Original Article
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Alterations of Cervical Lordosis in Neck Pain Patients

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Learning Point of the Article:

A sagittal spino-pelvic radiograph should be obtained to understand the interplay between the spinal regions, rather than looking at a single segment alone.

Abstract

Introduction: Chronic neck pain is a common musculoskeletal condition characterized by persistent pain in the neck lasting more than 3 months. The natural lordotic curvature of the cervical spine can impact the stability of the cervical vertebrae, and alterations to this curvature can lead to neck pain and disability. Our primary objective was to investigate the association of cervical lordosis with neck pain. Secondarily, we also examined the relationship of Cobb's angle and Jackson physiological stress (JPS) angle with age, gender and BMI.

Materials and Methods: This prospective cross-sectional study included 255 adult patients of either gender having neck pain. The patients were stratified into three groups. Neck pain cases without radiation to upper limb were categorised as group I, those with radiation to upper limb as group II and those with neck pain with radiculopathy/ myelopathy as group III. Lateral projection radiograph of cervical spine was obtained for all subjects. Cobb's angle (C2-C7) & Jackson physiological stress (JPS) angle were measured using DICOM software.

Results: Neck pain cases in group I included 93 cases, group II had 98 cases and group III had 64 cases. The mean cervical lordosis as measured by Cobb's angle was 27.24 ± 9.17 degrees and by JPS angle was 30.65 ± 10.39 degrees ($P<0.0001$). Both, Cobb's and JPS angle were similar in all age groups, gender and BMI subcategories (Cobb's angle: $p= 0.631$, $p=0.156$, $p=0.61$; JPS angle: $p=0.396$, $p=0.0804$, $p=0.539$) respectively. The degree of lordosis was similar in all three pain sub-type when measured by Cobb's method ($p=0.969$) or by JPS angle ($p=0.952$).

Conclusion: The study found that cervical lordosis (Cobb's angle and Jackson physiological stress angle) has no association with cases having neck pain with or without radiation to upper limbs or neck pain with radiculopathy/ myelopathy. Cervical lordosis does not vary significantly with age, gender and BMI irrespective of the method used.

Keywords: Cervical lordosis, Cobb's angle, non-specific neck pain, Jackson physiological stress angle, neck pain.

Introduction

Chronic neck pain is a common musculoskeletal condition and is characterized by persistent pain in the neck lasting beyond 3 months [1]. Around 30–50% of middle-aged and elderly individuals suffer from it, which impacts their overall quality of life [2]. Despite its benign nature, it has significant socioeconomic implications, including reduced productivity as well as job-related difficulties [3]. Globally, an age-fixed rate of prevalence is reported as being 3551.1, and the rate of incidence as 806.6 per one lac of neck pain patients has been reported [3]. In India, the prevalence rate has been reported as 18.6% [1].

The natural wedge shape of cervical vertebrae allows the cervical

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Author's Photo Gallery

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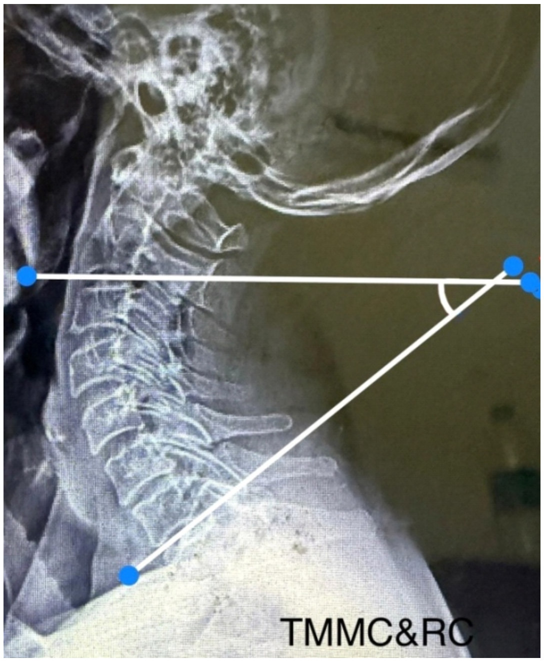

Figure 1: The Cobb angle is measured as the angle between the tangent on the inferior endplate of the second vertebra (C2) and the tangent on the inferior endplate of the seventh vertebra (C7).

