ADDIS ABABA UNIVERSITY COLLEGE OF HEELTH SCIENCE SCHOOL OF MEDICINE DEPARTMENT OF ANATOMY

Prevalence of Cervical Spondylosis and Its Associated Factors Among Symptomatic Adult Patients Attending referral hospital in Ethiopia 2023

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A Thesis to be Submitted to the School of Graduate Studies of Addis Ababa University in Partial Fulfillment of the Requirements for the Degree of Masters of Science (MSc.) in Anatomy.

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I, Beyan Abduljewad (ID No. GSR/4005/13), declare that this postgraduate thesis is my original work and has not been submitted partially or in full for any degree at any other university and that all sources of materials used for the thesis have been duly acknowledged.

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ACRONYMS AND/or ABBREVIATIONS

CS	Cervical Spondylosis
CSM	Cervical Spondylotic Myelopathy
CSR	Cervical Spondylotic Radiculopathy
DD	Degenerative Diseases
EB	Ethiopian Birr
GBD	Global Burden of Disease
HMIS	Health Management Information System
IVD	Inter-Vertebral Disc
MRI	Magnetic Resonance Imaging
MRN	Medical Record Number
MSD	Musculo Skeletal Disorders
NF	Neural Foramen
NP	Neck Pain
OA	Osteo- Arthritis
ODK	Open Data Kit
OPLL	Ossification of Posterior Longitudinal Ligament
SCI	Spinal Cord Injury
SNP	Shoulder Neck Pain
SPSS	Statistical Package for Social Science
TASH	Tikur Anbessa Specialized Hospital
US	United States

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ABSTRACT

Background: Cervical spondylosis is a comprehensive term that describes age-related chronic degenerative diseases that result in neck pain, tingling in the arms, and possible myelopathic-associated paralysis.

Methods and Materials: The study was conducted at the Tikur Anbessa Specialized Hospital (TASH) neurology and rheumatology clinic from May 1, 2022, to December 30, 2022. A 2-year retrospective hospital-based design was implemented. The source population was all spondylosis patients. The study population was all cervical spondylosis patients with complete clinical and imaging data from January 2020 to January 2022, and a total of 339 were selected randomly. Data was collected using the Open Data Kit and the internet-based Kobo Toolbox and analyzed using SPSS version 26. Mean, median, and standard deviation for continuous data and a frequency table for categorical data A bivariate and multivariate logistic regression analysis was carried out to see the association between dependent and independent variables. Statistical significance was considered at a level of 5% significance and an adjusted odds ratio (AOR) with a 95% CI.

Result: During the study period, 2176 degenerative spinal disease patients were diagnosed. Of these, the medical records of 339 cases were taken using simple random sampling. Among study participants, 189 (55.8%) were female and 150 (44.2%) were male. The mean age of patients was 54.9 years, with an SD of 10.044. The prevalence of cervical spondylosis was 97 (28.5%), which is the second most common next to lumbar spondylosis (199.5%). 40 (11.8%) had both cervical and lumbar spondylosis, and 3 (0.9%) had thoracic spondylosis. The odds of having cervical spondylosis among females were higher with an AOR of 2.959 (CI: 1.445–6.060; p =.003), and the age group between 40 and 59 was also higher with an AOR of 2.011 (CI: 1.164–6.240; p =.000); smokers with an AOR of 2.02 (CI: 1.843–11.0242; p =.008); and current alcohol intake with an AOR of 2.83 (CI: 1.520–6.0)

Conclusion: The prevalence of cervical spondylosis (CS) was relatively high compared to the reported literature. In Korea, Bangladesh (Punjab), India (population), China, Nigeria, and Sweden, the prevalence was: 47.8, 47, 17.2, 13.8; 10.7; and 0.035 percent, respectively. The risk of CS increases with age in both sexes, and females were once mostly affected by cervical spondylosis.

Keywords: cervical spondylosis, myelopathy, neck pain, prevalence, radiculopathy.

1. INTRODUCTION

1.1. Background

Spondylosis is a common term that is often used to describe various types of spinal degeneration of anatomical elements in the neck or back, particularly due to old age. This degeneration of structures in the cervical (neck)region of the spine is referred to as cervical spondylosis. In spondylosis, disc rupture, bony overgrowth, spinal ligament hypertrophy , or a combination of these situations may compress the spinal cord or the nerves incoming or leaving the spinal cord, resulting in pain and other symptoms that lead to cervical spondylosis, which is common in middle-aged and elderly people(1).

The overall term for this age-related degenerative deterioration that affects the cervical vertebrae, the facet joints, other joints, and their supporting soft tissues is called cervical spondylosis. Chronic disc degeneration causes the cervical spinal column to experience more mechanical stressors, which leads to the production of osteophytes and secondary deterioration of nearby anatomic structures such as the facet joints, the posterior longitudinal ligament (PLL), and the ligamentum flavum. The three clinical signs and symptoms that cervical spondylosis manifests are consequently caused by these degenerative modifications and concomitant nerve impingement. which are cervical myelopathy, radiculopathy, and axial neck pain. Patients may have one or more of the three syndromes in combination(2).

Research showed that 25% of individuals under the age of 40, 50% of adults over the age of 40, and 85% of adults over the age of 60 have some sign of cervical degenerative disease, it is routinely observed in many asymptomatic persons(3).

Another study of asymptomatic persons found that at 65 and 60 years old, respectively, 70% of women and 95% of men had significant degenerative alterations at 1 or more vertebral levels. At C5-C6 is where degeneration is most frequently detected, followed by C6-C7 and C4-C5(4).

Surgery is often recommended for patients with severe, intractable pain, advancing disease, and those who also have weakening and neurological abnormalities. Treatment for mild to moderate disorders is typically conservative(2).

This degradation results in ligament hypertrophy, osteophytes, and ruptured intervertebral discs, which may ultimately result in compression of the nerve roots and spinal cord. Cervical spondylotic myelopathy (CSM), also known as spinal cord compression, can result in symptoms such as gait imbalance, loss of fine motor control in the hands, sensory

problems, and urine complaints. Many CSM patients are asymptomatic or only have modest symptoms; the disorder is commonly discovered by an X-ray or an MRI(5). About 7.6% of asymptomatic participants in the research had cervical intervertebral disc protrusion with spinal cord compression, with older adults having a higher prevalence of the condition (4).

One of the more common illnesses related to dysfunction of the cervical spinal nerve root (s) is cervical spondylotic radiculopathy (CSR), which is characterized by the recurrence of pain episodes occasionally accompanied by sensory and/or motor abnormalities with a radicular distribution (6).

Every episode is a couple of weeks long. In this condition, the intervertebral neural foramina may constrict as a result of arthritic changes in the cervical spine nerve root and intervertebral disc prolapse. Cervical spondylotic radiculopathy and cervical myelopathy have quite different clinical presentations, and myelopathy only rarely develops from radiculopathy(7).

There are various illnesses that are challenging to distinguish clinically and can cause neck pain that radiates to an upper extremity and mimics cervical spondylotic radiculopathy. It is frequently required to do radiographic and electrophysiological tests, such as computed tomography and magnetic resonance imaging of the spine, in order to arrive at a definitive diagnosis. The limited knowledge regarding the prevalence and distribution of cervical spondylosis in the general population is due in large part to the lack of consensus on diagnostic criteria and the relative costs of imaging. On cervical spine plain radiographs, many people over 30 exhibit comparable anomalies; nevertheless, it can be challenging to distinguish between normal aging and illness. Oftentimes, severe cervical degenerative changes are asymptomatic, but they might cause neurological problems, neck pain, or stiffness(7).

In asymptomatic individuals, 25–50% of those between 50 and 64 years old and 75–90% of those over 65 have radiographic evidence of spondylosis. Repeated macro- and micro-trauma from occupational and environmental situations, as well as genetic predisposition, are risk factors for the development of CS. When the degenerative process results in a decrease in the spinal canal diameter and the sagittal mobility of the spinal cord, myelopathy begins to manifest. This causes ischemic cord compression, which results in cord atrophy, loss of grey matter neurons, and white matter demyelination (8).

1.2. Statement of problem

Spinal disorders have become an increasingly important social and medical problem in the modern world (9).

Problems in the cervical part of the spinal column are also connected with neck, arm, and forearm pain, which can significantly decrease the quality of life; this is due to pathological changes impacting the cervical spinal nerves forming the cervical and brachial plexuses (10).

Compared to low back pain, neck, and shoulder pain have been observed to be more prevalent illnesses recently (11).

According to estimates from 2013 and 2020, neck pain is the fourth leading cause of years spent living with a handicap worldwide. In 2020, neck pain was the second-leading cause of years lived with disability in Denmark, only exceeded by low back pain (12).

A significant personal and societal burden, neck, and shoulder pain affects roughly two-thirds of people at some point in their lives and is most common in middle age (13).

One study in the UK showed that 25% of women and 20% of men in the general population have neck pain. It currently affects 30 to 50% of the population at any given time (14).

An estimated 50 to 85 percent of people with neck pain do not completely recover from their symptoms, and others may develop chronic, debilitating pain (15).

Chronic neck pain (CNP), like chronic low back pain (CLBP), is frequently resistant to treatment and expensive in terms of direct and indirect costs (16).

Neck pain may be as frequent a factor in absenteeism from work-related activities as lower back pain (17).

Worldwide, neck pain is a condition that is becoming more prevalent. Epidemiological research on neck pain is quite heterogeneous, which makes it challenging to compare or combine data from various studies (18).

In a study conducted in Chinese, office workers' prevalence of 12-month reports of neck and/or shoulder pain was 66.7% (19).

The incidence of neck pain was found to be more common in office and computer-based workers. Some studies claim that between 33% and 65% of individuals have recovered from neck pain, but the majority of cases persist throughout a person's lifetime, making relapses common (20).

According to one meta-analysis, women are more likely than males to experience neck pain at the point, one year, and lifetime prevalence rates, which are 7.6%, 37.2%, and 48.5%, respectively(21).

In one study carried out in Ethiopia, school teachers self-reported having shoulder and/or neck pain for 12 months at a rate of 57.3% (95% CI: 53.6%–61.0%). Female teachers, teachers in primary public schools, and instructors with more than 30 years of experience in the classroom, respectively, had a greater prevalence of SNP (59.7, 60.42, and 72.2%)(22).

