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Occurrence of Work Related Musculoskeletal Disorders among School Teachers in Eastern and Northeastern Part of India

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Background: To determine the occurrence of Work related Musculoskeletal Disorder (WMSD), its prevalence and risk factors among school teachers in India.

Materials and Methods: 100 questionnaires was passed out and sent to teachers of different schools ranging from primary school to higher secondary schools across Kolkata and Aizawl. 72 percent of the teachers responded. A standardized Dutch Musculoskeletal Questionnaire (DMQ) was used.

Results: Neck pain was the most prevalent musculoskeletal complaint, reported by 53.52% of the respondents while chronic neck pain was not reported by the teachers. Shoulder and back pain were less prevalent than neck pain but the prevalence of chronic pain in these body sites were higher. Furthermore wrist/hand and knee pain were less prevalent than the other complaints. Working with hands above the shoulder was the highest reported risk factor (62.27%).

Conclusions: School teachers are susceptible to WMSD with a significant prevalence for neck, shoulder, back, wrist/hand and knee pain. Prolonged working nature like bending the neck forward/backward or holding the neck in a Forward/backward posture, same movements with arms, hands or fingers many times, hands above the shoulder level, reaching with arms or hands and standing are important factors which affect the occurrence of musculoskeletal disorders.

Keywords: Work related Musculoskeletal Disorders (MSD), Teachers, Rehabilitation, Posture, Prevalence

Introduction

The term Musculoskeletal Disorders (MSD) encompass a gamut of inflammatory and degenerative conditions that affects the muscles, tendons, ligaments, joints, peripheral nerves and supporting blood vessels with consequent ache, pain or discomfort (Tinubu BMS et al, 2010, Punnet L et al, 2004, Smith DR et al 2003). Work related musculoskeletal disorders (WMSDs) are defined as musculoskeletal disorders that results from a work-related event (Tinubu BMS et. al, 2010; Salik Y, Özcan A, 2004). A number of intrinsic and extrinsic factors have been implicated in the etiology of WMSDs (Tinubu BMS etal, 2010, Punnet L et al, 2004). Silverstein et al, 1987 reported repetitious movement, awkward postures, and high force levels as the three primary risk factors that have been associated with WMSDs.

These musculoskeletal disorders belong to a collection of health problems that are more prevalent among the working class than the general population (Saldana N, 1996). They represent the second largest cause of short-term or temporary work disability after the common cold (Yelin EH et al 1986).

The work of teachers has a fundamental social value because education can ensure economic growth, and technical and scientific development in any society (Vedovato T. G, Monteiro I. 2014). Musculoskeletal disorders (MSD) represent a common occupational problem in the teaching profession and teachers represent an occupational group among which there appears to be a high prevalence of MSD. It has been suggested that the prevalence of self-reported MSD among teachers

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ranges between 39% and 95% (Erick PN, Smith DR, 2011). A teacher plans, organizes and implements an appropriate instructional program in a learning environment that guides and encourages students to develop and fulfill their academic potential. A teacher spends the majority of the day standing in the classroom, walking through the classroom and be able to work in tight spaces between desks, teaching students, writing on the blackboard, preparing lessons, grading assignments, and school administrative work, which can cause adverse mental and physical health concerns(Chan AHS et al, 2010; Chong EYL, Chan AHS, 2010). The demands of the job as mentioned above being executed for prolonged hours daily in a year or more with constant stresses to the musculoskeletal system of the body may result in a work related musculoskeletal disorders with added poor body mechanics, positioning and posture.

The pronged static posture, body mechanics, continuous nature of the job without optimum rest intervals put the teachers in a vulnerable position to develop WMSDs (Liping Li et al, 2012). This study is an attempt to support and justify that teaching work does cause musculoskeletal disorders among teachers. The aim of this survey is to find out the prevalence and risk factors for WMSDs among school teachers in Eastern and North Eastern part of India.

