American Journal of
Health, Medicine and Nursing Practice
(AJHMN)

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American Journal of Health, Medicine and Nursing Practice
ISSN 2520-4017 (Online)
Vol.9, Issue 3, pp 28 – 41, 2023

www.ajpojournals.org

Prevalence of Cervical Spondylotic Myelopathy Among Patients with Cervical Spondylosis

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Article History

Submitted 04.10.2023 Revised Version Received 07.10.2023 Accepted 05.10.2023

Abstract

Purpose: To calculate the prevalence of cervical spondylotic myelopathy among patients with cervical spondylosis.

Methodology: The cross-sectional study was conducted in district Gujrat and Gujranwala on patients with cervical spondylosis in order to evaluate the prevalence of cervical spondylotic myelopathy among them. Data (n=186) was collected through non-probability convenient sampling using a Japanese orthopedic association cervical myelopathy evaluation questionnaire with the reliability of 0.89–0.96 by making a personal visit to different clinics and hospitals in Gujrat.

Findings: The prevalence of cervical spondylotic myelopathy in patients with cervical spondylosis was 62.37%. The prevalence among different age group varied with the highest prevalence among age group 61-65 years old (30.2%). Moreover, it was higher in males than in females (52.6% vs 47.4%). The study also observed significant association between age and prevalence of cervical spondylotic myelopathy as they have p-value (0.000). This study concluded that the prevalence of cervical spondylotic myelopathy is high in cervical spondylosis patients. It appears that advance age may be the factor responsible for cervical spondylotic myelopathy, as cervical spondylosis is more prevalent in older individuals.

Recommendations: There is a need to investigate the impact of lifestyle factors such as physical activity and posture on the frequency and severity of cervical spondylotic myelopathy. Both clinical assessment and imaging techniques should be considered to accurately diagnose and evaluate the severity of CSM. To explore potential correlation between the duration and progression of cervical spondylosis and development of CSM further studies should be conducted.

Keywords: *Cervical Spondylosis, Cervical myelopathy, Cervical spondylotic myelopathy, Prevalence*

1.0 INTRODUCTION

Cervical spondylosis (CS) is a degenerative condition that begins in the intervertebral disc and spreads as people age to affect many discs. The term applies to both the pathology of the spine and the related neurological condition. Around 50% of adults over age 50 and 75% of people over age 65 years have the typical radiographic findings of cervical spondylosis.[1] The C5-C6 & C6-C7 points are where CS typically manifests itself, while higher levels may also be affected.[2] The pathogenesis of cervical spondylosis is made up of progressive changes that impair the cervical vertebral column biomechanics. Water, protein, and mucopolysaccharides are lost from the intervertebral disc as a result of changes to the proteoglycan matrix brought on by an increase in the keratin-chondroitin ratio. During disc desiccation, the nucleus pulposus shrinks and becomes more fibrous, losing its flexibility.

The nucleus pulposus is responsible for the cervical spine's loss of disc height, ligamentous laxity, buckling, and compression as it loses the ability to effectively withstand stresses from weight bearing and starts to herniate over the fibres of the annulus fibrosus. Further disc dehydration makes the annular fibres more automatically susceptible to compressive loads, which causes significant alterations in the load distribution along the cervical spine.[3] The typical symptoms of CS include headaches, stiffness in the neck and arms, numbness, weakness, and burning in the neck and arms, as well as discomfort.[4]

The CS is multifactorial and age-related changes, strong physical demands on the job, shock, whole-body tremor, etc. are all potentially dangerous features. The structural changes in the spine are also influenced by smoking and genetic factors. The prevalence of CS varies depending on a number of variables, including age, gender, occupation, and race. After the age of 40, CS is frequently observed in people. It is discovered that the prevalence of CS rise with age, with 25% of individuals under the age of 40, 50% of adults above the age of 40, and 85% of persons above the age of 60 exhibiting almost signs of disc deterioration. In a 3:2 ratio, males are stated to be more prone to expanding CS than their female complements.[5]

Those who work in occupations that involve repetitive postural alterations to the cervical vertebra are more likely to develop cervical spondylosis. Cervical spondylosis is extra common in housewives and teachers, according to a study from ‘Banaras Hindu University in Varanasi, India’. This is because these groups spend more time bending their necks while performing household tasks like cleaning, cooking, and mopping, as well as while working at a desk like writing lesson plans.[6]

