

CERVICAL SPINE POSTURE OF SCHOOL TEACHERS

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INTRODUCTION

Posture is one of the most important factors affecting physical and mental status of an individual. Posture in humans is affected by different factors including familial factors, structural impairments, poor postural habits and occupation.^[1] Poor Postures may end up in development of various Musculoskeletal disorders (MSD) because of constant distortion of various structures.

Musculoskeletal disorders (MSD) represent one of the most expensive occupational health problems in both developed and developing countries. The National Occupational Research Agenda (NORA) in USA states that work related musculoskeletal disorders (MSD) account for a major component of the cost of work related illness in the United States.^[2]

The US Department of Labor defines work-related musculoskeletal disorders (WMSDs) as injuries or disorders of the muscles, nerves, tendons, joints, cartilage, and spinal discs associated with exposure to risk factors in the workplace. WMSDs account for approximately one third of all lost workday illnesses.^[3,4,5] Sixty-five percent of the 333 800 newly reported cases of occupational illness in 2001 were attributed to repeated trauma.^[6]

The etiology of MSP is now accepted to be multifactorial, including physical, psychological and social influences. Age, gender and working with improper position, daily lifting of loads and physically strenuous work increases the risk of MSP significantly (Miranda et al., 2002).

School teachers represent one such occupational group in which there appears to be a high prevalence (40-95 %) of MSD.^[7-11]

Epidemiological studies have demonstrated that factors such as gender, age, length of employment and awkward posture are associated with higher MSD prevalence rates among teachers.^[3]

Sometimes, teaching is carried out under unfavorable circumstances, in which teachers mobilize their physical, cognitive, and affective capacity to reach teaching

production objectives, over demanding or generating over effort of their psycho-physiologic functions.^[12] During the course of their work, teachers may be subjected to conditions that cause physical health problems.^[13] Teachers also participate in different school committees. These may cause teachers to suffer adverse mental and physical health issues due to the variety of job functions.^[14] Teaching leads to stress, with consequences to physical and mental health and with an impact on professional performance.

The MSD is one of the leading causes for retirement among school teachers.^[13] The job nature of school teachers involves a lot of head down posture, such as in frequent reading, assignment correction, and writing on the blackboard.^[15] Lifting of hands and head during writing in the black board may be the causative factor for neck and shoulder pain and also pain in hands and joints of hand.^[10]

The teachers who worked in senior middle schools also had the highest work load in comparison to those who worked in other levels of schools. Emotional exhaustion correlates with the high numbers of weekly lessons.^[11,16]

Primary school teachers, however, also perform a wide variety of tasks combining basic health childcare and teaching duties, and those that require sustained mechanical load and constant trunk flexion. Primary school teachers have been found to have elevated prevalence of neck, shoulder, arm and low back disorders.^[17,18]

Teachers involved to a considerable physical load, established by the educator remaining in the orthostatic position during up to 95% of activities, with varied levels of flexion of the backbone resulted in several types of

physical inability.^[6] The lack of chairs and tables their size and shape which are not appropriate for teachers develop positions unfavorable to the musculoskeletal system. Inappropriate chairs make teachers sit without back support with excessive flexion of knees and hips and flexion of the trunk to write and read texts on the table or even for student roll call, and without support for upper limbs resulted in the development of different kinds of physical illness.^[6] Activities of sustained sitting of frequent reading, marking of assignment and in front of computer, standing up teaching in class, repetitively overhead writing on board are also unsafe act and favorable to the development of NSP, LBP and upper limb pain.^[19,20,21]

Between Physiological and Psychosocial factors have been positively associated with MSD among school teachers, and the current review suggests that psychosocial factors such as high workload/demands, high perceived stress level, low social support, and low job control, low job satisfaction and monotonous work are most likely associated with MSD among teachers.^[19,20,21,22] This may occur because teachers often work in stressful conditions with large classes, a lack of educational resources, and limited reward for their work.^[23] Thus, school teachers are at risk of developing occupationally related NP and upper limb pain.^[24]

Educational issues such as working stress, teacher unemployment, education reforms, language proficiency assessment for teachers, and reduction in the size and number of classes and schools have already drawn much public attention. However, very little attention has been given to somatic health problems of teachers.