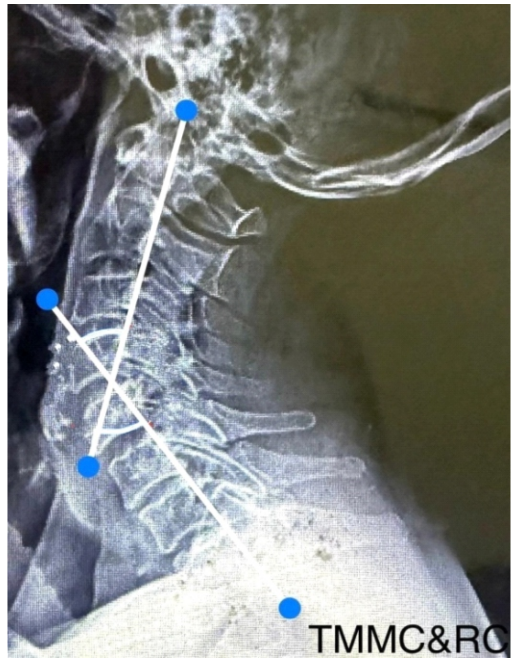

Figure 2: The Jackson physiological stress angle is measured between the tangent on the posterior surface of the second cervical vertebra (C2) and the tangent on the posterior surface of the seventh cervical vertebra (C7).

spine to maintain a lordotic curve to compensate for the thoracic kyphotic curve [4, 5]. Any alterations to this natural lordotic curvature can impact the stability of the cervical vertebrae [6]. The cervical spine in an asymptomatic individual usually exhibits a lordotic shape, but it has been reported that up to 35% of cases can display a kyphotic curve [7].

Alterations in the cervical curve, such as straightening or kyphosis, have been linked to neck pain, myelopathy, and disability [4]. It has been reported that lordosis <20° correlates with cervical pain, and a "clinically normal" range of 31–40° for cervical lordosis was suggested [8]. However, other researchers have suggested that neck pain characteristics do not influence global or segmental cervical spine curves [9]. Our primary objective was to investigate the association of cervical lordosis with chronic neck pain. Secondarily, we also examined the association of cervical lordosis with age, gender, and body mass index (BMI) as assessed by Cobb's angle and Jackson physiological stress (JPS) angle.

Materials and Methods

This prospective and cross-sectional study was conducted in the orthopaedic department of a tertiary health care center. The study included 255 adult patients aged above 18 years of either gender with neck pain attending the outpatient department from December 2023 to May 2025. The study was conducted after approval from the College Research Committee and the Institutional Ethics Committee (IEC) (approval no.: TMU/IEC No. 23/116). Written informed consent was obtained from all subjects. Our study is a cross-sectional study (level IV evidence). The study was carried out as per the standards laid down in the Helsinki Declaration (1964) and its amendment (2013).

The patients were stratified into three groups. Neck pain cases without radiation to upper limb were categorised as group I, those with radiation to upper limb as group II and those with neck pain with radiculopathy/myelopathy as group III. . Patients with a history of trauma, previous surgery, inflammatory or infective pathology, degenerative joint disease, and congenital conditions of the cervical spine or shoulder were excluded. Patients were evaluated by detailed history taking, examination, and relevant investigations.

A standard lateral radiograph of the cervical spine was done in a comfortable standing position with the upper extremities positioned naturally at the side of the body, maintaining a horizontal gaze. Cobb's angle (C2–C7) and JPS angle were measured on a plain radiograph in lateral view of cervical spine using Digital Imaging and Communications in Medicine (DICOM) software, by a radiologist who was blinded to clinical findings.

The Cobb's angle was measured as the angle between the tangential line of the inferior endplate of the second vertebra (C2) and another line tangential to the inferior endplate of the 17th vertebra (C7) [10] (Fig. 1). The JPS angle was measured between drawing a tangential line on the posterior surface of the second cervical vertebra (C2) and another tangential line drawn on the posterior surface of 17th cervical vertebra (C7). The angle of intersection between these two lines is JPS angle [10] (Fig. 2). Both angles were measured using lateral radiographs and DICOM software, allowing for precise calculations. Magnetic resonance imaging of the cervical spine was done to confirm the diagnosis of radiculopathy/myelopathy, if needed.