Cervical spondylotic myelopathy (CSM) is a typical age-related worsening illness which may lead to motor and sensory dysfunction (pain, variability, and disruption). Multilevel cervical spondylotic myelopathy is primarily seen in aged people and is characterised by anterior compressive disease like disc herniation, osteophytes, or ligamentous hyperplasia.[7] Upper and lower extremities could be seriously impacted by cervical myelopathy. [8] The two variables that lead to the expansion of CSM are mechanical factors and ischemia. Additional categories for the mechanical factors include static and dynamic mechanical factors. The static factors are physical spondylotic anomalies that cause the tightening of the spinal canal. Direct compression of the spinal cord by this anomalous structure might result in myelopathy. The static variables include the growth of osteophytes, ossification of the posterior longitudinal ligament (OPLL), hypertrophy of the flavum ligament, disc herniation, hereditary canal stenosis, kyphosis, and subluxation.[9]

Symptoms could be brought on by dynamic compression of the cervical nerve tissue. Osteophytic spurs and protruding intervertebral disks, also known as spondylotic bars, put pressure on the anterior part of the spinal cord as it elongates in flexion. In contrast, during extension, the facet joints or hypertrophic ligamentum flavum stress on the cord's posterior surface. In addition to direct mechanical injury, dynamic compression has been demonstrated to deteriorate the vasculature supplying the chord, resulting in different degrees of ischemia.[10]

The spinal cord flattens and widens as an outcome of constant mechanical compression, which also triggers a series of pathological processes such as ischemia, endothelial cell dysfunction, disturbance of the blood-spinal cord barrier, neuroinflammation, and programmed cell death. Axonal demyelination, gliosis, scarring, cavitation, deterioration of the corticospinal pathways, interneuronal loss, and wasting of the anterior horn cell may eventually occur in the spinal cord.[11] Furthermore, to mechanical or dynamic compression, increasing tension or shear stresses cause widespread or limited axonal injury to the spinal cord.

Due to the lengthening of the spinal canal, axial strain and stretching of the spinal cord may worsen during normal cervical spine flexion. [12] Most frequently, CSM develops slowly and subtly. The spinocerebellar and corticospinal tracts are typically the first to be compromised, and patients frequently have shaky gait and poor fine motor skills. Additionally, patients may experience radiculopathy or non-radiculopathy nonspecific neck and shoulder pain.[13]Lack of physical skill in the hands, weakness, rigorousness, increased frequency or uncertainty of urination, spasticity in the extremities, and walk disfunction, such as a rigid or spastic walk, are common symptoms and signs of CSM that can appear slowly over time.[14] The early symptoms of CSM are often sensory abnormalities, such numbness, which are mainly confined to upper limbs.[15]

Problem Statement

Previous studies have frequently assessed cervical radiculopathy associated with the cervical spondylosis. There is limited literature on prevalence of cervical myelopathy due to cervical spondylosis. So, the purpose of this study is to find the prevalence of cervical spondylotic myelopathy among patients with cervical spondylosis.

2.0 METHODOLOGY

This descriptive cross-sectional study was conducted in District Gujrat and Gujranwala on cervical spondylosis patients. Sample size of 186 was calculated and collected through non probability convenient sampling. The participants fulfilling the eligibility criteria were included in this study. Inclusion criteria comprised of the patients diagnosed with cervical spondylosis[16] and of age between 45 and 65 years[17]. The exclusion criteria comprised of patients with surgically treated cervical spine or spinal cord, history of cervical spine injury, infected cervical spine pathology (within last one year), tumors, congenital or developmental cervical abnormalities[1], patients who were identified of having symptomatic CS due to trauma, rheumatoid arthritis, and spondylitis within last 6 months[5] and diabetic patients from last 6 months.[18]

Data Collection

Our research was multicentral (Orthopedic Ward, Neuro ward, Physiotherapy clinics). Japanese Orthopedic Association cervical myelopathy evaluation questionnaire (JOACMEQ) was used to assess the cervical spondylotic myelopathy and questionnaire was given to the targeted population

after verbal consent and entire questionnaire was briefly explained. Information was collected from study subjects after interviewing them from questionnaire. Questionnaire consist of two portions. First portion consist of demographic data (Age, gender, occupation). Second portion consist of total 24 questions. (1) Cervical spine function (4 questions), (2) Upper extremity function (3 questions), (3) Lower extremity function (5 questions), (4) Bladder function (4 questions) and (5) Quality of life (8 questions). Questionnaire had total 93 score and prevalence of CSM was calculated through percentage by dividing the score achieved by patients to 93 and then multiplying it with 100. Answers were recorded in form of yes and no. Mild, moderate and severe myelopathy was considered yes for the prevalence and no myelopathy was considered no.

