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# Correlation of Severe Lumbar Spondylosis with Sociodemographics of Patients with Chronic Low Back Pain

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# ABSTRACT

**Background and aim:** Once red flag diagnoses such as cancer and fracture are ruled out in patients with chronic low back pain (CLBP), lumbar spondylosis (LS) tops the differential diagnosis. Various sociodemographic factors are associated with LS. The study aims to explore the presence and extent of LS in association with the various sociodemographic factors of CLBP.

**Material and methods:** This was a prospective hospital-based study. Lumbosacral radiographs of patients investigated for CLBP related to the various sociodemographic factors were evaluated for presence and severity of LS, graded using Kellgren-Lawrence grading of LS.

**Results:** Sixty-two males and 61 females (M: F of 1.0:1.1) aged 16-80 years with a clinical history of CLBP were studied. Fifty- seven patients (46.4%) had mild LS ( $\leq$ KL2), 10 (8.1%) moderate (KL3), and 23(18.7%) severe (KL4). Thirty -three (26.8%) cases were normal (KL0). Females had more normal radiographs; males had mostly moderate-severe radiographs. LS was rare below 20 years; after that, the frequency increased and was highest at 21-50 years. Those with no formal education had the severest forms of LS and were statically significant (p=0.000). Moderate-severe forms of LS were commoner in individuals with high BMI and were statically significant (p=0.000). Farmers had the most severe forms of LS and demonstrated the highest total sum of all cases of LS and was statically significant (p=0.000).

**Conclusions:** Severe forms of lumbar spondylosis are associated with various socio-demographics. Smoking, however, seems to have a protective effect on the development of severe LS; this, however, needs further exploration.

#### 1. Introduction

Lumbar spondylosis is a disorder that comprises a wide spectrum of conditions. It involves degeneration of the intervertebral disc or facet joints. Also, there could be the formation of bony spurs (osteophytes), vertebral body or endplate sclerosis, hypertrophy of ligaments, or in great seriousness, narrowing of the spinal line or disc space.<sup>[11]</sup> The term is synonymously for spondylosis deformans, lumbar osteoarthritis, and degenerative spine disease.<sup>[22]</sup> Lumbar spondylosis is a musculoskeletal issue and is a significant reason for physical weakening in old age.<sup>[3]</sup> The degeneration of the lumbar spine can be without symptoms; more than 80% of those over 40 may have lumbar spondylosis in the United States, though the majority are asymptomatic.<sup>[4]</sup> When symptomatic, the prevailing symptoms include low back pain(LBP), most commonly, low back stiffness, lower limb radiculopathy, neurogenic claudication, numbness, muscle pulls, or spasms.

The degree of symptoms severity may not be directly related to the degree of pathological changes in spine imaging.<sup>[5]</sup> Older age, female gender, low educational status, sedentary work, and smoking are some sociodemographic factors associated with LBP in LS. Others may include high BMI, DM, Hypertension, trauma, marital status, and psychological.<sup>[6]</sup> Conversely, some studies have found no association with obesity.<sup>[7]</sup> Similarly, regarding low back pain and gender, some studies have shown no association between gender and LBP.<sup>[8]</sup> Various imaging modalities, including conventional radiography, computed tomography, and magnetic resonance imaging, evaluate lumbar spondylosis. Conventional radiography, however, was chosen in this study because it is affordable, relatively cheaper, readily available, and noninvasive. Therefore, the study aimed to explore the presence and degree of lumbar spondylosis in association with the various

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sociodemographics associated with LBP using conventional radiographs to mitigate its occurrence and effect proper management when it occurs.