Table 1: General descriptive statistics of study subjects		
Parameters	**Mean±SD**	**Range**
Anthropometric parameters		
Weight (kg)	69.99±10.6	48–98
Height (m)	1.68±0.11	1.5–1.91
BMI (kg/m²)	24.72±3.59	17.3–33.9
Gender	**Frequency**	**Percentage**
Female	136	53.33
Male	119	46.67
Total	255	100
Age		
18–39 years	106	41.57
40–59 years	91	35.69
60–80 years	58	22.75
Mean±SD	44.02±15.08	
Range	18–80	
Body mass index		
<18.5 kg/m²	13	5.1
18.5–24.99 kg/m²	125	49.02
25–29.99 kg/m²	90	35.29
=30 kg/m²	27	10.59
Type of pain		
Non-radiating	93	36.47
Radiating	98	38.43
Radiculopathy	64	25.1
Cervical lordosis	**Mean±SD**	**Range**
Cobb's angle (°)	27.24±9.17	-2.6 –56.6
JPS angle (°)	30.65±10.39	5.4–61
P-value	<0.0001	

BMI: Body mass index, SD: Standard deviation, JPS: Jackson physiological stress

Table 2: Association of Cobb's angle with variables			
Cobb's angle			
Parameters	**Range**	**Mean+SD**	***P-value***
Age groups			
18–39 years (n=50)	-2.6–52.4	27.56±9.09	0.631†
40–59 years (n=28)	5.3–56.6	26.5±9.12	
60–80 years (n=58)	6–49.6	27.78±9.48	
Total	-2.6–56.6	27.24±9.17	
Gender			
Males	8.2–56.6	28.11±9.05	0.156*
Females	-2.6–52.4	26.47±9.25	
Total	-2.6–56.6	27.24±9.17	
BMI			
Underweight (n=1)	16.9–38.4	26.4±7.85	0.61†
Normal (n=31)	6-56.6	26.53±9.02	
Overweight (n=28)	-2.6–52.4	28.1±10.03	
Obese (n=4)	13.5–39	28±7.43	
Total	-2.6–56.6	27.24±9.17	
Pain type			
Non-radiating	15.3–46.3	27.38±6.87	0.969†
Radiating	6.8–46.5	27.06±8.53	
Myelopathy	-2.6–56.6	27.3±12.58	
Total	-2.6–56.6	27.24±9.17	

BMI: Body mass index, SD: Standard deviation † ANOVA,, * Independent t test

Statistical analysis was performed using Statistical Package for Social Sciences software version 22. Data were represented by frequency/percentages, mean, and standard deviation. Chi-square test was used to check significance. P < 0.05 was taken as the significance level.

Results

Demographic profile

The study population comprised 255 subjects subjects (Group I: 93 cases, Group II: 98 cases and Group III: 64 cases). None of the study subjects had concomitant thoracic or lumbar spine pain. The study subjects included 136 females (53.33%) and 119 males (46.67%), with a mean age of 44.02 ± 15.08 years (range: 18–80 years). There were 106 (41.57%) cases in the 18–39 years age group, 91 (35.69%) cases in the 40–59 years age group, and 58 (22.75%) cases in the 60–80 years age group. The study population had a mean BMI of 24.72 ± 3.59 kg/m2 (range: 17.3–33.9 kg/m2). BMI subcategories included 13 cases (5.10%) in underweight, 125 cases (49.02%) in normal, 90 cases (35.29%) in overweight, and 27 cases (10.59%) in the obese subcategory. There were 93 cases (36.47%) with non-radiating pain, 98 cases (38.43%) with radiating pain, and 64 cases (25.10%) with complaints of radiculopathy/myelopathy. The cervical lordosis, as measured by Cobb's angle, was 27.24 ± 9.17 degrees (range: −2.6–56.6), and by JPS angle was 30.65 ± 10.39° (range: 5.4–61) (P < 0.0001) (Table 1).