Statistical Analysis

Data was entered and analyzed using statistical package for Social Sciences (SPSS) software version 20. For descriptive analysis, mean and standard deviation were calculated for quantitative variables whereas frequency and percentages were calculated for qualitative variables. For inferential statistics, appropriate statistical test was applied. All results were calculated at 95% confidence interval and P-value ≤ 0.05 was considered as a significant value.

3.0 FINDINGS

186 middle aged adults were included in the study out of which 82 (44.09%) were of 45-50 years, 35 (18.82%) were of 51-56 years, 34 (18.28%) were of 56-60 years, 35 (18.82%) were of 61-65 years and the mean age was 52.91± 6.524 (Figure 1). From total sample size, 55.91% were males and 44.09% were females. Among the occupations 65 (34.94%) were housewives, 23 (12.37%) were drivers, 13 (6.989%) were bankers, 11 (5.914%) were farmers, 16 (8.602%) were teachers and 58 (31.18%) were workers. (Table 1)

When functional level of CS patients was checked through the questionnaire, it revealed that 34.41% and 39.78% patients had better cervical spine function and quality of life, 45.70%, 41.40% and 60.22% had no change in the function of upper extremity, lower extremity and bladder function. (Table 2)

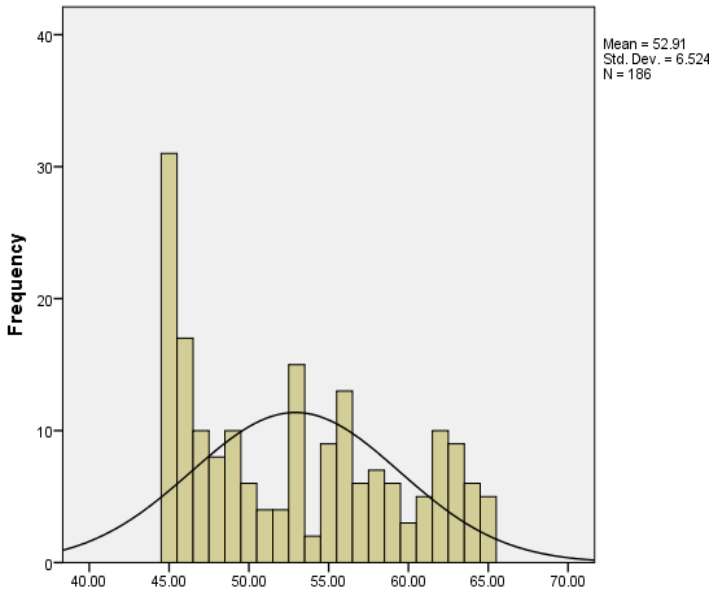

Figure 1: Age of Participants

Table 1: Demographic Data

Variables	Categories	n (%)
Age of participants	45-50	82 (44.09%)
	51-55	35 (18.82%)
	56-60	34 (18.28%)
	61-65	35 (18.82%)
Gender of participants	Male	104 (55.91%)
	Female	82 (44.09%)
Occupation of participants	Housewife	65 (34.94%)
	Driver	23 (12.37%)
	Banker	13 (6.989%)
	Farmer	11 (5.914%)
	Teacher	16 (8.602%)
	Worker	58 (31.18%)

Table 2: Functional Status of Patients

Variables	Categories	n (%)
Cervical Spine function	Somewhat worse	28 (15.1%)
	Somewhat better	32 (17.2%)
	Better	64 (34.4%)
	No change	62 (33.3%)
Upper extremity Function	Somewhat worse	15 (8.1%)
	Somewhat better	28 (15.1%)
	Better	58 (31.2%)
	No change	85 (45.7%)
Lower extremity function	Somewhat worse	21 (11.3%)
	Somewhat better	39 (21.0%)
	Better	49 (26.3%)
	No change	77 (41.4%)
Bladder function	Somewhat worse	18 (9.7%)
	Somewhat better	12 (6.5%)
	Better	44 (23.7%)
	No change	112 (60.2%)
Quality of life	Somewhat worse	39 (21.0%)
	Somewhat better	50 (26.9%)
	Better	74 (39.8%)
	No change	23 (12.4%)