Therefore, through this study we want to analyze the cervical spine posture of school teachers, deviation of which may put them at risk of developing neck pain.

AIM AND OBJECTIVE

To find out the deviation of the cervical spine posture in school teachers.

RESEARCH DESIGN

Cross-sectional study

METHODOLOGY

Number and Source of Subjects

300 healthy female school teachers fulfilling the inclusion criteria were taken from various schools of Delhi.

Inclusion criteria^[25-28]

1. Asymptomatic healthy female school teachers.
2. 28-40 years of age.
3. BMI (18.5-24.9 kg/m²).
4. Teaching since last five years.

Exclusion criteria^[29]

1. Any diagnosed case of musculoskeletal, neurological, psychiatric and cardio respiratory disorder.
2. If subject had participated in a neck or back exercise program in past 6 months or are undergoing treatment at the time of testing.

Method of selecting

Assessment of the individuals was performed and the individuals who were fulfilling the inclusion criteria were selected and after explaining the procedure and clearing all their doubts regarding study, participants agreed to be the part of the study with their written consent.

Instrumentation

Instruments and tools Used

1. Digital camera: Olympus (SP-610UZ)
2. Marker
3. Weighing machine
4. Measuring tape
5. Laptop
6. UTHSCSA Image Tool Software.

Outcome Measures

1. Cranio-vertebral Angle
2. Anterior Head Alignment
3. Cranio-horizontal Angle

Procedure

The school teachers were divided into 2 groups:

1. 150 primary school teachers
2. 150 secondary school teachers

The subject was seated erect on an adjustable stool with feet placed flat on the floor and arms resting comfortably on their thighs.

The subject's clothes were rearranged to allow skin and marker placement. Anatomical marks were located, and marker was applied over the canthus of the eye, tragus of ear, over seventh cervical spinous process and over the lower margins of both the ear lobes. Photographs were taken and three postural angles namely Cranio-vertebral Angle, Anterior Head Alignment and Cranio-horizontal angle were measured from photographs using the UTHSCSA Image Tool Software.

Cranio-vertebral Angle

Markers were marked on the spinous process of C7 and the tragus of the ear. A line was drawn from tragus to C7 and another horizontal line through the spinous process of C7, and the angle was measured at the intersection point of the two lines.^[26]

Anterior Head Alignment

Markers were marked on the inferior margins of both the ears and another horizontal line was drawn in relation to the inferior margins of the ears. The angle formed by the

intersection point of the two lines indicates the anterior head alignment. The eyes will level when the angle is zero.^[26]

Craniohorizontal angle

The angle formed at the intersection of a horizontal line through the tragus of the ear and a line joining the tragus of the ear and the external canthus of the eye, was measured. It is believed to provide an estimation of head on neck angle or position of the upper cervical spine.^[26]

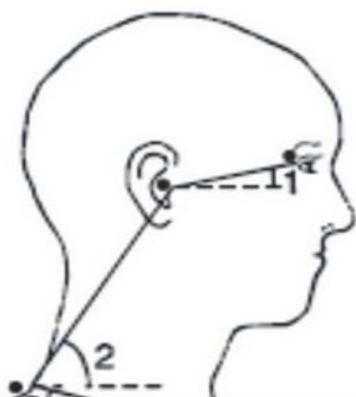


Illustration 1: Photographic representation of angles in Saggital View.

