

Postural Predisposition to Cervical Spondylosis Among Housewives, Teachers, Computers and Smart Phones Users

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Abstract: *Background:* The relationship between postural changes around the neck and the development of cervical spondylosis maybe something that's not fully understood and accepted but there some evidence that proves their relationship. *Aim:* This is review article on the effect of persistent postural changes around the neck on the development of cervical spondylosis and while cervical spondylosis is prevalent among housewives whose most of their house chores required bending of the neck, teachers who writes much of notes, prolonged computer users and in adolescents with prolonged usage of smartphones. *Methods:* A careful literature search was made on some scientific search engines like PubMed, EMBase using a very sensitive search strategy on researches made on cervical spondylosis and careful analysis was done to link the development to some postural activities another the cervical axis of the spine. *Results:* The reviews show evidence of relationship between posture and development of cervical spondylosis.

Keywords: Cervical Spine, Cervical Spondylosis, Postural Predisposition, Occupational Predisposition

1. Introduction

Cervical spondylosis is a chronic, progressive degeneration of the osseocartilaginous component of the cervical spine and is associated with aging.

Radiographic evidence shows that this chronic degeneration occurs in virtually everyone as they age.

For most people, cervical spondylosis causes no symptoms. When symptoms occur, they typically include pain and stiffness in the neck.

Clinical intervention may however be employed if there is any clinically significant dysfunction or deformity of the cervical spine.

It is also to be noted that there is no approved therapy to address or reverse this deterioration [1].

Patients presenting with degenerative cervical spondylosis may appear with mechanical neck pain (which can be associated with painful neck spasms), radiculopathy, myelopathy or a combination of these symptoms. [2]

Cervical radiculopathy is caused by the mechanical compression or inflammation of cervical nerve root C6 or C7. [3]. This compression may be acute (as a result of abruptly herniated disc) or chronic.

The pain may radiate from the shoulder or upper back to the proximal arm and it is the most common symptom of cervical radiculopathy [4].

This degenerative radiculopathy may also be associated with paresthesia, weakness and numbness that may often, but not always, be associated with dermatomes associated with the nerve roots 3.

Due to the nerve root compression, there is also diminished deep-tendon reflexes of biceps (C5-C6) or triceps (C7-C8).

The compression of the nerve roots is also associated with cervical degenerative myelopathy which is usually associated with inflammation and edema of the spinal cord and is the least common but most worrisome symptom as this leads to a slow progressive deterioration of neurologic function as a result of narrowing of the spinal cord and compression of long

tracts and local segmental elements of spinal cord [5].

2. Methods and Materials

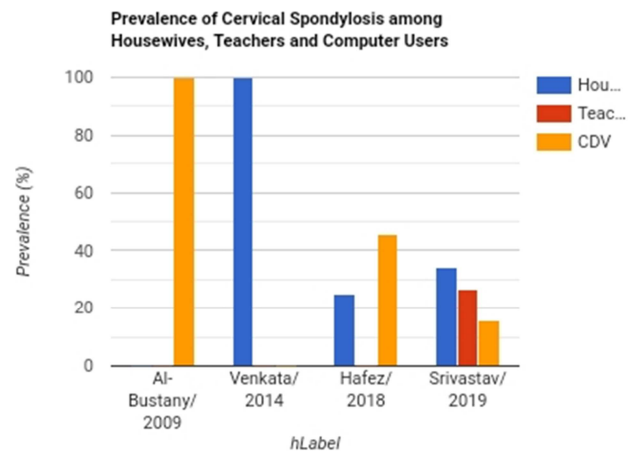
Literature search of articles on reports and cases of cervical spondylosis was made and about 40 articles were collected and about 35 were excluded because they couldn't meet the inclusion criteria. The inclusion criteria include that case of cervical spondylosis shouldn't be secondary to any cause such as trauma, osteoarthritis, osteosarcoma, congenital or metabolic problems and also the occupation of the subjects must be stated since the research is focused. Some radiological images were adapted in to this research to give pictures of the radiological findings in some of these patients.