Prevalence of cervical spondylotic myelopathy was calculated in the form of categories which were no myelopathy (76-100%), mild (51-75%), moderate (26-50%) and severe myelopathy (0-25%). Mild, moderate and severe myelopathy was considered yes for the prevalence and no myelopathy was considered no. (Table 3 and Figure 2). When prevalence of CSM was calculated it showed that cervical spondylotic myelopathy was present in 62.37% (116 participants) while 37.6% (70 participants) did not have cervical spondylotic myelopathy. (Table 4 and figure 3)

Table 3: Categories of Myelopathy

Categories	Frequency	Percent
No myelopathy	70	37.6
Mild myelopathy	75	40.3
Moderate myelopathy	41	22.0
Total	**186**	**100.0**

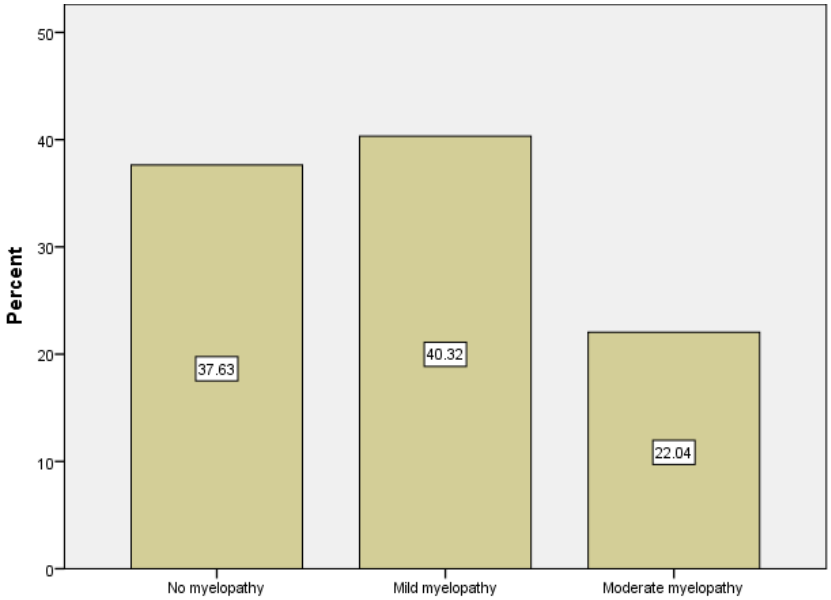

Figure 2: Categories of Myelopathy

Table 4: Prevalence of Cervical Spondylotic Myelopathy

Myelopathy	**Frequency**	**Percent**
Yes	116	62.4
No	70	37.6
Total	**186**	**100.0**

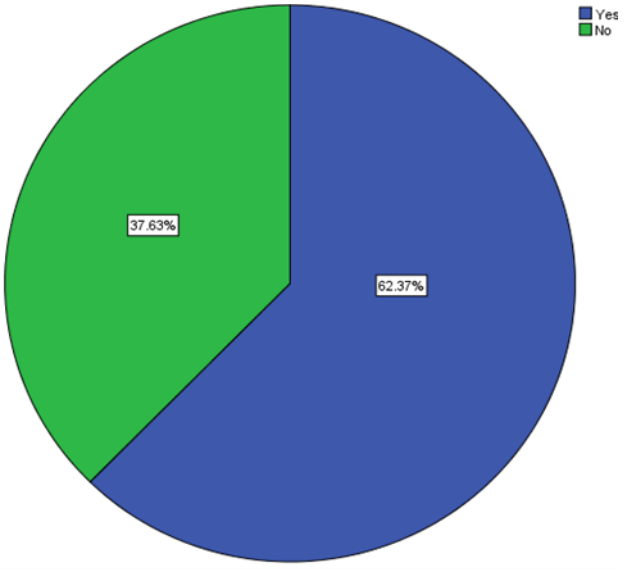

Figure 3: Prevalence of Cervical Spondylotic Myelopathy

When the association of cervical spondylotic myelopathy with the demographics of patients was checked, it showed that age had a significant relation to the prevalence of CSM (p-value 0.000). Different age groups had varying levels of connection strength with the prevalence of CSM. The age group between 61-65 years old had the greatest prevalence (30.2%) when compared to the youngest age group. Gender and occupation of participants were proved to be non-significant as they have p-value (0.239), (0.147) that is more than (>0.05) but myelopathy was more prevalent in males (52.6%) and among the occupation housewives (40.5%) and workers (25.9%) were more exposed to CSM. (Table 5)