Angle 1: Shows Cranio-horizontal angle
 Angle 2: Shows Cranio-vertebral angle

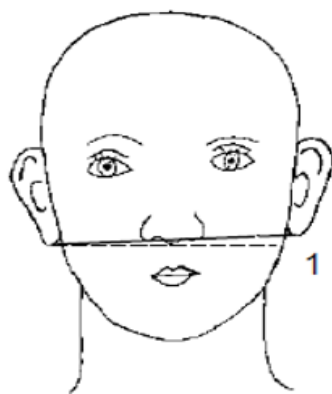


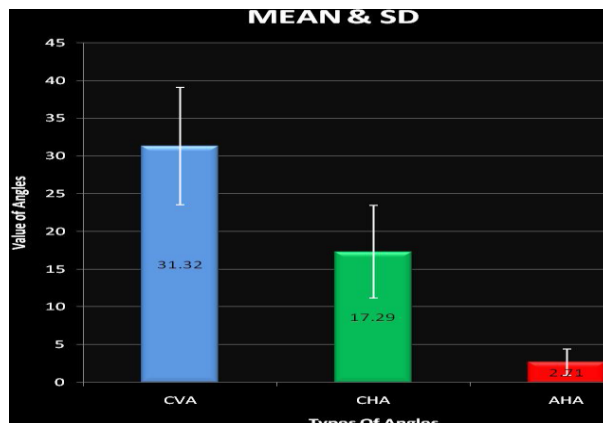
Illustration 2: Coronal View Shows Anterior Head alignment Angle.

Primary Teachers

Total sample of 150 subjects was taken who had fulfilled the inclusion criteria.

The mean of CVA is 31.32+7.76. The mean of CHA is 17.29+6.14. The mean of AHA is 2.71+1.75

The r between CVA and CHA is 0.194 which is significant at 0.05 levels. The r between CHA and AHA is -0.107 and the r between CVA and AHA is -0.029 which is not significant.



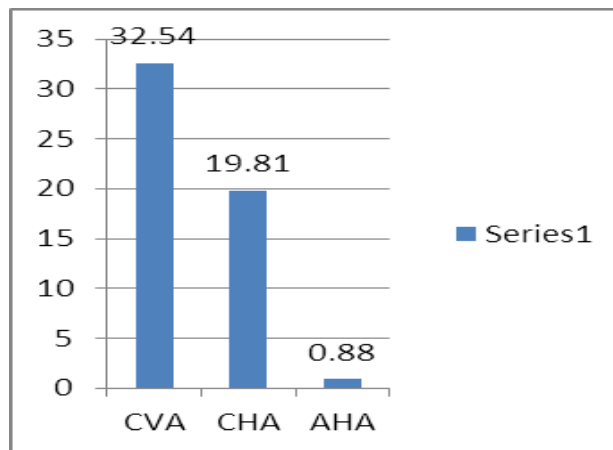
Representing Mean and SD of Variables.

Secondary School Teachers

Total sample of 150 subjects was taken who had fulfilled the inclusion criteria.

A total of one hundred and fifty female secondary school teachers were studied. The mean age of study subjects was 31.37±3.69 years with a range of 28-40 years

The mean of CVA is 32.54±7.89. The mean of CHA is 19.81±5.73. The mean of AHA is 0.88±2.22.



Representing Mean and SD of Variables

DISCUSSION

Determining the risk factors is considered an important component of the rehabilitation of teachers. As per the present study data analysis, it is found that the experimental hypothesis has been accepted according to which school teachers tend to have more forward head posture.

In a study of secondary school teachers done by Chiu TT et al, low colleague support, high anxiety, and high workload were significantly associated with neck pain. In the same study, high workload, very low colleague support and high anxiety were positively correlated with upper limb pain.^[30] In addition, another study of Chinese secondary school teachers done by Chiu TW, found a positive association between high workload, low

colleague support, high job stress, low job satisfaction and neck pain.^[31] According to Cardoso JP, these associations may occur because teachers work in stressful conditions with large classes, lack of educational resources and limited reward for their work.^[32] It has been reported by Beyen TK in his study that, the more psychological demands needed for a certain task, the greater the possibility to develop MSD regardless of the anatomical area.^[33]

Primary school teachers appear to be more prone to neck and shoulder pain. Prolonged exposure to unfavourable working conditions during teaching becomes a health risk factor. These unfavourable working conditions among teachers may be high physical exertion and occupational loading like remaining in the orthostatic position during up to 95% of activities, stereotyped repetitive use, headdown posture, heavy external loading, and frequent lifting of heavy loads, awkward working positions and injuries.^[34]

This has been evidenced in the results of a study done by Leon m straker et al, where the age group with the highest prevalence of neck pain was 31-35 years, with a significant difference among different age groups in the prevalence of neck pain.^[35]

On analyzing the total population of a study done by T David Punt and Paul Sharples it has been found that the teachers have more forward head posture as the studies measuring the C7-tragus-horizontal angle (indicative of forward Head Posture) in asymptomatic individuals report mean values between 42° to 56.7° and between 4.4° to 18.8° for the tragus-eye-horizontal angle (indicative of extension). Studies including individuals with a wide age range have found a significant decrease in the C7- tragus-horizontal angle (increasing forward HP) with increasing age (Dalton and Coutts, 1994; Raine and Twomey, 1997). The decreasing values of CVA and the increasing values of CHA shows increase in forward head posture.^[36] The results of my study are in consensus with this study.