Approximately 50% of adults over 50 and 75% of people over 65 have typical radiographic abnormalities caused by cervical spondylosis. It's crucial to understand that age-related radiological alterations in the vertebrae only represent structural changes in the vertebrae, and such changes do not necessarily cause symptoms (23).

Cervical spondylotic radiculopathy was identified in 27 (19%) of the 142 individuals who underwent evaluation for spinal degenerative disorders (24).

In the cervical region, where myelopathy could have devastating effects, attention is much less serious. If left untreated, cervical spondylotic myelopathy (CSM), which is thought to be the most common cause of spinal cord dysfunction in people over 55, may result in lifelong spinal cord damage. Due to this, older people may become more dependent and have a lower quality of life (25).

Of the 72 instances with CSM detected, 32 (40.1%) exhibited cord compression, with 38.1% at the C3-C4 level and followed by 30.9% at the C4-C5 level, indicating that older males were more likely to develop CSM (51–60 years)(8).

Without surgical intervention, between 20% and 60% of patients are thought to deteriorate over time (26).

In investigations done on coolies (loading and unloading workers), cervical spondylosis affected 48.7% of cases in people over 40 and 51.3% in people under 40. Coolies between the ages of 40 and 45 showed the highest prevalence of cervical spondylosis. In general, cervical spondylosis prevalence rose with age (27).

Studies based on clinical data revealed that the proportion of patients with cervical spondylosis increased with aging before the age of 50 and declined after the age of 50. Both the male and female respondents yielded the same results (28).

Cervical spondylosis not only affects the quality of life but also increases the economic burden since high-cost surgery is a regular treatment method. Therefore, cervical spondylosis might become a public health concern (29).

Therefore, the objective of this study is to report the baseline of the prevalence of cervical spondylosis and its related lifestyle influence factors and provide evidence on its prevention and management

1.3. Significance of the Study

Cervical spondylosis is a frequent condition that can result in excruciating pain, missed work, and disability. It is a global public health issue that has a wide-ranging impact on many people.

Understanding the frequency of cervical spondylosis, its associated factors, and how it affects patients may help to lower disease-related morbidity, disability, and mortality.

The purpose of this study is to assess the prevalence of cervical spondylosis, associated factors, clinical presentation, and imaging findings in people who have neck pain.

So, the results of this study will help policymakers in the development and implementation of programs to reduce morbidity and disability.

Knowledge of the prevalence and its presentation will help in taking appropriate action.

Due to the lack of previous research on cervical spondylosis in Ethiopia, this study is highly significant and will provide foundational information for future studies. Additionally, it will help create rules for conducting investigations.

2. LITERATURE REVIEW

2.1. Prevalence of cervical spondylosis

According to a hospital-based prospective study with 680 participants that was conducted in China, cervical spondylosis was prevalent in 13.76% of cases (95% confidence interval (CI): 12.67–14.85%). In comparison to the urban and rural areas (13.07% and 12.25%), the prevalence of cervical spondylosis was higher in the semi-urban area (15.97%) ($p = 0.01$). With advancing age, the prevalence showed a rising trend. Compared to men, women showed a higher prevalence of cervical spondylosis. The prevalence of cervical spondylosis was higher among participants with lower levels of education. People who sustained the same working position for one to two and a half to three hours were more likely to develop cervical spondylosis ($P < 0.001$) (29).

The prevalence of neck pain was higher in women, in high-income countries compared to poor and middle-income countries, and in urban areas compared to rural areas, according to research on clinical rheumatology at the University of Queensland. The onset and progression of neck discomfort are affected by numerous environmental and psychological factors. The majority of research shows that women are more likely than men to experience neck pain and that this elevated risk persists until the 35–49 age group, after which the risk starts to drop. Estimates of the global burden of neck pain in relation to disability and activity limitation are presently being made as part of the Global Burden of Disease 2005 Study; results will be published in 2011 (20)

Higher and lower activity frequency groups both had a higher prevalence than other groups ($P < 0.001$). The frequency of cervical spondylosis was correlated with exercise intensity ($P < 0.001$). When compared to healthy individuals, those whose WHR was central obesity had a higher prevalence ($P = 0.002$). Women who were menopausal had a higher prevalence than those who weren't ($P < 0.001$). The amount of housework was linked to cervical spondylosis (29).

Another retrospective clinical data analysis of 1,276 cervical spondylosis cases in central China revealed that the prevalence of cervical spondylosis grew with aging before age 50 and declined with aging after age 50, especially in the elderly after 60 years. Both the male and female respondents yielded the same results. The prevalence of the disease among older female patients has clearly decreased. Imaging results from the same study support the earlier findings that the proportion of cervical spondylosis rose with aging before age 50 and decreased with aging after that age. The frequency of bulging or herniation at the most conspicuous distinctive imaging features, C3-C4, C4-C5, and C5-C6, increased with

aging before age 50 and decreased with aging after age 50, especially after age 60. The bulge or herniation at C6–C7 showed the same pattern of observation. Additionally, although there was no clear change in calcification, the fraction of spinal stenosis and hyperosteogeny increased with aging before the age of 60 and reduced with aging beyond the age of 60(28). Adults in the population had a 48.5% lifetime prevalence of cervical spondylosis, and 55% in those who screened at work(30).

In another study, 4% of the volunteers under the age of 40 had foraminal stenosis, while 10% of the volunteers had a herniated nucleus pulposus. Herniated nucleus pulposus (5%) and disc bulging (3%) were mild findings in participants over the age of 40 compared to foraminal stenosis (20%). The pitfalls of making surgical decisions based on diagnostic test results without carefully matching those findings with clinical signs and symptoms are highlighted by the prevalence of abnormal MRI of the cervical spine as related to age in asymptomatic persons (31).

In another study, 42 patients over the age of 60 were examined in the same study for radiological evidence of cervical spondylotic myelopathy, and their results were compared to those of younger patients. Multi-segmental lesions (average: 3.0 lesions) were detected on myelography and post-myelography computed tomography (CT), which contributed to the varied clinical characteristics of myelopathy. In older individuals, the higher disc levels of C3-4 and C4-5 were primarily implicated. In this patient subgroup, ligamentous entrapments, disc protrusion, posterior osteophyte, and retrolisthesis were the main etiological causes of myelopathy (31).

According to BMI, cases and controls were assigned in the Iraqi study on the risk factors of cervical spine osteoarthritis in adult women, and it was discovered that obesity is linked to the development of cervical OA (OR = 7.48, P = 0.0001, and 95% C.I. = 3.66–15.29). Moreover, 0.85 is found to be an actual and important risk factor in the occurrence of cervical OA (OR = 8.43, P = 0.0001, 95% C.I. = 3.66–19.77). High parity is also thought to increase the risk of adult women developing cervical spine OA (OR= 6.97, P = 0.001, 95%C.I.=3.55-13.70)(21).

Observational research on 90 individuals about their occupations was conducted at the Banaras Hindu University Institute of Medical Sciences. Out of the 90 in total, 26.66% were teachers, 15.66% were businesspeople, 34.4% were housewives, 12.2% were students, 4.4% were defense personnel, 2.2% were tailors, 3.3% were advocates, and 1.1% were farmers.

In this study, the proportion of participants in the age groups 21–30 was 16.6%, 31–40 was 18.8%, 41–50 was 36.6%, and 51–60 was 27.7%. Overall evaluation reveals that the majority of subjects, or 36.66%, were in the age range of 41 to 50 years(32).

The prevalence of all spondylosis severity levels was 47.8% in another prospective investigation on the age-related incidence of cervical spondylosis in 460 adult patients in Korea. The incidence was 13.2%, 67%, 58.9%, 58.8%, 70.3%, and 75.0%, respectively, in the fourth, fifth, sixth, seventh, eighth, and ninth decades of life. The incidence of mono-, bi-, tri-, quadri-, and penta-segment spondylosis was, correspondingly, on average 45.5%, 34.1%, 15.0%, 4.5%, and 0.9%. The prevalence of mono-segment spondylosis was 60.0%, 48.6%, 45.5%, 48.0%, 40.0%, and 33.3%, respectively, in the fourth, fifth, sixth, seventh, eighth, and ninth decades of life. Age increased the proportion of patients with spondylosis, but not the severity. It is believed that spondylosis severity and its onset and observation times are connected (33).

In the entire population, cervical spondylosis was prevalent at 3.5 cases per 1000 people. Ages 50 to 59 saw the highest prevalence, which thereafter started to decline in both sexes. Women continue to have a higher prevalence. Of the 27 subjects examined, instrumental diagnostic procedures were performed in 11 subjects (40.7%). Cervical X-rays were performed in 11 cases and electromyography in 1, while nobody underwent computed tomography, nuclear magnetic resonance, or myelography. Right arm involvement was recorded in 6 participants (22.2%), left arm involvement in 2 subjects (7.4%), bilateral involvement in 17 subjects (63%), and no arm involvement in 2 cases (7.4%). Additionally, six participants (22.2%) reported having lumbosacral spondylotic radiculopathy symptoms (34). During the study period, 561 cases of cervical radiculopathy (332 males and 229 females) were discovered among Rochester, Minnesota residents. The median age at diagnosis was 47.9 ±13.4 years; for men, it was 47.6 ±13.1 years, and for women, it was 48.2 ±13.8 years. The total annual age-adjusted rates per 100 000 were 83.2, with males experiencing 107.3 and females experiencing 63.5. The modified rates have a 1.7 male-to-female ratio. The peak of the 50–54-year age group's cervical radiculopathy incidence rate was 202.9. Both sexes had a reduction in the prevalence of cervical radiculopathy beyond the age of 60, however, this tendency was more pronounced in women(35).