Association of Cobb's angle with demographic and clinical variables

The Cobb's angle was 27.56 ± 9.09 in the 18–39 years age group, 26.5 ± 9.12 in the 40–59 years age group, and 27.78 ± 9.48° in the 60–80 years age group, showing no statistical difference (P = 0.631). Male subjects (28.11 ± 9.05) had insignificantly higher values than females (26.47 ± 9.25) (P = 0.156). Analysis of BMI subcategories revealed insignificant differences (P = 0.61) between underweight (26.4 ± 7.85), normal (26.53 ± 9.02), overweight (28.1 ± 10.03), and obese (28 ± 7.43) subcategories. Pain type also did not significantly influence Cobb's angle (P = 0.969) in cases with non-radiating pain (27.38 ± 6.87), with radiating pain (27.06 ± 8.53), and the myelopathy group (27.3 ± 12.58), showing similar values (Table 2).

Association of JPS angle with demographic and clinical variables

The JPS angle was recorded as 31.18 ± 9.66 in the 18–39 years age-group, as 29.47 ± 10.71 in the 40–59 years age-group, and as 31.52 ± 11.14° in the 60–80 years age-group, with an insignificant difference (P = 0.396) between values. The angle of lordosis in male subjects (30.82 ± 10.14) and female subjects (30.49 ± 10.64) was also similar (P = 0.0804). BMI subcategories also did not show any statistically significant

Table 3: Association of Jackson's physiological stress angle with variables

Jackson's physiological stress angle			
Parameters	**Range**	**Mean±SD**	***P-value***
Age group			
18–39 years (n=50)	10–61	31.18±9.66	
40–59 years (n=28)	7.7–55.6	29.47±10.71	
60–80 years (n=58)	5.4–60.7	31.52±11.14	
Total	5.4–61	30.65±10.39	0.396†
Gender			
Males	7.7–60.7	30.82±10.14	
Females	5.4–61	30.49±10.64	
Total	5.4–61	30.65±10.39	0.804*
BMI			
Underweight (n=1)	20.3–42.9	30.55±8.21	
Normal (n=31)	5.4–55.6	29.7±10.48	
Overweight (n=28)	8–61	31.67±11.07	
Obese (n=4)	16.6–51.5	31.68±8.37	
Total	5.4–61	30.65±10.39	0.539†
Pain type			
Non-radiating	15.8–55.6	30.71±8	
Radiating	7.8–51.8	30.81±9.84	
Myelopathy	5.4–61	30.3±13.87	
Total	5.4–61	30.65±10.39	0.952†

BMI: Body mass index, SD: Standard deviation
† ANOVA, * Independent t test

difference (underweight: 30.55 ± 8.21, normal: 29.7 ± 10.48, overweight: 31.67 ± 11.07, and obese: 31.68 ± 8.37; P = 0.539). Similarly, pain type also did not influence JPS angle (P = 0.952) in cases with non-radiating pain (30.71 ± 8), with radiating pain (30.81 ± 9.84), and the myelopathy group (30.3 ± 13.87), showing similar values (Table 3).

Association of pain with Cobb's and JPS angle

The whole data set was relooked in all three pain categories, i.e., non-radiating, radiating, and with myelopathy groups. In the non-radiating pain group, both Cobb's and JPS angles (P = 0.621, P = 0.572) were similar across all age-groups (P = 0.621, P = 0.572), gender (P = 0.403, P = 0.824), and in BMI subcategories (P = 0.989, P = 0.854). In the radiating pain group, both Cobb's and JPS angles showed similar values when the degree of lordosis was measured between various age-groups (P = 0.253, P = 0.415), gender (P = 0.975, P = 0.475), and BMI subcategories (P = 0.368, P = 0.274). Similarly, in the radiculopathy/myelopathy group, as well as Cobb's and JPS angles did not vary significantly across different age-groups (P = 0.314, P = 0.146), male and females (P = 0.125, P = 0.241), and in BMI subcategories (P = 0.736, P = 0.674) (Table 4).