Table 5: Association of Participant's Demographics with Prevalence of Cervical Spondylotic Myelopathy

Variables	Categories	Prevalence of Myelopathy		Total	Chi-Square Tests	P-Value
		Yes	No			
Age of participants	45-50	29 (25.0%)	53 (75.7%)	82 (44.1%)	52.023	0.000
	51-55	25 (21.6%)	10 (14.3%)	35 (18.8%)		
	56-60	27 (23.3%)	7 10.0%)	34 (18.3%)		
	61-65	35 (30.2%)	0 (0.0%)	35 (18.8%)		
Gender of Participants	Male	61 (52.6%)	43 (61.4%)	104 (55.9%)	1.385	0.239
	Female	55 (47.4%)	27 (38.6%)	82 (44.1%)		
Occupation of participants	Housewife	47 (40.5%)	18 (25.7%)	65 (34.9%)	8.175	0.147
	Driver	17 (14.7%)	6 (8.6%)	23 (12.4%)		
	Banker	8 (6.9%)	5 (7.1%)	13 (7.0%)		
	Farmer	6 (5.2%)	5 (7.1%)	11 (5.9%)		
	Teacher	8 (6.9%)	8 (11.4%)	16 (8.6%)		
	Worker	30 (25.9%)	28 (40.0%)	58 (31.2%)		

Figure 4, 5 and 6 explains the association of participant's demographics with prevalence of cervical spondylotic myelopathy.