According to a study conducted in Botswana, 83.3% of teachers self-reported having MSD at any spot on their bodies within the previous 12 months. MSD was frequently and similarly reported at the neck (50.8%), upper back (52.6%), and shoulder (52.5%). The

frequency of MSD in the ankles and feet was 37.8%. Knees (33.3%), wrists/hands (30.7%), hips/thighs (18.2), and elbows (13.3%) were the areas with the fewest reported MSDs(36). A prospective study on 36 cases of cervical spondylosis in southwest Nigeria revealed that 36 occurrences of the condition were observed during the study period, accounting for 10.7% of all rheumatic cases. The male-to-female ratio was 1.8:1, with 23 men making up 63.9% and 13 females making up 36.1%. At the presentation, the average age was 52; 14 (50%) of these patients had severe radiological spondylotic alterations, and 28 (77.8%) of these patients had carried a heavy load on their heads. The most commonly impacted cervical spine levels were C4-C5, C5-C6, and C6-C7. Among the patients, one had radiculopathy, while the other had myelopathic quadriparesis (26).

Retrospective analysis of cervical spine magnetic resonance imaging findings in 160 neck pain patients at a tertiary hospital in Addis Ababa, Ethiopia, revealed that 79.4% of patients had degenerative cervical spine findings, including neural foramina and/or spinal canal stenoses. Of these, 53.5% were female and 46.5% were male. 6.3% of patients had non-degenerative imaging abnormalities, such as neoplasms and infections. Desiccation/dehydration, IVD height loss, and the disc osteophyte complex, either together or separately, were observed in 78.8% of patients with intervertebral disc (IVD) degenerative alterations. All of them have many levels of intervertebral discs or are multilevel. Seventy-five percent (75%) of patients had spinal bone degradation, shown as posterior marginal osteophytes alone or in conjunction with vertebral body height decrease(37). In the same study, patients over the age of 40 made up 85.3% of those who had a disc osteophyte complex with disc dehydration and/or height loss. Regarding IVD degenerative alterations, there was no statistically significant difference between participants' genders ($P = 0.112$). A disc osteophyte complex with either disc dehydration or height loss was linked to an older age group >40 years ($P< 0.0001$). In 18 individuals (11.25%) with intervertebral disc herniations other than disc osteophyte complexes, of which 44.4% were men and 55.6% were women, the fifth decade had the highest percentage of them (38.9%), followed by the third decade (27.8%). Only 5.6% of patients under the age of 21 were seen, and no patients older than 60 were examined. About 50% of them concerned the C5-C6 level, followed by the C4-C5 level (44.4%) and the C6-C7 level (22.2%). 61.1% of patients had single-level herniations, as opposed to 38.9% of patients who had multiple-level herniations, and 73.1% of patients had neural foramina, while 68.8% had spinal canal stenoses. In 24 (15%) of the patients the imaging results suggested spinal cord compression with signal alteration, 1.3% of patients had

spondylolisthesis, 1.9% of patients had findings that suggested a spine tuberculous infection, 1.9% of patients had neoplasm suspicions and 2.5% of patients had additional non-degenerative anomalies that were classified as miscellaneous (37).

According to a study done in Ethiopia on 422 medical students, the overall self-reported prevalence of NP was 49.2% (95% CI: 44.5–54%) in the previous year. The prevalence of NP was higher in male students, students with a history of NP, students who are under a lot of stress, students who use laptops or tablets for two hours or more, and medical students who sat in a head-down position for longer than two hours during a lecture, according to 52.0, 88.2, 61.9, 50.6, and 57.5% of students, respectively. The prevalence of NP was lower (42.9%) in those who had exercised, while it was higher (52.1%) in medical students who did not have comfortable back support(38).

In a different prospective study with 848 teachers in Ethiopia, the prevalence of shoulder and/or neck pain in the previous 12 months was self-reported to be 57.3% (95% CI: 53.4–61.0%). SNP was more common among instructors who were female, taught in public elementary schools, and had more than 30 years of experience in the classroom (59.7%, 60.4%, and 72.2%, respectively). The prevalence of shoulder and/or neck pain was higher (91.6%) in teachers with body mass indexes under 30(22).

2.2. Associated Risk factors of cervical spondylosis

A Chinese study was undertaken, and cervical spondylosis was positively correlated with suburban residence, 30 years of age or older, females, mental work activity, housework intensity, and sleeping for fewer than seven hours per day. The odds ratio (OR) for cervical spondylosis was 0.690 (95% CI: 0.512–0.929) among commuters who walked to work. Men and women have considerably different risk factors for cervical spondylosis. Age 30 or older in males and having vibrational features in their workplace were risk factors for cervical spondylosis (29).

In contrast, walking to work was a protective associated factor for cervical spondylosis in women. For women, living situation, age, menopause, mental-based employment, housework intensity, and sleeping for fewer than 7 hours/day were associated factors for cervical spondylosis. Different age groups had different cervical spondylosis symptoms. Work intensity, maintaining the same work position for 1 to 2.9 hours per day, and gender were linked factors for cervical spondylosis in people under the age of 30. The only characteristic related to the group of people between the ages of 30 and 45 was the amount of housework intensity they did. Living in a remote place, being a woman, working

mentally, getting less than 7 hours of sleep per day, and being exposed to vibration while working were the linked factors for the 45- and 60-year-old age groups. A preventive factor against cervical spondylosis was walking to work. Housework intensity, doing mental and mixed work, and getting less than 7 hours of sleep each night were linked to cervical spondylosis in adults who were at least 60 years old (29).

Out of the 422 participants in the study at Prince of Wales Hospital (the Chinese University of Hong Kong), 414 (98.1%) showed at least one MRI degenerative result at one or more vertebral levels. Statistical significance was not attained despite the fact that females tended to experience these degenerative alterations more frequently. At C3-C4, C4-C5, and C5-C6 levels, spinal canal stenosis, disc space narrowing, and disc bulging or protrusion were frequent, with C5-C6 having the greatest overall positive frequency. At C4-C5 levels, the spinal cord's high signal was more prevalent. The prevalence of cervical compressive deformity was highest at the C5 vertebra. Males who had larger sample sizes than females generally had a higher frequency of cervical spine degenerations, with spinal canal stenosis being statistically more common in male subjects with neck pain ($P=0.025$), and spine curvature straightening and disc space narrowing being slightly more common in male subjects with neck pain ($P<0.1$)(23).

At the lower disk levels, such as C5–6 and C–7, where the range of motion reduced with advancing age, spondylosis alterations, such as disk constriction and osteophytes, predominated. Comparatively increased mobility and spinal "olisthesis," notably "retrolisthesis" in extension, were observed in the upper disc levels, such as C3-C4 and C4-C5(33).

2.3. Conceptual framework

Sociodemographic details, such as place of residence, age, sex, and level of education, as well as lifestyle details, such as smoking and drinking alcohol, and etiological factors, such as dehydrated disks, herniated disks, bone spurs, stiff ligaments, neural foraminal stenosis, spinal canal stenosis, and repeated neck injuries, were all included in the data. Additionally, cervical radiculopathy, cervical myelopathy, and neck/shoulder pain are clinical features.

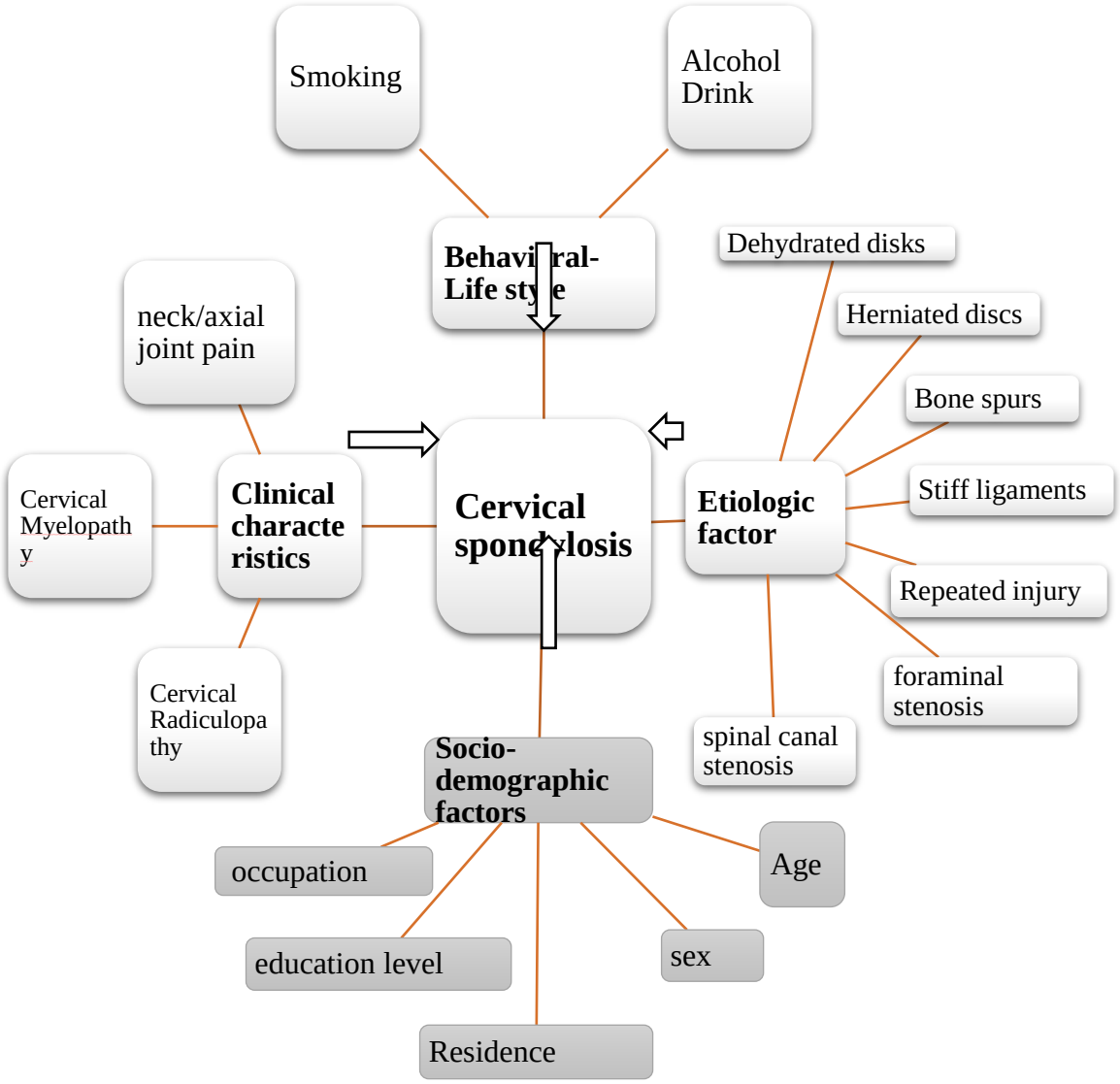

***Figure 1**: Conceptual framework of associated factors with cervical spondylosis Addis Ababa Ethiopia 2022*

3. OBJECTIVES

3.1. General objective

- ✓ To assess the prevalence of cervical spondylosis and its associated factors among symptomatic adult patients attending the neurology and rheumatology clinic of Tikur Anbessa Specialized Hospital,