Materials and Methods

100 questionnaires were sent to teachers of different schools ranging from primary school to higher secondary schools across Kolkata, West Bengal and Aizawl, Mizoram, India. Convenience sampling technique was used to accumulate the study population. Both primary and higher secondary school teachers were included in the research, from both genders, who accepted to participate in the research signing an informed consent. Seventy two percent of teachers responded. At least 1 year of work experience in the current position was the criterion for eligibility to the study and other inclusion criteria were teachers working for 5 + hours a day for 5 days a week, working in classroom with blackboards and working in urban areas. The exclusion criteria were teachers working part time, working in classroom with slide projectors or LCDs, who had less than 1 years experience in teaching, working in rural areas and teachers engaging in regular work out (physical exercise for minimum 3 days a week, minimum ½ hour a day). Participants were assured of the confidentiality of information obtained from them. Ethical clearance was obtained from the Institutes local Ethical Committee.

A self-administered questionnaire was distributed between August 2011 and January 2012. A standardized Dutch Musculoskeletal Questionnaire (DMQ) was used. The questionnaire comprises of the following sections (Waddell G, Burton A K, 2010).

Background variables (e.g. age, gender, education, duration of employment, work history, shift work);

Tasks (prevalence rates and perceived heaviness of task demands);

Musculoskeletal workload (postures, forces, movements);

Work pace and psychosocial working conditions (demands, control and autonomy, work organization and social support, work satisfaction).

Health, in particular musculoskeletal symptoms; the phrasing of questions on prevalence is comparable with the 'Nordic questionnaire on musculoskeletal disorders (Kuorinka et al. 1987), including the definition of areas of the body pictorially.

- Lifestyle (e.g. sports, smoking) (in the extended version of the questionnaire only);
- Perceived bottlenecks and ideas for improvements suggested by the workers themselves (optional).

Musculoskeletal workload (postures, forces, movements) is addressed in 63 questions. These questions can be categorized into the following six types of potentially hazardous workloads and working conditions (Waddell G, Burton A K, 2010).

Force exertions: lifting, carrying, bearing, pushing, pulling, pinching;

Dynamic loads: walking, bending and twisting of trunk, neck, wrists, stooping, squatting, reaching;

Static loads: sitting, standing, prolonged bent or twisted posture of trunk, neck or wrists, working with hands above shoulder level, kneeling or squatting posture;

Peak loads: sudden, forceful movements, unexpected movements, repetitive loads;

Ergonomic environmental conditions: climatic factors, vibration, limited working space, slipping and falling.

Data were summarized using the descriptive statistics of mean, standard deviation and percentages. The data analyses were carried out using SPSS 16.0 version software (SPSS Inc., Chicago, Illinois, USA).

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Results

The response to participate in the study was 72% (72/100 respondents). The principal reasons for non-participation were sickness leave, lack of time, and refusals. Our sample consisted of school teachers from Kolkata (15.27%) and Aizawl (84.72%). About 56.94% of teachers were having a post-graduate degree, 38.88% were graduated, 4.16% were master of philosophy and 1.38% had a higher secondary level of education. The baseline characteristics are shown in Table 1.

The school teachers had worked in average 12.02 years, ranging from 2 years to 39 years of experience. 6 to 10 years of experience has the highest frequency of 27 respondents (37.5%), 11 to 15 years of experience has the second highest frequency of 17 respondents (23.6%) and third highest frequency of 14 respondents is 16 to 20 years of experience i.e. 19.4%. The average working hours per week is 35.10 (SD 4.96) hours, average working hours per day is 5.13 (SD 2.88) hours and 86.11% of the respondents work 5 days a week and 13.88% of the respondents work 6 days a week. All the respondents work full time.

Personal characteristics and working experience among school teachers are given in Table 1.

Table 1. Personal characteristics and working experience among school teachers.