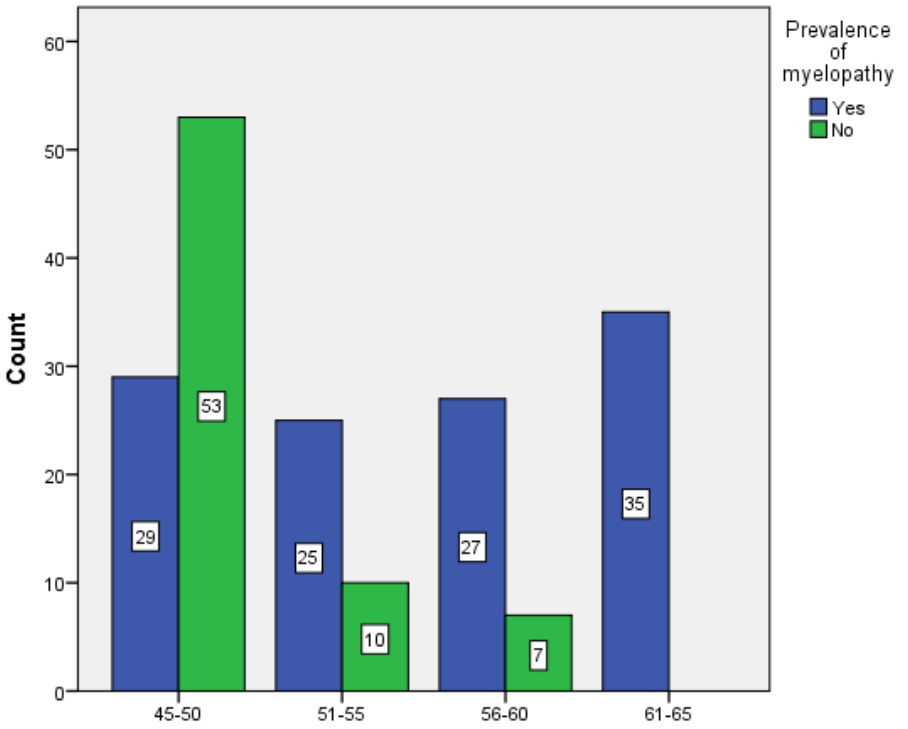

Figure 4: Relation of Age with the Prevalence of Myelopathy

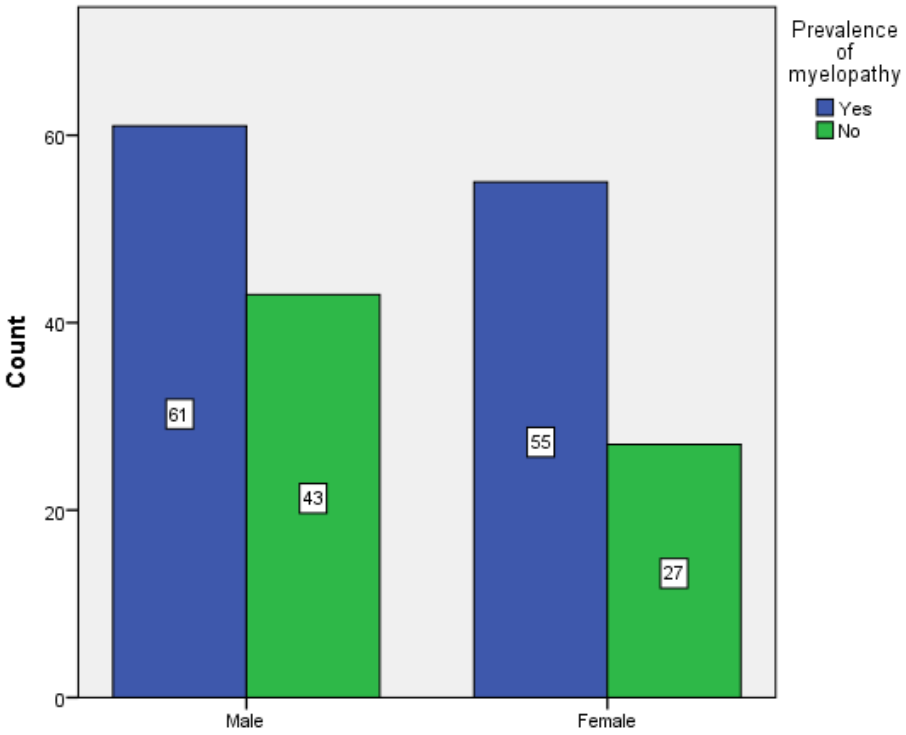

Figure 5: Relation of Gender with the Prevalence of Myelopathy

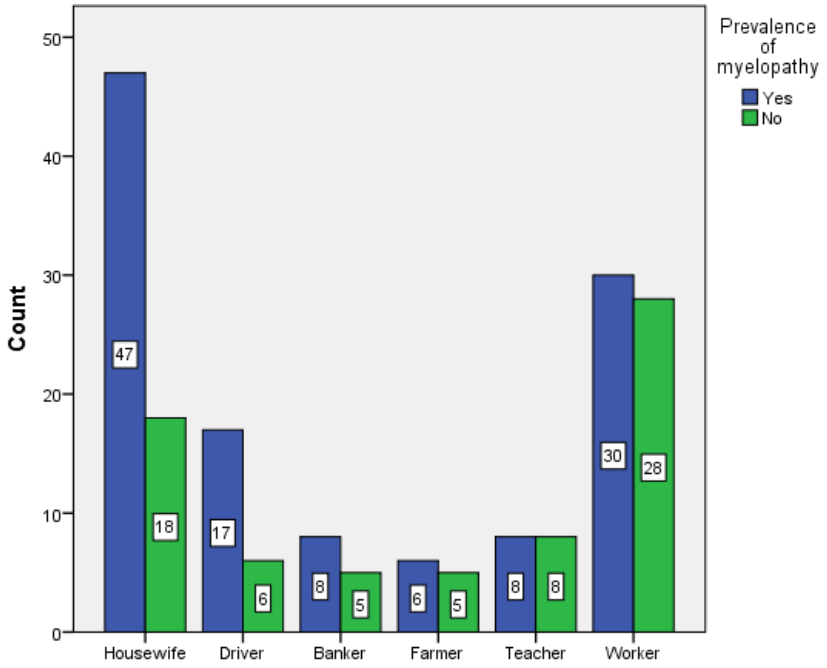

Figure 6: Relation of Occupation with the Prevalence of Myelopathy

Discussion

The focus of this study was to find the prevalence of cervical spondylotic myelopathy among patients with cervical spondylosis. Cervical spondylosis is a progressive illness which affects the vertebral bodies and intervertebral disks of the neck.[19] The results of this study showed quite significant prevalence of cervical spondylotic myelopathy among cervical spondylosis patients. There was a significant association between age and cervical spondylotic myelopathy and results also showed that different age groups had varying levels of connection strength with the prevalence of CSM. The age group between 61-65 years old had the greatest prevalence (30.2%) when compared to the youngest age group. As CSM had non-significant association with gender and occupation, myelopathy was more prevalent in males (52.6%) and among the occupation housewives (40.5%) and workers (25.9%) were more exposed to CSM.

A study conducted in Dhaka, Bangladesh concluded that our population is becoming more predisposed to cervical spondylosis, which is a serious public health concern. While affecting people of all ages, the middle-aged group was the utmost susceptible to this condition. Occupation (as service workers or housewives), longer hours worked per day, and stressful employment are some of the traits that are widespread among the patients.[20] Similarly in our study CSM was more widespread in housewives (40.5%) and workers (25.9%). The results of this study are corresponding to our study.

A study was conducted by Moon M-S et al. The results displayed that the prevalence of cervical spondylosis was 47.8% overall. By age, degeneration gradually gets worse and the prevalence of cervical spondylosis and the amount of spondylotic segments rise.[21] In our study, there was also a correlation between age and prevalence of cervical spondylotic myelopathy (p= 0.000). As the age

increases, chances of having cervical spondylotic myelopathy also increases. The results of this study are in accordance to our findings.

A study was conducted by Tian W et al. and the results of study showed that among 3859 people 531 people had cervical spondylosis and frequency of CS found to be 13.76%. The prevalence in females (16.51%) was higher than that (10.94%) in males. Young women, adults in their forties or older, and working individuals were high risk groups.[22] This study contradicts our results because according to our findings CSM was more prevalent in males (52.6%) than females (47.4%) and older age groups were more exposed to CSM.