3.2. Specific objectives

- ✓ To determine the prevalence of cervical spondylosis among symptomatic adult patients attending the neurology and rheumatology clinic at Tikur Anbessa Specialized Hospital
- ✓ To identify associated factors with cervical spondylosis among symptomatic adult patients attending the neurology and rheumatology clinic at Tikur Anbessa Specialized Hospital

4. METHOD AND MATERIALS

4.1. Study area and period

The study was conducted at the Tikur Anbessa Specialized Hospital Neurology and Rheumatology Clinic from May 1, 2022, to December 30, 2022, in Addis Ababa, Ethiopia. Tikur Anbessa Specialized Hospital (TASH) is the prime referral hospital in the country. It was established in 1964. It offers specialty, subspecialty, and healthcare facilities along with education and research activities. It is also an organization where specialized clinical facilities are provided that are not accessible in other public or private organizations. The TASH neurology and rheumatology department is one of the departments in the institution that provides clinical services for multiple neurologic disorders.

4.2. Study design

A 2-year institution-based retrospective cross-sectional study design was implemented from January 2020 to January 2022.

4.3. Source population

All adult patients with spondylosis visited the neurology and rheumatology clinic at Tikur Anbessa Specialized Hospital.

4.4. Study population

All cervical spondylosis patients who visited the neurology and rheumatology clinic of Tikur Anbessa Specialized Hospital from January 2020 to January 2022.

4.5. Eligibility

4.5.1. Inclusion criteria

All patients' records with a diagnosis of cervical spondylosis were included in the study.

4.5.2. Exclusion criteria

Patients with incomplete or unavailable data

Patients with a history of acute trauma to the neck

Patient with cervical diseases like congenital, neoplastic, idiopathic, circulatory, and metabolic.

4.6. Sample size determination and sampling procedure

4.6.1. Sample size calculation

The sample size was determined by using a single population proportion formula. The following assumptions were made while calculating the sample size: a 95% confidence level and a 5% margin of error in calculating the sample size. The percentage of symptomatic cervical spondylosis was 13.76% in the study conducted in China, but using the percentage of the associated factor in the study conducted in Gonder, the percentage of shoulder and/or neck pain was 72.2%, then by using the following formula

$$\mathbf{n} = \frac{\left(\frac{Z\alpha}{2}\right)2 * \boldsymbol{p}(\mathbf{1}-\boldsymbol{p})}{\boldsymbol{d}\mathbf{2}}$$

n= minimum sample size required for the study

Z = standard normal distribution (Z = 1.96), CI of 95% = 0.05

P is the proportion of shoulder and/or neck pain; p = 72.2% (0.722).

d = absolute precision or tolerable margin of error = 5% (0.05).

$n=\frac{((1.96)2 \times 0.722(0.278)}{(0.05)2}$ = 308.4

Since the sample was taken from a relatively large population that is greater than 10,000, there is no need for the sample size correction formula. To adjust for incomplete information, 10% of the contingency was used.

308*.1 = 30.8, 308+30.8= 339

4.6.2. Sampling Procedure and technique

A simple random sampling technique was used to select the medical record number. A digital record of the hospital was used as a sampling frame. First, medical record numbers (MRNs) were obtained from the health management information system (HMIS) registration book in the year from January 2020 to January 2022.

Then a medical record number was selected by computer-generated random sampling, and 339 sample patients were selected from the adult neurology and rheumatology units from January 2020 to January 2022.

4.7. Data Collection Tool and Procedures

The tool was adapted and modified based on several studies (8,28,29,32,37,37,39,40) to collect data. Data was collected using a pretested structured checklist. The structured checklists were tested on 5% of the sample at Alert Hospital. The tool contains four major sections: socio-demographic characteristics, lifestyle, clinical characteristics, and associated radiologic findings. The data was collected using the Open Data Kit (ODK) and stored on Kobo Toolbox using MRN as a baseline.

4.8. Data Quality control and management

To ensure the quality of the data, two BSc and one MSc nurse were recruited to collect the data. The data collectors were trained for two days on basic data collection skills and the use of the Open Data Kit (ODK). Both data collectors and supervisors participated in the pre-testing and standardization of the checklists. The collected data were checked for completeness and consistency on each day of data collection by the principal investigator. Case sheets based on MRN were read, and the necessary details were seen. In case of an unclear diagnosis, a neurologist was consulted.

4.9. Variables

4.9.1. Dependent variable

Cervical spondylosis

4.9.2. Independent variables

Socio demography

- ✓ Age
- ✓ Sex
- ✓ Place of residence
- ✓ Education level
- ✓ Occupation

Clinical characteristics

- ✓ Cervical Radiculopathy
- ✓ Cervical Myelopathy and
- ✓ Neck/Axial Joint Pain

Etiologic factor

- ✓ Dehydrated dick
- ✓ Herniated disc
- ✓ Bone spurs
- ✓ Facet joint hypertrophy
- ✓ Neural foraminal stenosis
- ✓ Spinal canal stenosis
- ✓ Stiff ligaments
- ✓ Repeated neck injury

Life-style:

- ✓ Current smoking
- ✓ Current alcohol intake

4.10. Operational definition

The spondylosis in cervical region is a term that includes an extensive variety of advanced deteriorating changes that disturb all the components of the cervical spine. To be termed cervical spondylosis, it should contain at least one of the following clinical characteristics: cervical radiculopathy, cervical myelopathy, and chronic neck or shoulder pain (32).

The spondylosis is may be applied non-specifically to any and all degenerative circumstances affecting the discs, vertebral bodies, ligaments, and/or associated joints of the spine(41).

Radiculopathy of cervical spine is Complaints in a dermatomal or myotomal distribution often occur in the arms, forearms, and hands. manifested by numbness, pain, and loss of function (40).

Myelopathy of Cervical spine is A group of complaints and findings due to intrinsic impairment to the spinal cord itself. Considered by loss of sensation, coordination, and gait disturbance, as well as bowel and bladder control complaints (40).

The Herniation of disc is a disorder during which the nucleus pulposus is displaced from the intervertebral space(42).

The foraminal stenosis is the reduction in the openings of the foramen due to loss of disc

height, osteophyte formation, and disc protrusion, producing compression of the exiting nerve root (40).

The canal stenosis is the decrease in the anteroposterior, transverse, or combined diameter secondary to loss of disc height with or without bulging of the intervertebral disc, hypertrophy of facet joints, and ligamentum(40).

Age group: younger age group is age less than 40, and the older age group is age 40 and above(43).

4.11. Data processing and Analysis

Data collection was done with Open Data Kit (ODK) version 1.25.2. After data collection, all completed forms were transported to Microsoft Excel for clearing and checking for completeness and then exported to SPSS version 26 for analysis. Mean, median, and standard deviation were used to describe continuous and discrete data, and frequency and percentage were used to describe categorical data. Bivariate binary logistic regression analyses were used. Variables with p-values ≤ 0.2 were identified as candidate variables for multivariable analysis. The results of multivariate analysis with a p-value ≤ 0.05 were considered statistically significant. The level of significance of 5% and the adjusted odds ratio (AOR) with a 95% confidence interval (CI) were used to present the estimates of the strength of the association. Finally, the results were presented using text, tables, and charts.

4.12. Ethical consideration

Ethical clearance was obtained from the Department Research Ethics Review Committee (DRERC) on behalf of the College of Health Sciences at Addis Ababa University's Institutional Review Board (IRB). After getting permission from the hospital administration, a cooperation letter was written for the concerned bodies of their respective departments following this research. Obtaining the medical record number of the selected sample was processed by the assigned person. Confidentiality was maintained at all levels of the study; besides, only the MRN numbers of study participants were used without mentioning their names.

5. RESULT

5.1. Scio-demographic Characteristics

In the study period, 2176 degenerative spinal disease patients were diagnosed at the neurology and rheumatology clinic. Out of these, the medical records of 339 cases were taken randomly. Among the 339 cases, 189 (55.8%) were female and 150 (44.2%) were male. The mean age of degenerative spinal disease patients was 54.9 years, with an SD of ±10.044 and a median of 56 years. Separately, the mean age of females was 54.1 (95% CI for the mean of 52.66–55.53 years) and that of males was 56.03 (95% CI for the mean of 54.41–57.65 years). The majority of the patients, 193 (56.9%), were between the ages of 40 and 59, with 122 (36.0%) being older than 60 and 24 (7.1%) being younger than 39. In addition, their residence 157 (46.3%) of the patients were from semi-urban areas, 109 (32.2%) were from city/urban and 73 (21.5%) were from rural areas. Regarding educational status, college, high school, only reading and writing, illiterate, and degree holders and above were 11.2%, 10.9%, 8.8%, 4.7%, and 1.8%, respectively. The patients' occupations were 51 (15%) office work, 22 (6.5%) merchants, 17 (5%) laborers, 12 (3.54%) farmers, and 30 (8.85%) others. Regarding nature of work 72(21.2%) mental-based, 65(19.2%) physical based work (table 1 below).