Discussion

The aim of this research was to study the relation of cervical spine alignment as measured by two methods (C2-C7 Cobb's angle and JPS angle) with neck pain. We chose C2-C7 Cobb's angle and JPS angle as two parameters to assess cervical lordosis, as they are the most reliable and commonly used parameters [6]. The relationship between cervical pain and sagittal cervical alignment is still not conclusively established [11]. Although it is generally accepted that the cervical spine has a lordotic curve, yet 35% of the asymptomatic population show a kyphotic curve [7]. The mere presence of structural variations cannot be termed an abnormal radiological finding and cannot be linked as a causative factor for neck pain [7, 9]. Further, it has been reported and generally accepted that cervical lordosis depends on thoracic and lumbar lordosis and their changes as a compensatory response to changes in thoracic and lumbar curvature [6]. The "clinically normal" range of cervical lordosis was first suggested as 31°–40°, and <20° of lordosis was said to be significantly associated with neck pain [8]. Subsequently, Grob et al., in 2007, quantified kyphotic spine as having more than 4°, lordotic spine as <4°, and straight spine as those having +4° to –4° of lordosis [9].

Demographic profile

The variations in lordotic angle in asymptomatic or healthy individuals with age, gender, and BMI have been reported in many published reports. Cervical lordosis increases with age and is more in males [2, 6, 12, 13, 14], but there are contradicting reports as well [9, 15, 16, 17]. The general consensus is that lordosis increases with age and is more common in males. However, in our study, we did not find any statistically significant difference values of cervical lordosis between any age subgroup (P = 0.631), gender (P = 0.156), and BMI subcategory (P = 0.61) when measured by Cobb's method,

Table 4: Association of type of pain with age groups, gender, and BMI

Parameters	Cobb's angle		Jackson's physiological stress angle	
1. Non-radiating neck pain				
Age group	Range	Mean ±SD	Range	Mean ±SD
18–39 years	15.3–46.3	26.73 ±7.57	15.8–55.6	30.64 ±9.15
40–59 years	16–37.8	28.11 ±6.01	16.9–42.6	29.85 ±6.8
60–80 years	17.9–39	28.17 ±6.08	25–42.9	32.57 ±5.74
P-value	0.621†		0.572†	
Gender				
Males	17–41.5	28.05 ±6.53	15.8–51.7	30.5 ±7.92
Females	15.3–46.3	26.84 ±7.15	16.9–55.6	30.88 ±8.13
P-value	0.403*		0.824*	
BMI				
Underweight	17–38.2	27.67 ±6.33	23.7–42	32.4 ±6.64
Normal	15.3–46.3	27.12 ±7.08	15.8–55.6	30.59 ±8.52
Overweight	15.9–42.1	27.62 ±7.06	16.9–50.2	31.17 ±8.15
Obese	15.6–39	27.65 ±6.75	18.2–42.9	29.32 ±6.9
P-value	0.989†		0.854†	
2. Radiating neck pain				
Parameters	Cobb's angle		Jackson's physiological stress angle	
Age group	Range	Mean ±SD	Range	Mean ±SD
18–39 years	12.3–46.1	26.89 ±8.44	14.6–48.4	29.69 ±8.66
40–59 years	6.8–42.9	25.82 ±8.14	7.8–51.8	30.52 ±10.8
60–80 years	15.7–46.5	29.57 ±9.18	15.1–50	33.18 ±9.86
P-value	0.253†		0.415†	
Gender				
Males	8.8–46.1	27.03 ±8.6	12.2–50	30.03 ±9.13
Females	6.8–46.5	27.08 ±8.55	7.8–51.8	31.47 ±10.44
P-value	0.975*		0.475*	
BMI				
Underweight	16.9–35.8	22.22 ±7.99	20.3–42.9	26.42 ±9.69
Normal	6.8–46	26.27 ±8.4	7.8–51.8	29.75 ±10.14
Overweight	8.8–46.5	28.23 ±9.1	12.2–48.4	31.53 ±9.78
Obese	13.5–36.2	28.94 ±6.82	24–51.5	35.4 ±7.85
P-value	0.368†		0.274†	
3. Neck pain with radiculopathy/myelopathy				
Parameters	Cobb's angle		Jackson's physiological stress angle	
Age group	Range	Mean ±SD	Range	Mean ±SD
18–39 years	-2.6 –52.4	30.88 ±12.79	10–61	35.22 ±11.82
40–59 years	5.3–56.6	25.72 ±13.19	7.7–55.6	27.18 ±14.09
60–80 years	6–49.6	25.63 ±11.55	5.4–60.7	29.03 ±14.76
P-value	0.314†		0.146†	
Gender				
Males	8.2–56.6	29.65 ±11.96	7.7–60.7	32.28 ±13.51
Females	-2.6 –52.4	24.81 ±12.94	5.4–61	28.19 ±14.15
P-value	0.125*		0.241*	
BMI				
Underweight	38.4–38.4	38.4 ±0	38.2–38.2	38.2 ±0
Normal	6–56.6	26.04 ±12.27	5.4–55.6	28.26 ±13.49
Overweight	-2.6 –52.4	28.39 ±13.33	8–61	32.3 ±14.76
Obese	15.3–38.1	26.78 ±12.3	16.6–43.8	30.05 ±12.6
P-value	**0.736†**		**0.674†**	