The occupations focusing on housewives, teachers and computer-dependent vocations and prevalence in each article are recorded in the tables below.

3. Results

The analysis of the prevalence of cervical among those whose their occupation requires bending and other postural imbalance to the neck focusing on housewives, teachers and

those with computer dependent work such as typists, business workers, bankers, computer scientist, computer programmers and others. The summary of the result from each article are reported in table 1 and figure 1 below.



*Hou=Housewives, Teac=Teachers, CDV=Computer Dependent Vocations

Figure 1. Graphical representation of the prevalence of cervical spondylosis among housewives, teachers and people with computer dependent vocations as reported in selected articles.

Table 1. Prevalence of cervical spondylosis among housewives, teachers and people with computer dependent vocations as reported from selected articles.

Author/Year	Number of cases	Housewives prevalence		Teachers prevalence		CDV* prevalence	
		No	%	No	%	No	%
Al-Bustany/ 2009 [7]	30	—	—	—	—	30	100%
Hafez / 2018 [18]	240	60	25%	—	—	110	45.83%
Srivastava / 2019 [6]	90	31	34.4%	24	26.66%	14	15.6%
Venkata / 2014 [17]	1	1	100%	—	—	—	—

*CDV=Computer Dependent Vocations

Analyzing the prevalence of cervical spondylosis among people with computer dependent occupation with respect to the duration in the occupation and working hour per day using research done by Al-Bustany [7] as reference. The results are recorded in table 2 and figure 2 below.

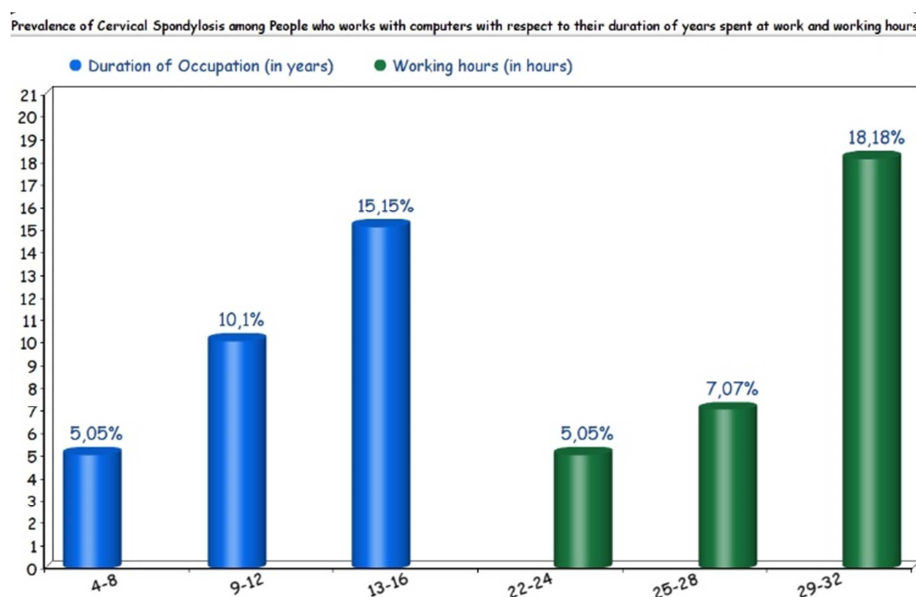


Figure 2. Graphical representation of the prevalence of cervical spondylosis among people with computer dependent occupation in relation with the duration in occupation and working hour per day.

Table 2. Prevalence of cervical spondylosis among people with computer dependent occupation in relation with the duration in occupation and working hour per day.