Table 1*: Socio-demographic distribution of study participants attended at neurology and rheumatology, in TASH, 1 January,2020-1 January, 2022*

Variables		**Frequency**	**Percent**
Sex	Female	189	55.8
	Male	150	44.2
Age group	below 39	24	7.1
	between 40 and 59	193	56.9
	greater 60	122	36.0
Residence	City/Urban	109	32.2
	Semi- urban	157	46.3
	Rural	73	21.5
Educational Status	Degree and above	6	1.8
	College	38	11.2
	High school	37	10.9
	only write and read	30	8.8
	Illiterate	16	4.7
	Unknown	212	62.5
Occupation	Farmer	12	3.54
	Marchant	22	6.5
	Office work	51	15
	Labor	17	5

	Other	30	8.85
	Unknown	207	61.1
nature of work	Mental-based	72	21.2
	Physical-based	65	19.2
	Unknown	207	61.1

5.2. Prevalence of Cervical Spondylosis

In this study, concerning the prevalence of spondylosis cases diagnosed at TASH during the study period, cervical spondylosis (28.6%) was the second most common, and lumbar spondylosis (58.7%) was the first common degenerative spinal disease. The 40 (11.8%) had both cervical and lumbar, and the 3 (1.9%) had thoracic spondylosis. (Figure 2 below).

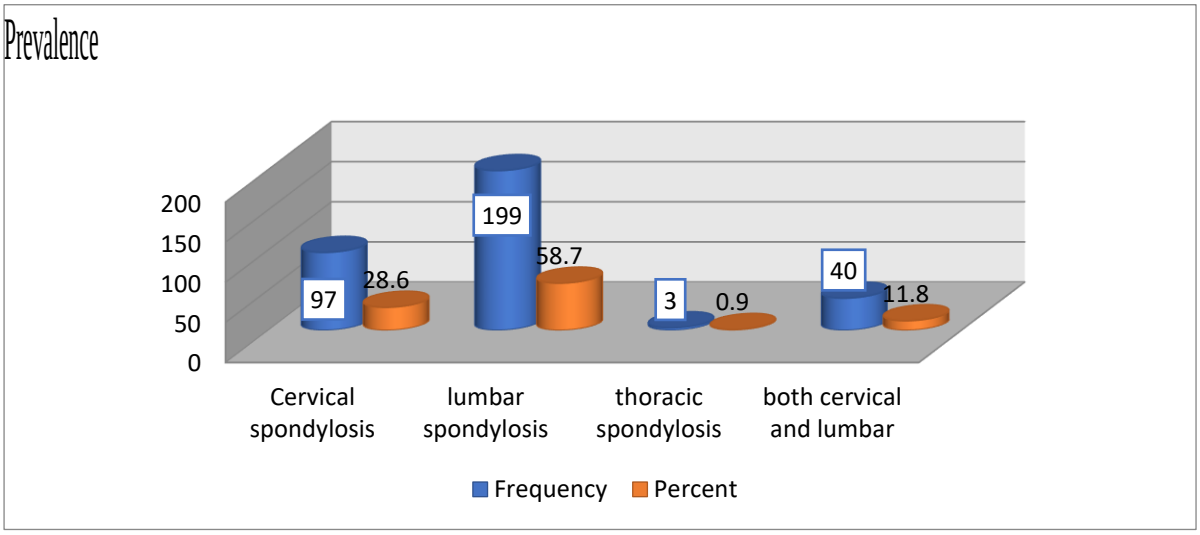

***Figure 2**: frequency and percentage distribution of prevalence of cervical, lumbar and thoracic spondylosis at neurology and rheumatology, in TASH, 1 January,2020-1 January, 2022*

5.3. Clinical Characteristics of Patients with Cervical Spondylosis

Of the 137 patients diagnosed with cervical spondylosis, 135 (98.5%) had neck pain, with 75 (55.6%) being female. Regarding duration, 96 (70%) had a duration greater than twelve months, 39 (28.8%) had a duration less than 12 months, and the least duration was three months. Of these, 102 (74.5%) had chronic shoulder and axial joint pain with more than three months' duration. On the other hand, 117 (85.4%) women reported cervical radiculopathy, compared with 73 (53.3%) men. The cervical myelopathy was diagnosed in 8(5.8%) among the people cervical spondylosis with 6(75%) was male (figure 3 below).

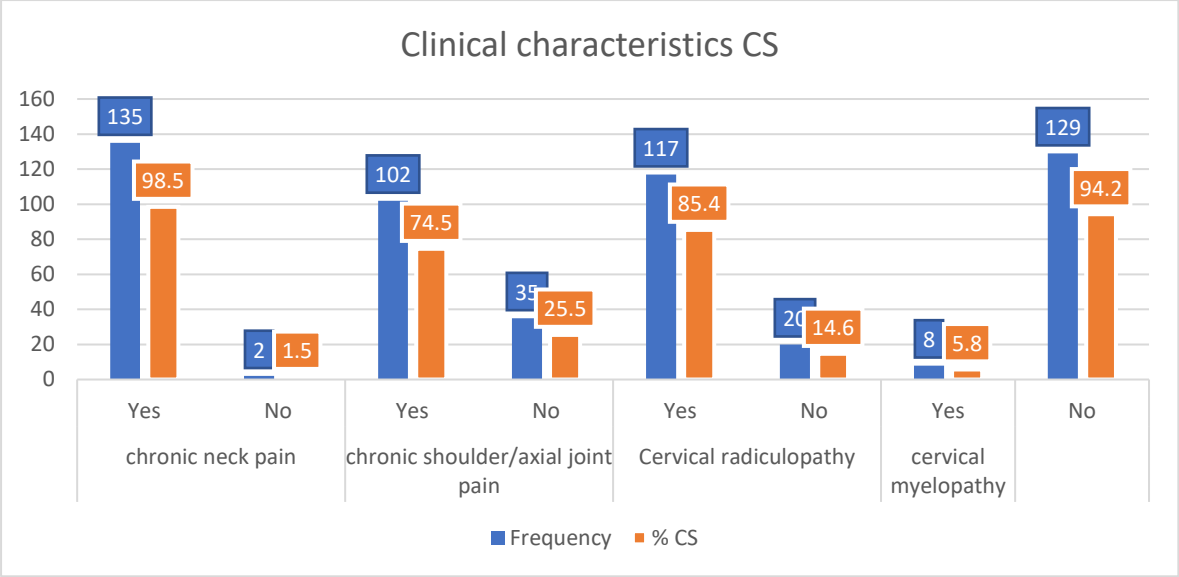

Figure 3 *frequency and percentage distribution of patients according to their clinical presentation of cervical spondylosis at neurology and rheumatology, in TASH, 1 January,2020-1 January, 2022*

Regarding cervical radiculopathy, there were 58 (49.6%) bilateral radiculopathies, followed by 33 (28.2%) right-side unilateral radiculopathies and 26 (22.2%) left-side unilateral radiculopathies.

The affected nerve root occurred more frequently at the C5-C7 levels, and less frequently at C3-C4 of the cervical and brachial plexuses. Radiculopathy presents with sensory symptoms like shooting pains, numbness, and diminished reflexes.

In cases of types of cervical myelopathy involving extremity weakness 3 (35.5%) and loss of bladder control 2 (25%), both extremity weakness and bladder control loss 2 (25%) and quadriparesis 1 (12.5%) were seen. In addition, major neurological problems like clumsiness of the hand, gait disturbance, and wasting of muscles were also identified

(figure 4 below)

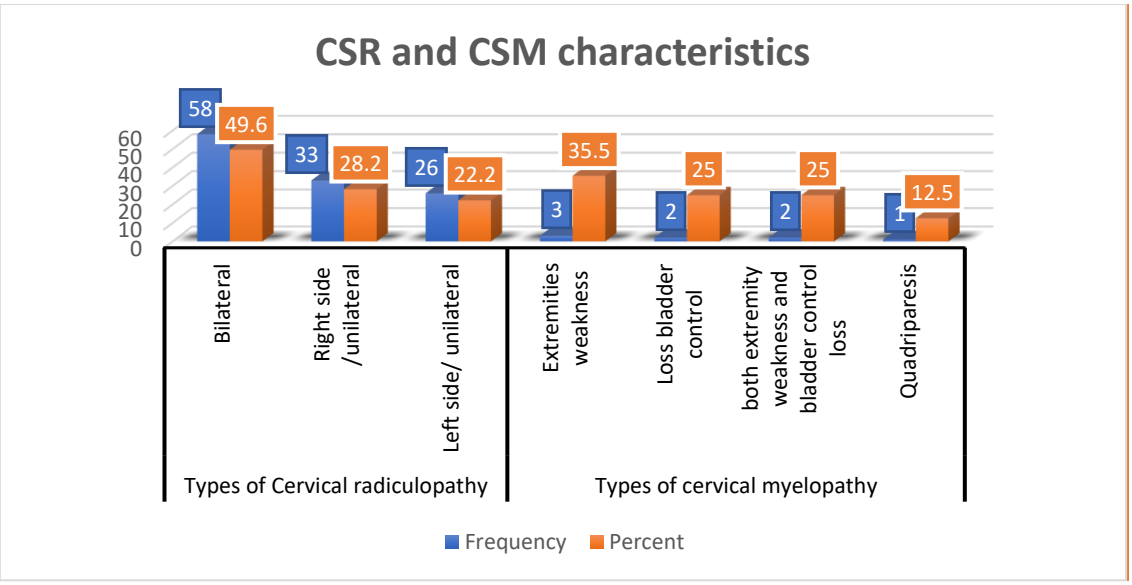

***Figure 4**: subdivision of cervical spondylotic radiculopathy (CSR) and cervical spondylotic myelopathy of patients with cervical spondylosis at neurology and rheumatology, in TASH, 1 January,2020-1 January, 2022*

5.4. Imaging Finding Results of Cervical Spondylosis Etiologic Factors

There were different aspects of etiologic factors evaluated in this study. The imaging findings in those who underwent cervical spine imaging showed that 107 (78.1%) had degenerative spinal diseases, 5 (3.65%) had mass lesions, 2 (1.5%) had tuberculous abscesses, 2 (1.5%) had spondylolisthesis, and 1 (0.73%) had spondylodiscitis. The remaining 10 (9.8%) were normal. In this study, osteophytes, disc herniation, disc dehydration, spinal canal stenosis, neural foraminal stenosis, ligament thickening, facet joint hypertrophy, and repeated chronic neck injuries were identified as the causative factors for cervical spondylosis (table 2).