BMI: Body mass index, SD: Standard deviation
† ANOVA, * Independent t test

signifying that cervical lordosis is independent of age, gender, and BMI (Table 2). Similarly, when the JPS angle was measured to assess lordosis, again, we did not find any significant variations of lordotic angles in different age subgroups (P = 0.396), gender (P = 0.804), and BMI subcategory (P = 0.539) (Table 3). These data suggest that cervical lordosis angle is independent of age, gender, and BMI.

It has been reported that obesity influences global spinal parameters rather than local cervical measures, with pelvic and lower limb adaptations compensating for added weight [18]. This suggests that the cervical spine remains unaffected by BMI in isolation. Our study also did not show any relation of BMI in any subcategory of age, gender, and pain, as reported earlier as well [15]. Hence, we conclude that there is no relation of cervical lordosis with age, gender, and BMI, irrespective of which method (Cobb's method or JPS angle) was used to assess the lordotic angle.

On comparison of cervical lordosis values given by the C2-C7 Cobb's angle (27.24° ± 9.17°) method and JPS angle (30.65° ± 10.39°) method, our study revealed significant differences between these two (P < 0.0001). JPS angle gives higher values of lordosis than Cobb's method has been reported earlier, where the authors have compared Cobb's C0-C2, Harrison, Cobb's, and JPS angle methods. They have stated that Cobb's technique overestimates cervical lordosis at the C0-C2 level and underestimates it at the C2-C7 level [19, 20].

Pain profile and lordosis

There are many risk factors reported for neck pain, and hence, it has been labeled as a multifactorial disease [3]. The risk factors have been categorized as (a) psychological causes (depression, stress, anxiety, cognitive variables, sleep problems, social support, personality, and behavior), (b) biological causes (neuro-musculoskeletal disorder, autoimmune diseases, genetic, gender, and age), and (c) individual causes (work related and work place related) [3]. Recently, overuse of computers and mobile phones has also been recognized as an individual risk factor. One author in his review article has stated that most risk factors for neck pain are psychosocial and not physical [21].

The relation of cervical pain and lordosis is highly controversial. For the last two to three decades, many researchers have been trying to answer the two basic questions: (1) Is the angle of lordosis actually related to cervicalgia, and (2) alterations of cervical lordosis are the "cause" or "effect" of neck pain. There are many published reports in support of and against these hypotheses. Many authors, after their study with asymptomatic and symptomatic individuals and a few meta-analyses, have denied any relation of cervical lordosis with neck pain [2, 7, 9, 15, 16], but some others have reported a significant association of neck pain with lordotic angle. McAviney et al. reported a significant association between neck pain and cervical lordosis of <20° [8]. Delen and İlter, in a cross-sectional study on chronic neck pain patients with and without loss of cervical lordosis, stated that both groups were similar with respect to age, gender, employment status, and duration of pain, but the group with loss of lordosis had a longer duration of headache than the group without loss of lordosis [22]. Seo et al., in their study with young soldiers, stated that cervical lordosis is similar in those with and those without neck pain when Cobb's (C2-C7) technique is used (P = 0.821), but when the JPS angle technique is used, the two groups show a significant difference in lordotic angle (P = 0.011) [11]. This emphasizes the point that the lordotic angles would be different with different techniques used. In our study, we have used both Cobb's and JPS angles to assess the lordosis.