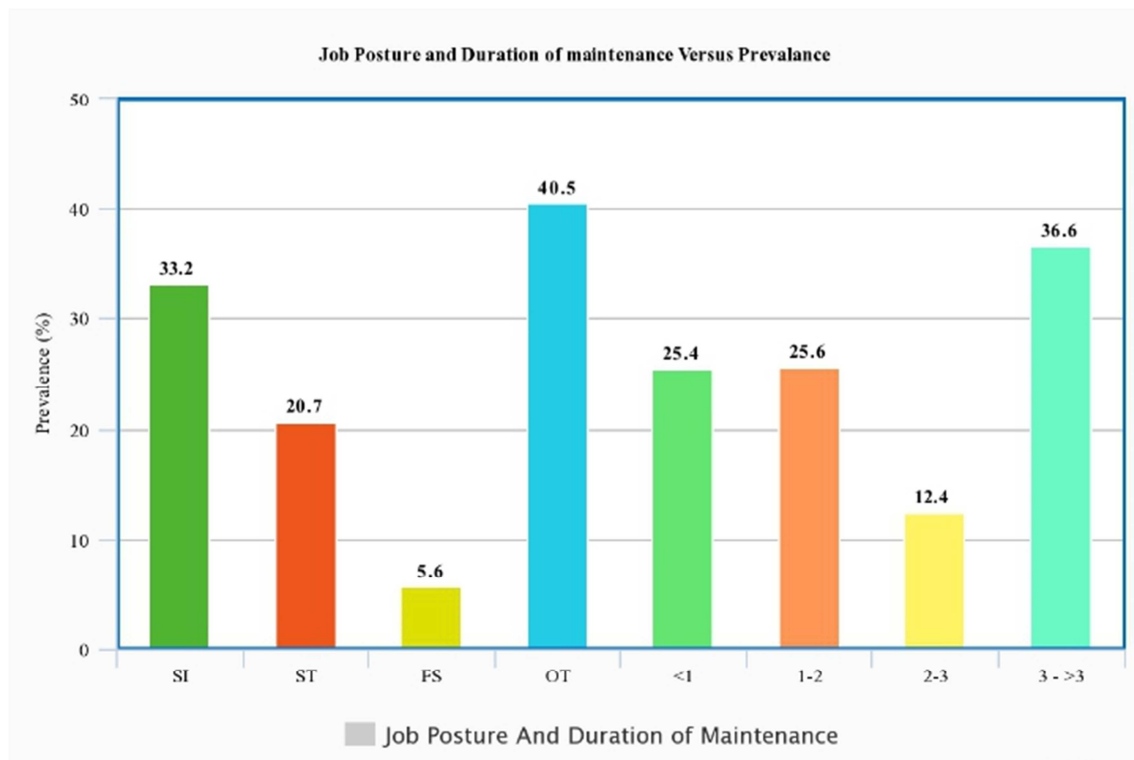
Parameters	Duration of occupation in years			Working hours in hours		
	4-8	9- 12	13 - 16	22 - 24	25 - 28	29- 32
Prevalence%	5.05	10.10	15.15	5.05	7.07	18.18

The effects of posture at work and the duration of maintaining same posture on the prevalence of cervical spondylosis as reported Lv [9] were analysis and reported in table 3.

Table 3. Effects of posture at work and duration of retaining same posture on the prevalence of cervical spondylosis.

Parameters	Job Posture				Duration of same working posture			
	SI	ST	FS	OT	<1	1-2	2-3	3->3
Prevalence %	33.2	20.7	5.6	40.5	25.4	25.6	12.4	36.6

*SI=Sitting, ST=Standing, FS=Frequently Stooping



*SI=Sitting, ST=Standing, FS=Frequently Stooping

Figure 3. Graphical representation of the effects of posture at work and duration of retaining same posture on the prevalence of cervical spondylosis.

4. Discussion

The prevalence of cervical spondylosis seen housewives, teachers and people working computers recorded in table 1 shows there's a relationship between the postures in these people which requires bending of their necks while doing house chores, writing notes and punching the keyboard with the development of cervical spondylosis.

Table 2 reveals increase incidence of cervical spondylosis with increase length of period spent in the occupation and increase working hours in people that works on computer. This is because there's longer period of exposure to postural destabilization around cervical vertebrae.