Oguntona S et al. done a study to find the prevalence of cervical spondylosis of South West Nigerian farmers and feminine sellers, they concluded that cervical spondylosis and lifting large loads on the head are positively and significantly linked and weighty load movers are more likely to develop severe cervical spondylosis.[23] Similar results were found from this study that among the occupations the workers who carries load were more exposed to CSM with the prevalence of (25.9%). The results of this study are in favor of our study.

Previous research was conducted by Olarinoye akoredo et al. concluded that CSM was 42.1% prevalent in spondylotic individuals. Males were more prone to the illness than females were. In spondylosis most frequently impacted disc level were C4/5 and C5/6 while in CSM C3-4 level were impacted.[24] Our study had also the same findings that prevalence of CSM was more common in males (52.6%) than females (47.4%).

Alshami AM conducted a study and they concluded that of the total patients (5929), Cervical spondylosis was widespread (30%) in the age groups older than 30. Women (7.8% and 76.2%) had a higher prevalence of spondylosis than men (73.9% and 3.3%, respectively).[25] The findings of this study oppose our results in a way according to our study males were more prone to CSM than females. A study's findings showed that prevalence of CS was reported as 17.2%, and 12.2% of cases had abnormal pure-tone audiometry findings with significant association with CS while age, gender, BMI chronic illness had non-significant association.[26] In our study we found significant association between myelopathy and age so this study contradicts with our results.

4.0 CONCLUSION AND RECOMMENDATIONS

Conclusion

According to this study finding, the prevalence of cervical spondylotic myelopathy is relatively high in cervical spondylosis patients. It appears that advance age may be the factor responsible for cervical spondylotic myelopathy, as cervical spondylosis is more prevalent in older individuals.

Recommendations

Following recommendations should be considered:

1. After conducting this study, there is a need to investigate the impact of lifestyle factors such as physical activity and posture on the frequency and severity of cervical spondylotic myelopathy.
2. Both clinical assessment and imaging techniques should be considered to accurately diagnose and evaluate the severity of CSM.
3. There is a need to explore the potential risk factors and their link with the expansion of CSM.

4. Studies should be conducted to explore potential correlation between the duration and progression of cervical spondylosis and development of CSM.

Acknowledgements

Author is grateful to her parents, family, friends and all the teachers, and her supervisor helping and providing their insights as well as motivation.

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