In the present study, in the non-radiating pain group, both Cobb's and JPS angles did not vary significantly in sub-groups of age (P = 0.621, P = 0.572), gender (P = 0.403, P = 0.824), and in BMI (P = 0.989, P = 0.854). Furthermore, in the radiating pain group, both Cobb's and JPS angles showed similar values of lordosis between subgroups of age (P = 0.253, P = 0.415), gender (P = 0.975, P = 0.475), and BMI (P = 0.368, P = 0.274). Similarly, in the radiculopathy/myelopathy group as well, both Cobb's and JPS angles did not vary significantly among subgroups of age (P = 0.314, P = 0.146), gender (P = 0.125, P = 0.241), and in BMI (P = 0.736, P = 0.674) (Table 4). Gender and BMI did not affect alignment measures, paralleling previous research. The absence of such demographic influence is noteworthy, given the lack of similar studies for direct comparison.

Most studies, whether observational, cross-sectional, or longitudinal, with asymptomatic volunteers or with patients having neck pain, conclude that no correlation of cervical lordosis and cervicalgia exists [2, 7, 9, 15, 16]. There is only a handful of reports stating definite correlation of cervical lordosis with age, gender, and cervicalgia, but they fail to give any explanation as to whether the change in lordotic curve is the "cause" of cervicalgia or it is the "effect" of cervicalgia [2, 8, 12, 14]. Further, in cases where the patient has been treated with spinal manipulation and or physiotherapeutic exercises and in those who have undergone a surgical procedure to correct sagittal alignment of the cervical spine, surgical outcomes were more related to symptoms and functional scores than alignment changes [17, 23, 24, 25].

It seems logical to believe that abnormalities of cervical curvature in a neck pain patient should be considered coincidental, as stated by Grob et al. [9], and the amount of lordosis should not be taken as a point in favor of any pathology.

However, in our present study, we could demonstrate any relationships between age, gender, BMI, and cervical lordosis values with pain. This prompts us to look further into pain mechanisms, which may involve additional factors beyond cervical alignment. It has been reported that wherever possible, radiographic studies of the whole spine have to be obtained for a deeper understanding of the interplay between the spinal regions much rather than looking at a single region on its own [26].

Overall, the study concludes that age, gender, and BMI do not significantly influence cervical alignment parameters (Cobb's angle and JPS angle) in patients with various neck pain types, including radiculopathy/myelopathy. Further research is needed to understand the relationship between cervical lordosis and neck pain, and factors beyond sagittal cervical alignment are likely more crucial in determining symptoms.

Conclusion

This study found no association between Cobb's angle or JPS angle with neck pain, suggesting that cervical lordosis may not be a reliable indicator of neck pain. The study also revealed that both Cobb's angle and JPS angle methods are equally reliable and give similar results across all age groups, gender, or BMI categories, indicating that these demographic factors may not have a significant impact on cervical spine alignment parameters.

Clinical Message

The clinical message is that the degree of cervical lordosis has no relation with neck pain with or without radiation to the upper limb and with radiculopathy/ myelopathy and is independent of age, gender, and BMI.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

References

1. Sidiq M, Ramachandran A, Kashoo FZ, Yadav M, Shaphe MA, Ahluwalia G, et al. Prevalence of chronic non-specific neck pain and its associated risk factors among adults in Mathura, India. NeuroQuantology 2022;20:3210.

2. Gao K, Zhang J, Lai J, Liu W, Lyu H, Wu Y, et al. Correlation between cervical lordosis and cervical disc herniation in young patients with neck pain. Medicine (Baltimore) 2019;98:e16545.

3. Kazeminasab S, Nejadghaderi SA, Amiri P, Pourfathi H, Araj-Khodaei M, Sullman MJ, et al. Neck pain: Global epidemiology, trends and risk factors. BMC Musculoskelet Disord 2022;23:26.

4. Scheer JK, Tang JA, Smith JS, Acosta FL Jr., Protopsaltis TS, Blondel B, et al. Cervical spine alignment, sagittal deformity, and clinical implications: A review. J Neurosurg Spine 2013;19:141-59.

5. Gay RE. The curve of the cervical spine: Variations and significance. J Manipulative Physiol Ther 1993;16:591-4.

6. Ames CP, Blondel B, Scheer JK, Schwab FJ, Le Huec JC, Massicotte EM, et al. Cervical radiographical alignment: Comprehensive assessment techniques and potential importance in cervical myelopathy. Spine (Phila Pa 1976) 2013;38(Suppl 22):S149-60.