## 2. Material and methods

This prospective study was conducted at the Radiology Department of the Benue state university Teaching Hospital Makurdi. The research and ethical committee of the Benue State University Teaching Hospital approved the ethical clearance study. Patients who presented for lumbosacral spinal investigation following a clinical history of low back pain (LBP) were recruited for the study. The study was explained to the patients, after which questionnaires were administered. Age and sex were recorded. Height (in meters) and weight (in kilograms) were taken with the subject wearing light clothing and without shoes. Body mass index (BMI) was then calculated as weight/height2. Information obtained included educational status, medical history, smoking, alcohol consumption, marital status, parity, and occupation. The occupation was broadly grouped into Sedentary and active workers. Sedentary workers comprise clerks, secretaries, drivers, pilots, and receptionists, amongst others, and active workers include but are not limited to farmers, traders, laborers, Security, Doctors, and athletics. Lumbosacral radiographs were obtained in anterior-posterior (AP) and lateral views (Lat.). The AP radiographs were done with the patient supine on the X-ray table. The spine is aligned with the central line with a source image distance (SID) of 100-110cm. The knees flexed to reduce lordotic curvature. The anterior superior iliac spines placed equidistance from the table to avoid rotation, and a long narrow collimation field of the lumbar spine region was obtained. The incidence ray was perpendicular to the X-ray table 2.5cm above the iliac crest. Exposure is obtained at the end of expiration. The lateral views were obtained with the same 100-110cm SID. Patients were placed recumbent in the true lateral position, hip and knees flexed. Support pads were placed under the waist to place the entire spine parallel to the tabletop and between the knees for stability and comfort. The central ray was perpendicular to the table 2.5cm above the iliac crest. Exposure is obtained at the end of respiration. The degree of the lumber spondylosis was assessed using the Kellgren-Lawrence (KL) grading of the lumbosacral radiograph defined as:

KL0-Normal radiograph KL1-Slight osteophytes (minimal)

KL2-Definite osteophytes

KL3-KL2 above (moderate)

-Disk space narrowing

- KL4-KL3 (severe)
  - -Bone sclerosis

-±Vacuum phenomenon.

#### Statistical analyses

The data obtained were analyzed using Statistical Package for Social Sciences (SPSS) software (version 26.0) for Windows. As appropriate, results were presented as mean  $\pm$  standard deviation, percentages, tables, and graphs. Means were compared using Student's t-test. Pearson's correlation was used to assess the association between CT findings, sociodemographic factors, and clinical diagnosis. P-values less than or equal to 0.05 were considered statistically significant.

#### 3. Results

One hundred and twenty-three patients comprised 62 males and 61 females with a male-to-female ratio of 1.01:1. (Fig. 1) who presented with a history of LBP were studied. Their radiographs were reviewed for features

of lumbar spondylosis. They were aged 19-80, with a mean age of 44 and a standard deviation of  $\pm$  16.87 years.



Fig. 1. Sex distribution in the study.

Fifty-seven patients (46.4%) had a mild form of Ls ( $\leq$ KL2), 10 (8.1%) moderate (KL3), and 23(18.7%) severe (KL4). Thirty -three (26.8%) cases were normal (KL0). (Fig. 2) There was no particular pattern concerning LS and sex.



Fig. 2. I resence and Severity of LS in the study.

Females, 21(63%), have more normal radiographs than males, with 12(19.4%). Males, on the other hand, have slightly more cases of moderate to severe forms of LS, 8 (12.9%) and 13(21.0%) compared to females of 2(3.3%) and 10(16.4%), respectively, but these were not statically significant (p=0.158). (Fig. 3)



Fig. 3. Age distribution pattern of LS.

Lumbar spondylosis was rare below 20 years; after that, the frequency increased though not serially. Generally, the frequency was highest at 21-50 years. The severity of LS, however, increases with age; the Age group above

60 years has the most severe forms of LS and was statically significant p=0.000 (Fig. 4). From table 1, 37 (30.1%) patients had tertiary education, 41(33.3%) had secondary, and 43(35.0%) had no former education.



Fig. 4. Age distribution pattern of LS.