The prevalence of cervical spondylosis was more in people who assume sitting posture while working but was low in

people who frequently stooped; this maybe due to the tendency for someone to bend his neck while sitting. Also, there's gradual increase incidence of cervical spondylosis with increase hours of maintaining a fixed working posture but there was reduction in incidence in people who maintained their postures for about 2 – 3 hours this may be due to reduction in frequency of changes in position making the vertebrae to adapt to the postural changes. The sudden rise in the prevalence with increasing hours may also be due to weaning off this adaptation.

4.1. Relationship Between Posture and Development of Cervical Spondylosis

Although cervical spondylosis has been age related, researches have been proposing prolonged postural activities

around the neck such as bending of the neck, to be one of the major predisposing factor to cervical spondylosis as there are increased incidences among housewives [6] whose house chores requires bending as in washing, sweeping cooking and also in prolonged computer users [7].

Prolonged bending, carrying of heavy load and rapid alternating movements around the neck increases the pressure around the cervical spines which can lead to wearing and tearing of the spines. This causes reduction in the height of the spines which also result in reduction in capacity to bear load along the axial axis of the spines [8].

There is continuous degeneration in the height of the spine initiated by the wear and tear with continuous daily activities thereby resulting in alteration in the posture of the cervical vertebrae and increased moment arm about the central rotation [8].

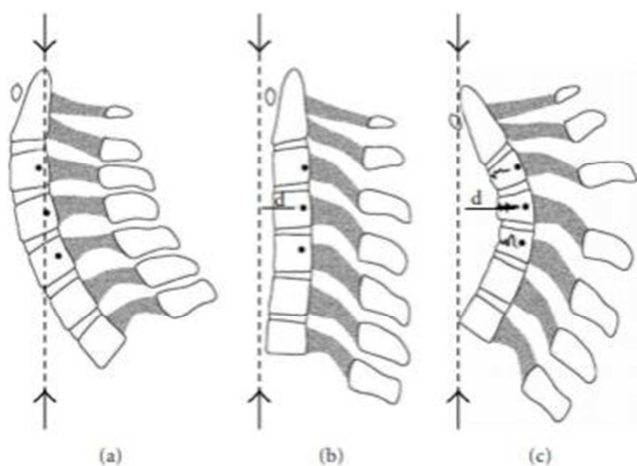


Figure 4. Cervical spine postural changes related to the degenerative process will lead to the spondylotic spine.

In the normal lordotic posture of the cervical spine, the axial force is applied along the instantaneous axis of rotation (IAR) with no deviation from this neutral point of rotation (a). However, with early disc height loss, the lordotic posture is reduced and the axial force is now offset from the instantaneous axis of rotation (d) causing a moment arm at this point of rotation.

If an axial force is placed at a particular distance from the center of rotation or the IAR, a bending moment is applied about this point (b), and it will take less force to induce injury to the apical spinal segment. The larger a moment arm, the greater the bending moment, which will cause further progression of the kyphosis (c).

(Taken from Benzel EC: Biomechanics of Spine Stabilization. Rolling Meadows, American Association of Neurological Surgeons Publications, 2001 [16]).

Venkatal et al 2014, reported a case of Cervical Spondylosis in a 53 years old housewife [17]. The magnetic resonance imaging findings is shown in figure 4.

Figure 5 (a) reveals progressive reduction in the normal lordotic posture of the cervical vertebra C3 - C7 leading to the wearing of the intervertebral disc between C5 and C6 resulting in the protrusion of the fifth and sixth cervical vertebra thereby

compressing the spinal cord.