Range			
Variable	**Minimum**	**Maximum**	**Mean ± S. D**
Age (yrs)	26	60	37.68 ± 6.87
Height (cm)	145	180	161.33 ± 7.82
Weight (kg)	46	100	63.06 ± 9.94
Body Mass Index (kg/cm^2)	14.8	30.9	24.02 ± 3.23
Years of experience (yrs)*	2	39	12.02 ± 3.19
Hours per week (hrs)*	25	56	35.10 ± 5.43

Table 2 presents the past 12 month prevalence of musculoskeletal complaints of neck, shoulder, back and knees among 72 school teachers. Neck pain was the most prevalent musculoskeletal complaint, reported by 53.52% of the respondents while chronic neck pain was not reported by the teachers. Shoulder and back pain was less prevalent than neck pain but the prevalence of chronic pain in these body sites were higher. Furthermore wrist/hand and knee pain were less prevalent than the other complaints.

From the results yielding from musculoskeletal workload (postures, forces, movements) questions, the self reported risk factors with high frequencies that causes work related musculoskeletal disorders are given in Table 3.

Table 2. Prevalence of musculoskeletal complaints in the past 12 months among school teachers: (n = 72).

	Neck N (%)	**Shoulder N (%)**		**Back N (%)**		**Wrist/Hand N (%)**		**Knee N (%)**	
		Right	**Left**	**Upper**	**Lower**	**Right**	**Left**	**Right**	**Left**
Occurrence in the past 12 months	38.5 (53.52)	22.3 (30.98)	18.2 (25.35)	28.3 (39.43)	24.3 (33.80)	14.19 (19.71)	11.1 (15.49)	18.2 (25.35)	16.2 (22.53)
Chronic complaints	0 (0.00)	03 (4.17)	01 (1.38)	01 (1.38)	5.9 (8.33)	02 (2.78)	01 (1.38)	01 (1.38)	01 (1.38)
Visit doctor	12.7 (17.7)	12.7 (17.7)		16 (22.3)		N.C*		N.C*	

Table 3. Self reported risk factors of musculoskeletal disorders.

Self Reported Risk factors	**Frequency N (%)**
Lifting with one hand	12 (16.66)
Lifting in an uncomfortable position	10 (13.88)
Bending the neck forward or holding the neck in a forward posture for long periods	17 (23.61)
Bending the neck backward or holding the neck in a backward posture for long periods	17 (23.61)
Bending slightly with the trunk	10 (13.88)
Slightly bent posture for long periods	13 (18.05)
Same movements with arms, hands or fingers many times per minute	26 (36.11)
Working with hands above the shoulder	44.8 (62.27)
Reaching with arms or hands	30 (41.66)
Holding hands above shoulder level	21 (29.16)
Holding hands under shoulder level	19 (26.38)
Standing for long periods	43 (59.72)
Sitting for long periods	15 (20.83)
Stair climbing	18 (25.00)
Same posture for long periods	14 (19.44)

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About 15.27% reported insufficient space to do work properly and 4.16% also reported slips or falls during work.

The respondents reported their work to be physically strenuous (11.1%), mentally very exacting (45.54%) and also caused to perspire or to be out of breath (6.95%). About 56.99% reported they had to be hurry to be ready on time and 50.04% had to regularly work under the pressure of time. Furthermore, 13.9% reported having problems regularly with the pace or the busy nature of their work, 36.14% thought they needed to take it somewhat easier in their work and 23.63% reported their work to be often too tiring. About 66.72% reported having enough time to finish all the work in time, 47.26% had much work to do, 20.85% had to work extra hard, 18.07% had to work very fast and 6.95% reported their work as hectic or a madhouse.

Of the respondents, 26.38% were mentally exhausted by the work, 27.77% feel tired when waking up at the start of a new working day, 13.88% felt burnt out by their work and 20.83% felt an emptiness at the end of a working day. Moreover, 16.66% thought they had too much to do at work and 13.88% thought the work were too much for them.

Majority of the respondents reported their work mostly interesting (88.88%), mostly enjoyable (93.05%) and had enough training to perform their tasks (81.94%). About 56.94% reported their work to have enough variety and 20.83% considered their work to be too simple.

The respondents (74.96%) also reported that there were certain factors hindering their work. The main factors reported noisy (36.11%), lack of fresh air (9.72%), dry air (8.33%), change of extremes of temperature (5.55%) and bad smell or stench (15.27%).