The Severity of LS (KL)	KL0	KL1	KL2	KL3	KL4	Total (%)	P-value	
Age (Years)								
11-20	5	0	0	0	0	5 (4.1)		
21-30	22	2	4	1	0	29 (23.6)		
31-40	4	9	6	2	2	23 (18.7)		
41-50	0	12	10	1	2	25 (20.3)		
51-60	1	4	5	3	5	18 (14.6)		
61-70	1	1	4	1	8	15 (12.2)		
>71	0	0	0	2	6	8 (6.5)		
Total	33	28	29	10	23	123 (100)	0.000	
Sex								
Male	12	15	14	8	13	62		
Female	21	13	15	2	10	61		
Total	33	28	29	10	23	123	0.158	
Education								
None	3	5	11	6	18	43		
Primary	0	2	0	0	0	2		

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Table 1. Degree	of LS with	socio-demograp	ohic factors.

Secondary	15	13	10	2	1	41			
Tertiary	15	8	8	2	4	37			
Total	33	28	29	10	23	123	0.000		
			BMI (Kg/M	<b>1</b> <sup>2</sup> )					
Underweight (<25)	1	0	0	0	0	1			
Normal (18.5-<25)	30	17	14	2	9	72			
Pre-obese (25 - <30)	2	6	13	7	13	41			
Obese (>30)	0	5	2	1	1	9			
Total	33	28	29	10	23	123	0.000		
	Occupation								
Sedentary	8	9	5	1	3	26			
Students	14	0	0	0	0	14			
Farmers	2	4	9	4	17	36			
Traders	0	3	3	0	2	8			
Laborers	0	2	1	1	0	4			
Security	1	1	3	3	1	9			
Teachers	1	4	2	0	1	6			
Athletes	1	0	0	0	0	1			
Others	6	5	4	1	1	17			
Total	33	28	27	10	25	123	0.000		
Hypertension									
Yes	3	9	9	6	16	43			
No	30	19	20	4	7	80			
Total	33	28	29	10	23	123	0.000		
Smoking									
Yes	3	7	7	4	7	28			
No	30	21	22	6	16	95			
Total	33	28	29	10	23	123	0.193		
DM									
Yes	1	2	3	5	5	16			
No	32	26	26	5	18	107			
Total	33	28	29	10	23	123	0.001		

Those with no former education were observed to have the highest number of moderate and severe forms of LS, 6 (60%) and 18 (78%), respectively. This was statistically significant (p=0.000). Seventy-two (58.5%) of our study population had normal BMI. Nine (7.3%) were obese. Moderate-severe form of LS was relatively commoner with increased BMI. Thirteen (56%) of pre-obese patients had KL stage 4 of LS compared to 9 (39%) patients with normal BMI. In the obese group, however, only 1 case was seen with KL stage 4, but compared with the total number of obese patients in the study, it was relatively high, and all were statistically significant (p=0.000). Farmers had the most severe form of LS; 48% had KL4 followed by traders (25%). They also demonstrated the highest total of all cases of LS closely followed by sedentary workers comprising secretaries, receptionists, drivers, and clerks, and this was statistically significant (P=0.000). Drivers (41%) were more prone to having LS than other sedentary workers; however, this was not statistically significant (P=0.120). In this study, Hypertension and smoking had direct opposite values of Lumber spondylosis, as seen in the table. Forty-three (35.0%) had Hypertension in the study; the moderate to severe forms of LS occurs in those with Hypertension, i.e., 13.0% and 37.0%, as against 5.0% and 8.0% of those who do not have Hypertension, respectively and was statically significant (P=0.000). Conversely, smoking seems to have a protective effect in developing LP; however, this was not statistically significant (p=0.193). Sixteen (13%) had DM; the most severe form occurred in those with diabetes, i.e., 31.3% against 16.7% had KL4 LS. Both groups saw an equal proportion of stage KL 3 and were statically significant (P=0.001).