***Table 2**: Frequency and percentage distribution of imaging findings among cervical spondylosis patients at neurology and rheumatology, in TASH, 1 January,2020-1 January, 2022*

Etiologic factor		Frequency	Percent
Osteophytes	Yes	84	61.3
	No	53	38.7
Disc herniation	Yes	48	35
	No	89	65
disc dehydration	Yes	65	47.4
	No	72	52.6
Spinal canal stenosis	Yes	67	48.9
	No	70	51.1
Neural-foraminal stenosis	Yes	91	66

	No	46	34
liagamentum thickening	Yes	43	31.4
	No	94	68.6
Facet joint hypertrophy	Yes	36	26.3
	No	101	73.7
Chronic-repeated neck injury	Yes	31	22.6
	No	106	77.4
associated back pain	Yes	87	63.5
	No	50	36.5

For various etiologic causes, there was a somewhat varied level of cervical vertebrae involvement. The C5-C6 region has the highest occurrence of bone spurs 32 (38%). There were 64.2% of females with osteophytes.

Right, left, and bilateral neural foraminal stenosis were identified. Following bilateral involvement, right unilateral involvement was prevalent.

Depending on the degree, spinal canal stenosis can be classified as mild, moderate, or severe. These included 8 (11.94%) severe, 35 (52.2%) moderate, and 24 (35.8%) mild spinal canal stenosis. The posterior longitudinal ligament and ligamentum flavum thickened and buckled in 43 (31.4%). It occurred concurrently with disc dehydration and osteophytes, which involved multiple vertebral levels.

The chronic-repeated neck injury was also one of the complaints in the study, which may occur accidentally/through trauma or during physical-based work. It was seen by 31 (22.6%) of the people. Most people with cervical spondylosis had associated back pain, which was simultaneous with neck pain, shoulder pain, and upper extremity pain.

Table 3 distribution of etiologic factors at specific cervical vertebrae among cervical spondylosis patients at neurology and rheumatology, in TASH, 1 January,2020-1 January, 2022

Etiologic factors		Frequency%	Cervical vertebrae level				
			C2-C3	C3-C4	C4-C5	C5-C6	C6-C7
Osteophyte	Yes	84(63.1%)	-	8(9.52%)	28 (33.3%)	32 (38%)	16 (19.0%)
	No	53(38.7%)	-	-	-	-	-
Disc herniation	Yes	48(35%)	5(10.4%)	8(16.7%)	13(27%)	15(31.3%)	7(14.6%)
	No	89(65%)	-	-	-	-	-
Spinal canal stenosis	Yes	67(48.9%		7 (10.4%)	34 (50.7%)	18 (26.9%)	8 (12%)
	No	70(51.1%)	-	-	-	-	-
Disc-herniation	Yes	35(25.5%)	-	-	6(17.1%)	15(42.9%)	14(40.0%)
	No	102(74.5%)	-	-	-	-	-
Neural-foraminal stenosis	Yes	91(66%)	5(5.5%)	8(8.8%)	29(31.9%)	34(37.4%)	15(16.5%)
	No	46(34%)	-	-	-	-	-
Facet joint hypertrophy	Yes	36(26.3%)	-	4(11.1%)	9(25%)	16(44.4%)	7(19.4%)
	No	101(73.7%)	-	-	-	-	-

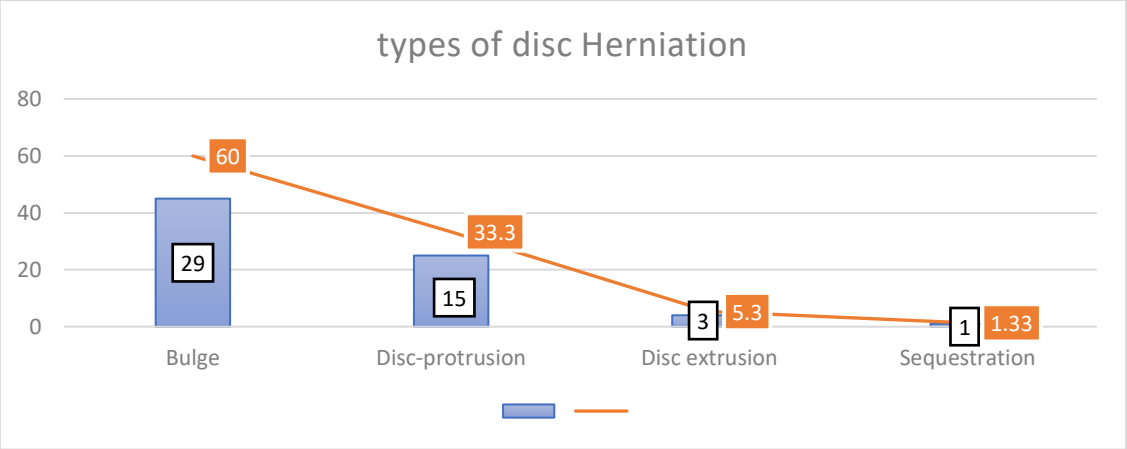

***Figure 5**: Frequency and percentage distribution of types of disc herniation among cervical spondylosis patients at neurology and rheumatology, in TASH, 1 January,2020-1 January, 2022*

5.5. Life style and behavior of cervical spondylosis patients.

In this study, smoking and alcohol intake were assessed. In the smoking and current alcohol intake histories of the patients with cervical spondylosis, 37 (27.0%) said yes to smoking and 57(41.6%) said yes to current alcohol use (Table 4 below)

Table 4 percentage distribution of smoking and current alcohol usage among patients of cervical spondylosis at neurology and rheumatology clinic, in TASH, 1 January,2020-1 January, 2022

Life style		**Frequency (%)**		
		Female	Male	Total
Smoking	Yes	7(9.3%)	30(48.4%)	37(27.0%)
	No	68(90.6%)	32(51.6%)	100(73.0%)
Alcohol intake	Yes	21(28.0%)	36(58.1%)	57(41.6%)
	No	54(72.0%)	26(41.9%)	80(58.4%)

5.6. Co-morbid Disorders of Patients with Cervical Spondylosis

Co-morbid disorders were common in spinal degenerative diseases. The most common was hypertension, which accounted for 36 (26.3%); the second most common was DM 14 (10.2%); followed by 12 (8.8%) rheumatoid arthritis; and 5 (3.65%) HIV and 5 (3.65%) spinal TB. Other co-morbid diseases accounted for 23 (16.9%). In addition, 8 (5.8%) had both hypertension and DM. (Figure 7 below)

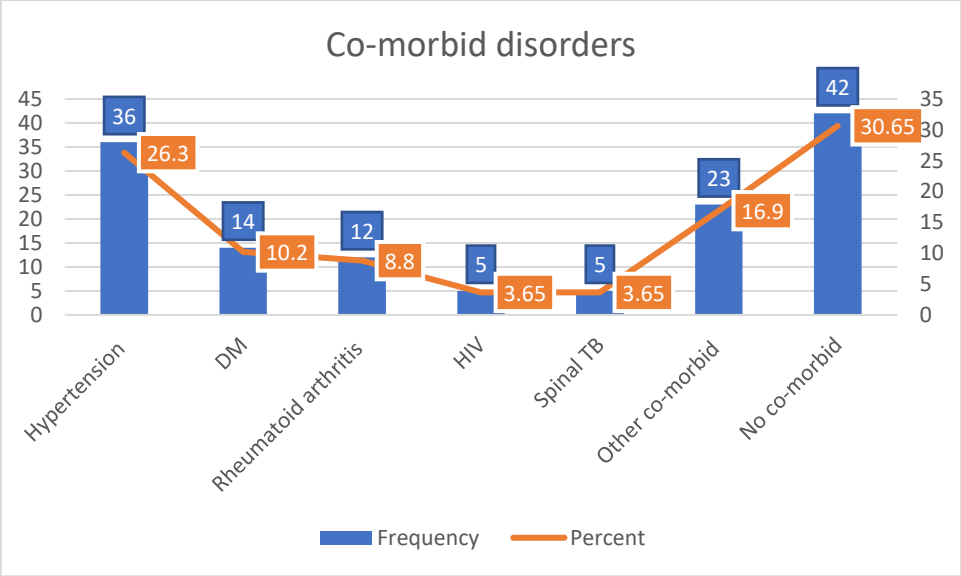

***Figure 6**: Distribution of co- morbid disorder among cervical spondylosis patients at Neurology and Rheumatology, in TASH, 1 January,2020-1 January, 2022*

5.7. Medical and surgical managements of cervical spondylosis patients

Antidepressants (amitriptyline) were the first line of management. Of the total 137 cases of cervical spondylosis, 110 (80.2%) were treated with amitriptyline, 48 (35%) with an anti-convulsant, 41 (30%) with non-steroidal anti-inflammatory drugs (NAID), 25 (18.2%) with corticosteroids, and 6 (4.4%) were managed surgically; physiotherapy was ordered for 43 (31%).