7. Gore DR, Sepic SB, Gardner GM. Roentgenographic findings of the cervical spine in asymptomatic people. Spine (Phila Pa 1976) 1986;11:521-4.

8. McAviney J, Schulz D, Bock R, Harrison DE, Holland B. Determining the relationship between cervical lordosis and neck complaints. J Manipulative Physiol Ther 2005;28:187-93.

9. Grob D, Frauenfelder H, Mannion AF. The association between cervical spine curvature and neck pain. Eur Spine J 2007;16:669-78.

10. Rajesh R, Rajasekaran S, Vijayanand S. Imaging in cervical myelopathy. Indian Spine J 2019;2:20-32.

11. Seo YN, Yu JW, Yun DJ, Kwon YM, Lee SM. The association between cervical spine alignment and neck axial pain in early twenties soldiers. Asian J Pain 2019;5:1-6.

12. Yukawa Y, Kato F, Suda K, Yamagata M, Ueta T. Age-related changes in osseous anatomy, alignment, and range of motion of the cervical spine. Part I: Radiographic data from over 1,200 asymptomatic subjects. Eur Spine J 2012;21:1492-8.

13. Iorio J, Lafage V, Lafage R, Henry JK, Stein D, Lenke LG, et al. The effect of aging on cervical parameters in a normative North American population. Global Spine J 2018;8:709-15.

14. Tang R, Ye IB, Cheung ZB, Kim JS, Cho SK. Age-related changes in cervical sagittal alignment: A radiographic analysis. Spine (Phila Pa 1976) 2019;44:E1144-50.

15. Kim JH, Kim JH, Kim JH, Kwon TH, Park YK, Moon HJ. The relationship between neck pain and cervical alignment in young female nursing staff. J Korean Neurosurg Soc 2015;58:231-5.

16. Guo GM, Li J, Diao QX, Zhu TH, Song ZX, Guo YY, et al. Cervical lordosis in asymptomatic individuals: A meta-analysis. J Orthop Surg Res 2018;13:147.

17. Iyer S, Lenke LG, Nemani VM, Fu M, Shifflett GD, Albert TJ, et al. Variations in occipitocervical and cervicothoracic alignment parameters based on age: A prospective study of asymptomatic volunteers using full-body radiographs. Spine (Phila Pa 1976) 2016;41:1837-44.

18. Jalai CM, Diebo BG, Cruz DL, Poorman GW, Vira S, Buckland AJ, et al. The impact of obesity on compensatory mechanisms in response to progressive sagittal malalignment. Spine J 2017;17:681-8.

19. Yuceli S, Yaltirik CK. Cervical spinal alignment parameters. J Turk Spinal Surg 2019;30:181-6.

20. Harrison DE, Harrison DD, Cailliet R, Troyanovich SJ, Janik TJ, Holland B. Cobb method or Harrison posterior tangent method: Which to choose for lateral cervical radiographic analysis. Spine (Phila Pa 1976) 2000;25:2072-8.

21. Kim R, Wiest C, Clark K, Cook C, Horn M. Identifying risk factors for first-episode neck pain: A systematic review. Musculoskelet Sci Pract 2018;33:77-83.

22. Delen V, İlter S. Headache characteristics in chronic neck pain patients with loss of cervical lordosis: A cross-sectional study considering cervicogenic headache. Med Sci Monit

2023;29:e939427.

23. Shilton M, Branney J, De Vries BP, Breen AC. Does cervical lordosis change after spinal manipulation for non specific neck pain? A prospective cohort study. Chiropr Man Therap 2015;23:33.

24. Liang G, Liang C, Zheng X, Xiao D, Zeng S, Yin D, et al. Sagittal alignment outcomes in lordotic cervical spine: Does three-level anterior cervical discectomy and fusion outperform laminoplasty? Spine (Phila Pa 1976) 2019;44:E882-8.

25. Passias PG, Bortz C, Horn S, Segreto F, Poorman G, Jalai C, et al. Drivers of cervical deformity have a strong influence on achieving optimal radiographic and clinical outcomes at 1 year after cervical deformity surgery. World Neurosurg 2018;112:e61-8.

26. Lippa L, Lippa L, Cacciola F. Loss of cervical lordosis: What is the prognosis? J Craniovertebr Junction Spine 2017;8:9-14.

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