine curvature, presence of osteophytes, reduction of intervertebral disc, and presence of cervical rib [31]. Normal cervical spine shows physiological lordosis. This physiological lordosis enables the spine to enable load bearing of the head and maintains spinal stability [32]. A study conducted by Zhou et al in 2016 reported abnormal cervical curvature in 71.67% of patients presenting with neck pain who are 26 to 35 years old [33]. Cui et al reported abnormal cervical curvature in 29.1% of their study participants [34] whereas another study revealed abnormal cervical curvature in 57.8% of patients with cervical spondylosis [35]. While in our study, we found abnormal cervical curvature of cervical spine straightening in only 37.7% of patients suffering from cervical spondylosis. Cervical osteophytes were present in all the patients in our study contrary to the study by David et al., in which osteophytes were present in 81.3% of patients [36]. The results of our study are consistent with those conducted by David et al in terms of levels of vertebrae at which cervical osteophytes are present as anterior marginal osteophytes were more commonly present at C5-level vertebrae in both studies. But the least common vertebra affected by cervical osteophytes was C3 in our study in contrast to the study of David et al in which the least commonly affected vertebra was C7 [36]. Moreover, this research shows a significant association between increasing age with the severity of cervical spondylosis and the results are consistent with Moon et al (2018) who reported an increase in the severity of cervical spondylosis with age [38].

Our study has a few limitations. Firstly, it is a single-centered study so the results could not be generalized. Secondly, this is a simple prevalence study with no follow-up of patients to look for a correlation of symptoms with the treatment outcomes. A multi-centered prospective study will therefore fill these gaps.

6. CONCLUSION

Cervical curvature abnormality was equally prevalent in both genders suffering from cervical spondylosis but the severity of cervical spondylosis was more in elder patients. The most frequently involved vertebra in cervical spondylosis was C5 and the least affected vertebra was C3.

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