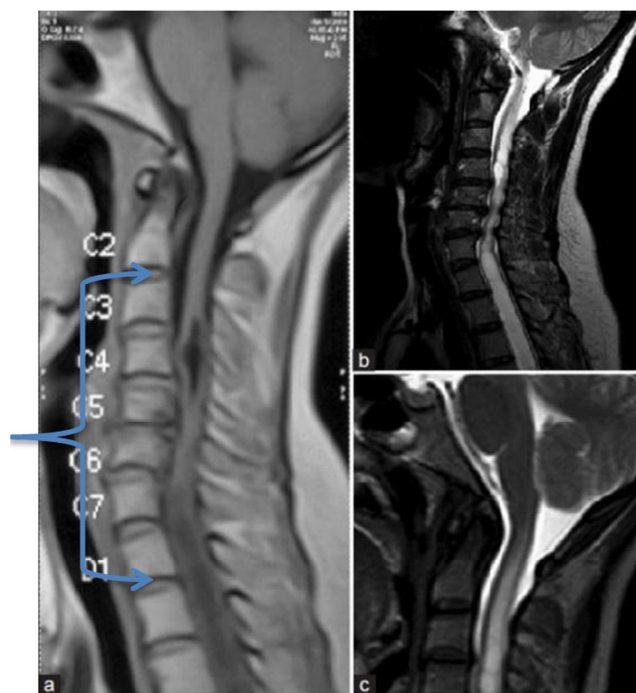


Figure 5. MRI findings in a 53 years old housewife with cervical spondylosis (Adapted from Venkata et al: Cervical spondylosis and syringomyelia. *J Neurosci Rural Pract*, 2014 [17]. Reprinted with permission).

4.2. Occupational Predisposition to the Development of Cervical Spondylosis

Cervical spondylosis is seen to be prevalent in people whose occupation requires prolonged postural changes to the cervical vertebra, mechanism of which is explained above.

According to a study done at Banaras Hindu University, Varanasi, India, the prevalence of cervical spondylosis is seen more in housewives and teachers; reasons attributed to prolonged bending of their neck; while house chores such as washing, mopping, cooking etc. and while doing table work such as writing lesson notes respectively.

In another research, increased prevalence of cervical spondylosis has been seen with increase housework intensity and in people which occupation requiring holding of a particular posture for about 1 - 2.9 hours amidst the Chinese communities [9].

Al-Bustany et al found out an increased prevalence of cervical spondylosis among computer users after excluding all other factors [7]. These and other occupations that involve postural imbalance to the neck should be considered as risk factors to the development of cervical spondylosis.

4.3. The Impact of Excessive use of Smartphone on the Development of Cervical Spondylosis

Smart phones are good devices for entertainment communication and social interaction. However, their prolong usage, which is usually associated with sitting or standing with a flexed or hyperflexed neck, is detrimental to the cervical discs of the cervical vertebrae.

According to a published paper in the journal of orthopedic science, excessive smartphone use has been linked to the development of cervical spondylosis among adolescents [10]. The precipitating factor being the extensive flexion of the cervical vertebrae for long hours and prolonged periods.

Previous studies have also showed that the excessive use of smartphones has a negative impact on the cervical spine [11-13].

One mechanism of the development of cervical spondylosis is the increased cervical flexion for long hours which results in cervical instability due to the progressive wear and tear changes of the cervical spine which progressively degenerates [14].

It has also been shown that patients with overuse of smartphones have higher cervical disc degeneration scale (CDDS) scores higher than those who do not use smartphone excessively [10].

The excessive usage of smartphone has been shown to facilitate the rapid progression of cervical myelopathy and has been suggested that flexion of the cervical spine be limited [15].

Preventive measures which can be taken to limit the flexion of the neck include the use of phone tripods, reduced screen time, frequent breaks, regular exercise, good sleeping posture and many others.

5. Conclusion

The gradual wear and tear of the cervical discs is the major predisposing factor to the development of cervical spondylosis and is usually age related. However, it's deductible from this research that postural imbalance associated with certain occupation, excessive flexion of the neck due to excessive smartphones usage, may also predispose people to the development of cervical spondylosis. This research seems to establish a correlation between the duration of postural instabilities to the cervical vertebra or the neck and development of cervical spondylosis which has almost direct relationship and will suggest that people whose occupation obligated them to maintain a longer period of postural imbalance to the neck like bending to be taking break in at least every two to three hours.

Conflict of Interests

Authors declared no conflict of interest.

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