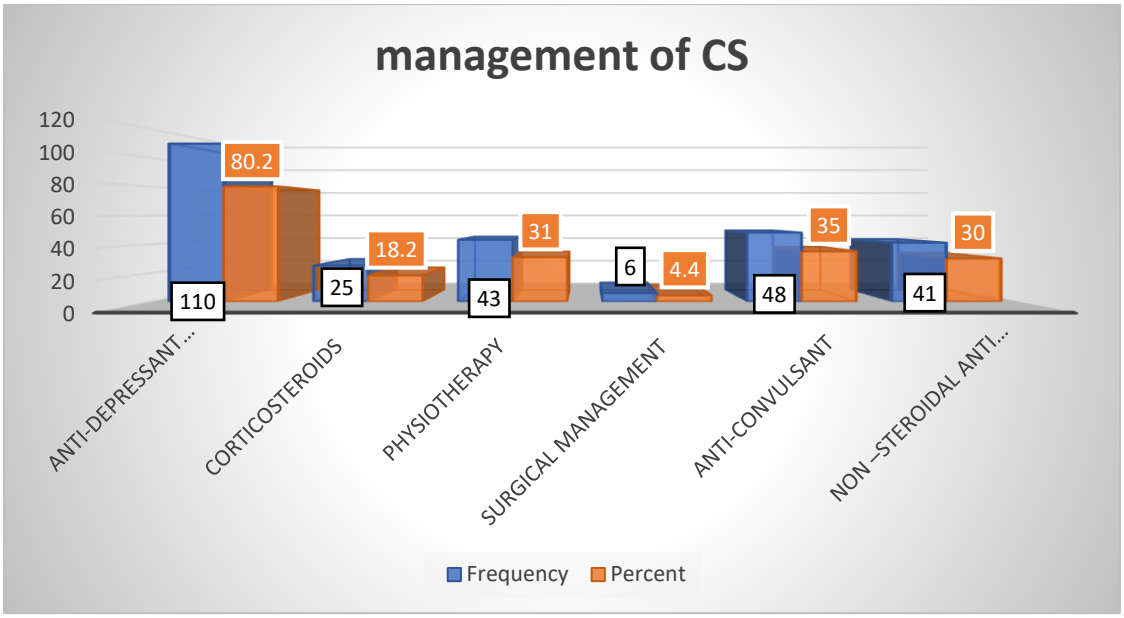

***Figure 7**: Medical and surgical managements among patients with cervical spondylosis at Neurology and Rheumatology, in TASH, 1 January,2020-1 January, 2022*

5.8. Correlation between clinical characteristics and imaging findings

The correlation between clinical characteristics and imaging findings was carried out using the Pearson correlation coefficient (r) to observe the relationship. Osteophyte complex, neural foraminal, spinal canal stenosis, and disc herniation had a positive correlation with cervical radiculopathy, cervical myelopathy, shoulder, and neck pain ($r > 0.55$).

5.9. Factors associated with occurrence of cervical spondylosis

5.9.1. Bivariate analysis

In this study, explanatory variables such as age, sex, nature of work, place of residence, current alcohol intake, current smoking, educational status, osteophyte, disc herniation, disc dehydration, spinal canal stenosis, neural foraminal stenosis, ligament thickening, facet joint hypertrophy, chronic repeated neck injury, and associated back pain were analyzed first by bivariable analysis. Based on the p-value (<0.2), nine variables were identified as candidate variables for the multivariable analysis.

***Table 5**: Distribution of risk factors among patients with cervical spondylosis and results of bivariate analysis at neurology and rheumatology, in TASH, 1 January,2020-1 January, 2022*

Variables		Frequency	COR	CI = 95	p-value
Gender	Female	75	2.12	1.4 -3.3	**.001**
	Male	62	.429	-	-
Smoking	Yes	37	15.4	8.3- 150	**.000**
	No	100	.495	-	-
Alcohol intake	Yes	57	20.4	18.3-198.3	**.000**
	No	80	.353	-	-
Age group	Below 39	14	.482	-	-
	Between40 &59	85	1.67	1.56-2.46	**.102**
	Above 60	38	.232	.201- 1.16	.236
Place of residence	City/Urban	67	3.31	1.78-6.16	**.000**
	Semi-urban	48	.679	.372-1.24	.206
	Rural	22	.521	-	-
Occupation	Farmer	14	1.4	0.5-3.5	0.29
	Marchant	23	2.8	1.4-5.5	0.3
	office work	51	3.5	1.5-7.1	0.3
	Labor	19	1.4	0.7-2.8	0.45
	Other	30	.89	-	-
Nature of work	Mental-based	72	1.7	1.1-2.5	0.33
	Physical-based	65	0.56	-	-
Osteophyte	Yes	84	.990	.61- 1.61	**.**967
	No	53	.053	-	-
Disc herniation	Yes	48	1.06	.68- 1.64	**.**798
	No	89	.640	-	-
Dehydration of disk	Yes	35	1.41	.91-2.2	.23
	No	102	.545	-	-
Spinal canal stenosis	Yes	67	1.361	.86- 2.17	**.192**
	No	70	.539	-	-
Neural foraminal stenosis	Yes	91	1.17	0.25-5.39	**.016**
	No	46	.540	-	-
Ligamentum thickening	Yes	43	.998	.61- 1.53	.887
	No	94	.968	-	-
Facet joint hypertrophy	Yes	36	1.25	.80- 1.98	.333
	No	101	.003	-	-
Associated back pain	Yes	87	7.31	4.23-12.7	**.000**
	No	50	.387	-	-
Repeated neck injury	Yes	31	18.8	8.2-42.97	**.000**
	No	106	.411	-	-

5.9.2. Multivariable analysis

As shown in the table below, of the nine variables included in the multivariable analysis, six of them remain significant at a p-value of ≤ 0.05. Those were sex, age group between 40 and 59, place of residence, smoking, alcoholism, and associated back pain. Females were 2.959 times more likely than males to have cervical spondylosis (CI=1.445-6.060, p=.003), and those aged 40 to 59 were 2.011 times more likely than those aged 39 to 60 (CI=1.164-6.240, p=.000). Furthermore, the odds of having cervical spondylosis were 2.02 times higher in current smokers than in non-smokers (CI=1.843-11.0242, p=.008), and 2.83 times higher in current alcohol users than in non-alcohol users (CI=1.520-10.974, p=0.000). The odds of cervical spondylosis were 27.2% lower in semi-urban with (CI= .129-.576, p =.001) and 44% lower in rural with (CI=.196-.983, p=0.045) as compared to city/urban. The odds of having associated back pain in cervical spondylosis patients were 2.846 times higher than those without cervical spondylosis with (CI=1.161- 6.973, p=.022)

***Table 6**: Distribution of risk factors among patients with cervical spondylosis and results of multivariate analysis at Neurology and Rheumatology, in TASH, 1 January,2020-1 January, 2022*

Variable		**Frequency**	**AOR**	**CI=95%**	**P-Value**
Sex	Female	90	2.96	1.45- 6.06	**.003***
	Male	47			
Age group	below 39	14	1	1.164 -6.24	**.05***
	between 40 and 59	85	2.01		
	sixty and above	38	.987		
Current using alcohol	Yes	67	2.8	1.5-10.9	**.00***
	No	70			
Current smoking	Yes	57	2.02	1.8-11.02	**.008***
	No	80			
Associated back pain	Yes	87	2.85	1.2-6.97	**.022***
	No	50			
Place of residence	City/Urban	67	1	1	
	Semi-urban	48	.27	.13-.58	**.001***
	Rural	22	.44	.196-.98	**.045***

`

6. DISCUSSION

A hospital-based cross-sectional study on the prevalence of cervical spondylosis and related risk factors was carried out at TASH. The study found the prevalence of cervical spondylosis among all spinal degenerative diseases was 40.4%.

The prevalence of this study is similar to a study in Bangladesh on male collies (loading and unloading), which reported that the prevalence of cervical spondylosis was 39.8%, and a study in Korea among older adults, which was 47.8%(27,33).

But it was significantly higher than the study in China, where the prevalence of cervical spondylosis was 13.76%, and the study in the southwest region of Nigeria found a prevalence of 10.7% for cervical spondylosis(26,29).

The discrepancy seen between the above result and the current study was probably due to study design and sample size, as the study in China was a population-based study and that in Nigeria used a smaller sample size.

In this study, the most affected age group was 40–60 years, which was 57%. This was in line with the study done in the same setting in the radiology department on people with neck pain and the study done in Ireland, China, Nepal, and Nigeria on patients with neck pain that undergo cervical spine MRI evaluation(8,9,12,29,37).

The second highest was seen in those older than 60 years. The reason for the higher incidence in this age group was due to involvement in high-effort activities in the 4^{th} and 5^{th} decades.

Sex was related to cervical spondylosis. In this study, there was a difference between males and females. This study showed that female was more vulnerable to cervical spondylosis with (AOR = 2.959, CI= 1.445- 6.060, P= .003). The reason may be that women hold the same position for several hours. One study in China found menopause as an associated factor for cervical spondylosis (OR = 1.772, 95% CI: 1.159–2.710)(29). Estrogens can maintain the collagens that protect the intervertebral disc. Lou et al. found a relationship between menopause and the degeneration of the intervertebral disc(40). This finding is almost similar to most of the world's literature.

In this study regarding the place of residence, living in a city or urban area had no association with cervical spondylosis, and living in a semi-urban and rural area had protective factors for cervical spondylosis with (AOR = .27, CI= .129-.576, p=.001) and (AOR = .44, CI=.196-.983, p=0.045) respectively. In nature of work, office work/ mental based work had positive relation with cervical spondylosis. This was the same with the study in China and different from the study in Bangladesh on male coolies(27,29).

The difference was the study in Bangladesh was exclusively done on male coolies. Smoking and current alcohol use also had positive associations with cervical spondylosis, with (AOR =2.016, CI=1.843-11.0242, p=.008), and (AOR =2.83, CI=1.520-10.974, p=0.000), respectively. One of the experimental research found that smoking increased inflammatory cytokine synthesis and release, which led to chondrocyte activity degradation and disc degeneration (40). Numerous epidemiological studies have linked shoulder and/or neck musculoskeletal pain among school teachers to factors including sex, age, body mass index, various influences like smoking and drinking behavior, exercise, occupational aspects like working hours, head down position, over-head actions, and low job satisfaction(22). Many other studies also identified smoking and alcohol intake as risk factors for CS.

The neck pain was the common complaint in patient with cervical spondylosis. The complaint was high with people in their 4th, 5th, and 6th decades. The most common types of NP were chronic neck pain with arm pain (about 70%), followed by chronic neck pain without arm pain (about 13.9%), and acute neck pain with arm pain and acute neck pain without arm pain were less common in this study.

This study also showed 98.5% were diagnosed with NP in people with cervical spondylosis. It was higher than the study in Northwest Ethiopia (Gondar Town), which was 72.2%(22). It was also higher than the study in Norwegian on cervical spondylosis and neck pain, which was 34%, and the study in Denmark (University of Southern Denmark), which showed the lifetime prevalence of NP ranged from 14% to 71%, with elderly women being more affected(39,44).

This study was also different from the population-based study in the USA, which was 13.3%, and the study in North Carolina, which was 2.2%(45,46).

The other problem was shoulder/axial joint pain along with chronic NP in people with cervical spondylosis. According to this study, the problem occurred in 74.5% of those diagnosed with cervical spondylosis. The study was higher than the study in Botswana, which was 52.5%(36).