#### 4. Discussion

Lumbar spondylosis is the primary cause of low back pains worldwide after the fourth decade.<sup>[1]</sup> The male (50.4%) to female (49.6%) ratio of 1.01:1 in our study indicated a slightly higher incidence in men in this environment. This ratio contradicts the work of Igbinedion et al. in Benin-City<sup>[8]</sup> and Ajiboye in South West, all in Nigeria<sup>[5]</sup>, where male: female ratios of 1.4:1 and 1.5:1 were reported. This variant could result in more male involvement in substantial farming activities, a major sociodemographic risk factor for developing LS, which is the main occupation of the patients studied in this environment. Age was positively correlated with radiographic lumbar spondylosis. Below 20 years of age, only some cases of LS were recorded. After the age of 51, the number of normal radiographs reduced as the abnormal ones increased so much that after the age of 71, no patient had a normal-mild LS radiograph. The frequency and severity increase with advancement in age. This work collaborates with Tsujimoto et al.<sup>[9]</sup>, who demonstrated similar findings among Japanese women. There was no definite pattern between sex and LS. In some instances, females demonstrated more normal radiographs, and Males demonstrated more moderate-severe Ls, however, with no statistical relationship. It was in line with the findings of other workers, Van Saase et al.<sup>[10]</sup> proved that the relationship between lumbar spondylosis differs between sexes. The relationship between lumbar spondylosis may differ by severity, ethnicity, or sex. Pre-obesity was associated with lumbar spondylosis of KL  $\geq$ 3 grade but not obesity. This suggests that greater BMI may be associated with lumbar spondylosis. This collaborated with the work of Symmons DP et al. on A longitudinal study of back pain and radiological changes in the lumbar spines of middle-aged women<sup>[11]</sup> and O'Neill TW et al. on the distribution, determinants, and clinical correlates of vertebral osteophytosis, a population-based survey.<sup>[12]</sup> Similar findings were also reported by Tsujimoto R et al.<sup>[9]</sup> However, some studies have reported that obesity is related to lumbar spondylosis<sup>[13]</sup>, but others have not.<sup>[14]</sup> Yoshimura et al.<sup>[15]</sup> demonstrated regional variation of obesity-related

LS. The work reported obesity related to lumbar spondylosis in the United Kingdom but not in Japan. This study proved that occupations requiring repetitive movement and lifting heavy items result in LS followed closely by sedentary workers. Farmers were shown to have more moderate and severest forms of LS (11.1 % and 47.2%, respectively) than other occupations. Sedentary workers followed closely with 11.5% of KL4. This work collaborated strongly with that of Ansari et al., who found abnormalities in 42% of manual laborers, 24% of sedentary workers, 26% of homemakers, and 4% of students.<sup>[16]</sup> However, the work contradicts Juliette A. O et al. 6, demonstrating that LBP was most common, up to 36.22% in those patients with a sedentary lifestyle compared to 17.30% of farmers. This could be because farmers in our study use a substantial farming method, which requires repetitive movement of their lumber bones compared to those in their study area, who are more mechanized. All the students in our study had normal radiographs, as none demonstrated any stage of LS. This is variant with the works of Goode et al.<sup>[6]</sup> and Ansari et al.<sup>[16]</sup>, who demonstrated 4.32% and 4.0% cases of LS in their works, respectively. The possible explanation for this variation could be that our Students attend school at younger ages, as it was shown that none of the students in this study were aged >30 years. There was a positive relationship between lumber spondylosis and level of education. Patients with no former education had more and several forms of lumbar spondylosis, and this was statically significant. This study collaborated with Vinícius Cunha Batista et al.<sup>[17]</sup>, who established a stronger association of low education with longer duration, higher recurrence of back pains, and less favorable courses, including LS. They attributed the Mechanisms that could explain these associations include variations in behavioral and environmental risk factors by educational status, differences in occupational factors, compromised "health stock" among people with low education, differences in access to and utilization of health services, and adaptation to stress.[17]

## Limitations

This was a single-centered study done in a tertiary hospital in our environment. A multi-centered or community-based study with a higher sample size will be more statistically significant for the conclusion.

#### 5. Conclusion

There was a positive correlation between severe lumbar spondylosis with socio-demographics of patients with chronic low back pain. Being male, advanced age, farmers, low educational status, obese, and hypertensive were directly proportional to the severity of LS. However, smoking in our study seems to have a protective effect on developing severe LS; however, this needs further exploration to draw a firm conclusion.

#### **Conflict of Interest**

The authors declared that there is no conflict of interest.

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