According to Tully EA et al. forward head posture (FHP) is one of the most common cervical abnormalities that predisposes individuals toward pathological conditions, such as headache, neck pain, temporomandibular disorders, vertebral bodies disorders, soft-tissue length and strength alteration, or even scapula and shoulder dyskinesia.^[37,38]

Already it has been evidenced in the study done by Laura Punnett et al that school teachers have risk factors for the development of MSDs include rapid work pace, daily duration of computer work, repetitive motion, forceful exertions, static and non-neutral wrist, arm, and neck work postures, lack of vibration and psychosocial factors.^[39]

It has also been seen in the study done by Anabela Gonçalves Silva et al that there is no significant relationship of CVA, CHA, AHA in the total population sample, but there is significant correlation between CHA and AHA which contributes to forward as well as side head tilt in the sample population, the posture of the head and shoulder can be influenced negatively by many diseases of nervous system, visual or vestibular system. Studies measuring the right ear left ear-horizontal angle (indicative of side flexion) have found symmetrical posture (no right or left side-flexion) in asymptomatic individuals.^[36]

MSD is the result of interaction between the affected person and a host of risk factors including those that are personal, physical and psychosocial in nature. The most notable risk factors among teachers include gender, age, weekly working hours, length of employment and awkward posture.

It is said by Ono Y et al in his study that, the possible adverse developmental effects of prolonged exposure to postural stresses, computer furniture, mental stress and reports of pain and vision factors can all influence school teachers' posture.^[40] It has also been included in the study of David Seaman et al that, most of the teachers complained that they didn't have the time to take care of themselves due to school work.^[41] Accordingly a dedicated 20 min for exercises at school itself as a part of their schedule has a good psychological impact on them, indirectly resulting in pain relief apart from the physiological effect. Therefore, a multidimensional approach may be needed if sustainable improvements are to be made including psychological assurance.

According to Chiu TT and Lam PK, the purpose was to inculcate the treatment protocol in teachers' school timetable and to suit their schedule. Also conducting every session under supervision of therapist was considered more suitable for teachers than unsupervised performance with biofeedback at home. This could have psychologically assured the teachers and contributed to the positive results.^[42]

Ariëns GA et al said that, it may help to prevent neck pain or arrest it in the early stages in the teaching population. It may also improve the functional status of teachers. Once the teachers feel better this would make their job easier and more productive.^[43]

It is given in the study of Bergqvist U et al that computer use in schools is increasing day by day; the risk of development of musculoskeletal disorders within the teaching population has also increased resulting in a potentially greater number of disorders. Musculoskeletal disorders have been associated with a decline in productivity in adults and seriously affect work performance. Supposing that these symptoms now emerge earlier in a lifespan than in previous generations, we should expect increasing sick leave and early

retirement. It helps towards prevention of such possibilities in the future.^[44]

Clinical Relevance

The study performed suggests that there is deviation of the cervical spine posture in female school teachers. This review has identified different possible risk and protective factors for MSD. As such there is need to develop and implement effective intervention strategies that are aimed at curbing the development of MSD among teachers. These intervention strategies may include ergonomically designed workplaces, proper equipment and training and reasonable job demands and exercise.

Scope of Future Study

- Working hours of the teachers can be included in future to see how much it effects the cervical posture
- Male teachers can also be considered to compare the results with that of female teachers.
- Psychological factors through which the teachers are gone through in their occupational career, length of employment of the teachers, ergonomically designed furniture can also be included in the study to check whether it affects the posture of the teachers.

CONCLUSION

There is a significant deviation of cervical spine posture of school teachers.

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