This study was higher than other studies as it tried to assess symptomatic individuals. The difference in studies may be due to the difference in study variables and study design and some of the studies were population-based studies.

The most significant symptoms in people with cervical spondylosis were cervical radiculopathy. Radiculopathy (nerve root compression) due to cervical spondylosis occurred more frequently at the C5-C7 levels, with C3-C4 affected in a small percent.

Neurological characteristics follow the anatomical distribution of the nerve root in the upper limb with sensory symptoms like shooting pains and numbness, but weakness was less common in this study. In some patients, a diminished reflex was reported at a specific level, like the biceps at C5-C6 and the triceps at C7. In cervical radiculopathy, 48% had bi-lateral radiculopathy, 33% had right-side unilateral radiculopathy, and 24% had left-side unilateral radiculopathy. This study reported that cervical radiculopathy was seen in 85.4% of those who had cervical spondylosis. It was higher than study Sicilian municipality which reported the existence of cervical radiculopathy was 33% and study in Minnesota which was 31% (24,35).

This was higher than all other similar studies because it focused primarily on spinal degenerative diseases. But on the other hand, a meta-analysis study of the African population reported that patients in developing countries are often diagnosed very late in the course of their illness, when irreversible changes and progressive neurological deterioration have already occurred. This may be due to the lack of diagnostic facilities and inadequate suspicion on the part of the caregivers(31).

The cervical myelopathy showed clumsiness of the hand, gait disturbance, sensory ataxia, spastic paraparesis of the lower limbs, and bladder dysfunction. Wasting and fasciculation of biceps and triceps were also identified. Extremity weakness alone and/or with loss of bladder control, quadriparesis, and sensory disturbances were the problems seen. The cervical myelopathy was 5.6% in this study which was comparable with study Taiwan 4.04% (95% CI 3.98–4.11) but, significantly lower than study in Northern Nigeria which ranges from 20% to 60% in spondylosis cases(8,47). According to this study extremity weakness was leading problem about 35% and one case of cervical myelopathy identified as grade 5 nurick scale.

In this study, the imaging examination revealed the most prominent characteristic features of cervical spondylosis, which included bone spurs, disc dehydration, disc bulge, spinal canal stenosis, neural foraminal stenosis, and herniation of the disc at C3-C4, C4-C5, C5-C6, and C6-C7. The C5-C6 level was concerned with a common single level in the spondylosis process. The next frequency was C4-C5. This had similar characteristics to studying in Denmark(34). Overall, the cervical vertebrae involved showed multiple levels of involvement

Additionally, the posterior longitudinal ligament, ligamentum flavum (LF) thickening, and facet joint hypertrophy were found on the spine's MRI. Ossification of the posterior longitudinal ligament (OPLL) and cervical spondylosis are two of the most often occurring

causes of cervical spinal cord dysfunction worldwide. OPLL, which is more common in Asian people than age-related spondylosis and is defined by pathological ectopic bone growth in the posterior longitudinal ligament, is an aberrant outcome record. About 17% of people with OPLL develop myelopathy, according to research (46). Additional reduction of the spinal cord space could be caused by a pathologic change in t he ligamentum flavum's hypertrophy and bone thickening (31). This study found that facet joint hypertrophy and ligamentum thickening were present in 32.4% and 27% of participants in the sixth and seventh decades, respectively.

In this study, the osteophyte complex was 61.3 % in the cervical spine. This study was comparable with a study at the same setting in the TASH radiology department on people with chronic neck pain, which was 68.8% (37). The study had greater findings than the study done in Tokyo, Japan; the difference may have been caused by the Tokyo study's small sample size (12). Another prevalent finding in spondylosis was neural foraminal stenosis. In bivariable analysis, neural foraminal stenosis had an association with the clinical characteristics of cervical spondylosis. (COR= 1.17, 955%CI: 0.25-5.39). Additionally, radicular pain was reported by those who had neural foraminal stenosis. In this study, 66% of the cervical spine had neural foraminal stenosis. It was lower than the 73.1% from the previous TASH trial and the 77% from the Danish study (37,39).

The spinal cord is compressed by severe spinal canal stenosis, which results in compressive myelopathy. According to this study, the cervical spine's spinal canal stenosis was found to be 48.9%. It was once again lower than in the prior TASH research (37).

Another common problem was disc herniation, which affect more women in their fourth and fifth decades. Disc protrusion, disc bulge, sequestration, and disc extrusion all occur in disc herniation. This study's disc herniation rate of 35% was greater than the previous TASH radiology department study's 11.5% and comparable to that of Borno State, Nigeria, which was 37% (8,37).

Joint hypertrophy and a narrowing of the disc gaps are connected to flavum thickening. Since the majority of degenerative conditions coexist, ligament thickness and the osteophyte complex are intimately connected. Chronic repeated neck injury was identified 31(22.6%) in this study. In bivariable analysis, chronic repeated neck injury has shown an association with cervical spondylosis (COR = 18.8, 95% CI: 8.2-22.97, P =.00). The associated back pain also had an association with cervical spondylosis (AOR = 2.85, CI: 1.2–6.97, P = 0.022).

In spine degenerative disease, the co-morbidities were frequent. The co-morbid conditions that were most frequently present were hypertension, DM, rheumatoid arthritis, spinal TB, and others. Another study conducted in the People's Republic of China found that co-morbidities of cardiovascular disease, cerebral infarction, hyperlipidemia, and diabetes were also present (48).

Amitriptyline, anti-convulsants, corticosteroids, and non-steroidal anti-inflammatory drugs were the most frequently prescribed drugs. These drugs were prescribed either singly or in combination. In addition to the prescribed medication, physiotherapy was also ordered. Surgical management was less frequently used and was typically conservative. The therapy of cervical spondylosis in Africa was primarily conservative in another review research (31). Laminoplasty, laminotomy, and laminectomy were the most frequently performed surgical procedures.

7. STRENGTH AND LIMITATION

7.1. The Strength

This study's ability to use a large sample size is one of its advantages. The study attempted to evaluate all the potential ways to estimate the prevalence and included variables that had been explored in several studies.

7.2. The limitations of this study

Since the study was retrospective, secondary data was used, and most variables couldn't be studied due to the data not being found or being under reported, specifically biographic data was not found sufficiently.

In addition, there was no enough literature to discuss more as the problem still under studied in all over the world.

8. CONCLUSION

The prevalence of cervical spondylosis (CS) was relatively high compared to the reported literature. In Korea, Bangladesh (Punjab), India (population), China, Nigeria, and Sweden, the prevalence was: 47.8, 47, 17.2, 13.8; 10.7; and 0.035%, respectively. The risk of CS increases with age in both sexes, and females were once mostly affected by cervical spondylosis.

The development of cervical spondylosis is influenced by numerous factors. Age, sex, behavioral factors, and concomitant conditions were the most significant. The most affected age groups were the fourth, fifth, and sixth. The study indicated that chronic morbidity was widespread among patients with this medical condition.

9. RECOMMENDATION

Based on the findings of the study, it was identified that the cervical spondylosis was one of the public health problems in Ethiopia. Public health initiatives, ministry of health (MoH), health institutions, referral hospitals and policy makers should target the high-risk population for cervical spondylosis to help early detection and treatment, which improve quality of life and decrease the duration of morbidity, complications and resource wastage. The same or similar studies need to be conducted as the problem was still less studied, by collecting prospective data, and including other regions of Ethiopia. Population based study is also recommended to determine prevalence cervical spondylosis in the population.

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11. ANNEX1: CHECKLISTS

MRN No……

No	Question		Remark
	Socio-demographic		
101	Age group	1. Below 39 2. Between 40-69 3. >60	
102	Participants gender	1. Male 2. Female	
103	Place of residence	1. City/Urban 2. Semi-urban 3. Rural	
104	Participants educational status	1. Degree and above 2. College 3. High-school 4. Only read and write 5. illiterate	
105	Weight in KG	_____	
106	Participants occupation	1. Office work 2. Marchant 3. Labor work 4. Farmer 5. Other	
107	Nature of work	1. Physical-based 2. Mental-based	

	Section II: Life style		
201	Current alcohol intake	1. Yes 2. No	
202	Smoking	1. Yes 2. No	
	Section III: clinical sign and symptoms		
301	Neck pain	1. Acute neck pain with arm pain 2. Acute neck pain without arm pain 3. Chronic neck pain with arm pain **4.** Chronic neck pain without arm pain	
302	Shoulder/Axial joint pain	1. yes 2. No	
303	Cervical Radiculopathy	1. Yes 2. No	
304	If yes on 303	1. Bi-lateral 2. Right side/unilateral 3. Left side/ unilateral	
305	Cervical myelopathy	1. Yes 2. No	
	If yes on 305	1. Extremity weakness 2. Loss bladder control 3. Sensory loss 4. Specify ___	
	Section III: radiologic findings		
401	Cervical osteophytes	1. Yes 2. No	
402	Cervical disc-herniation	1. Yes 2. No	
403	If ye on 402	1. Disc bulge 2. Disc protrusion 3. Disc-extrusion 4. Sequestration	
404	Cervical disc-dehydration	1. Yes 2. No	
404	Cervical spinal canal stenosis	1. Yes 2. No	
405	Cervical neural foraminal stenosis	1. Yes 2. No	
406	Cervical ligament thickening	1. Yes 2. No	
407	If present specify	Specify_____	
408	Cervical facet joint hypertrophy	1. Yes 2. No	

	Cervical vertebrae level involved	Specify _____	
409	Chronic repeated neck injury	1. Yes 2. No	
410	Associated back pain	1. yes 2. No	
411	Comorbid disorders	1. Hypertension 2. DM 3. HIV 4. Rheumatoid Arthritis 5. Spinal TB 6. Other disorder	
412	Cervical imaging	1. Degenerative spinal disease 2. Mass lesion 3. Tuberculous abscess 4. Spondylolisthesis 5. Spondylodiscitis 6. Normal	
413	Managements	1. Corticosteroid 2. Physiotherapy 3. Surgical management 4. Anticonvulsant 5. Corticosteroids 6. NSAID	