Discussion

School teachers are susceptible to work related musculoskeletal disorders with a significant prevalence for neck, shoulder, back, and wrist/hand and knee pain. School teachers, spend a substantial portion of their work-days in tasks involving movements and postures, which stress their bodies (Cheng HYK, Cheng CY, Ju YY, 2013).

In this study neck pain was the most prevalent musculoskeletal complaint, reported by 53.52% of the respondents while chronic neck pain was not reported by the teachers (0%). Prolonged working nature like bending the neck forward/backward or holding the neck in a forward/backward posture, and significant use of 'head down' posture such as frequent reading, marking of assignments and writing on a black board might have caused this significant percentage of teachers to complain neck pain (Chiu TT, Lam PK, 2007, Horng YS et al 2008.).The findings of this study is supported by a similar study of secondary school teachers in Hong Kong, where the life-long prevalence of neck pain has been reported at 69.3%, within 12 month prevalence of 66.7%, and the prevalence after becoming a teacher being 59.7% (Chiu TT, Lam PK, 2007).

In this study 30.98% reported right shoulder pain and 25.35% of subjects reported left shoulder pain. Same movements with arms, hands or fingers many times, hands above the shoulder level, reaching with arms or hands and standing are important factors which affect the occurrence of musculoskeletal symptoms at shoulder joint. In Turkey, 28.7% of school teachers had experienced MSD symptoms in the shoulder area (Korkmaz NC, Cavlak U, Telci EA, 2011). Where as in a study conducted on chinese school teachers, the highest shoulder pain prevalence was found to be 73.4% for the previous month (Chong EY, Chan AH, 2010).

The prevalence of upper back pain was found to be more than lower back pain in this study.39.43% of teachers in this study reported upper back pain where as 33.80% teachers reported lower back pain. This is in contrast to a study on Turkish school teachers, which found that 43.8% of the studied participants reported low back pain, compared to 36.9% of whom reported upper back pain (Korkmaz NC, Cavlak U, Telci EA, 2011). This might be due to more of standing postures used while teaching and poor posturing while seated works mostly forward bending of neck and upper back.

Pain in wrist and hand was reported to be 19.7% and a similar finding was also seen in a study among Swedish music teachers, ranging from 13-22.2% of the teachers surveyed (Edling CW, Fjellman-Wiklund A, 2009).

prevalence of knee pain was 25.35% in this study and in a Turkish study, knee pain had been experienced by 32% of the teachers studied (Korkmaz NC, Cavlak U, Telci EA, 2011).The prolonged standing postures increases load o the knees joints. The prevalence of pain in the lower extremities of teachers seems to be relatively low

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when compared to the prevalence of pain in the upper extremities and the back. (Erick PN, Smith DR, 2011).

The self reported risk factors found in this study are mostly physical factors among which slightly bent posture for long periods and same movements with arms, hands or fingers many times per minute were reported by 62.27% and 41.66% of teachers respectively. Holding hands above shoulder level was also found to be a risk factor and reported by 59.72% of teachers.

Intense physical exertion, and other physical factors like lower muscle strength have been associated with WRMDs in teachers (Yoshimura E, et al 2008, Cardoso JP, et al 2009).

Physical environment is a potential risk factor for development of WRMDs in teachers. 15.27% teachers reported of insufficient space to do work properly and 4.16% also reported of slips or falls during work. This study has found that lifting heavy loads is a risk factor for shoulder, back and elbow pain which is supported by a study conducted among Turkish teacher (Durmus D, 2012).

Work place and psychosocial working conditions are also found to be important risk factors for WRMDs in teachers. In a Chinese study of secondary school teachers, low colleague support, high anxiety, and high workload were significantly associated with neck pain (Chiu TT, Lam PK, 2007). As teachers work in stressful conditions with large classes, lack of educational resources and limited reward for their work, the psychosocial stress affects their mental health (Cardoso JP, 2009).

There are a few limitations to the present study. The survey was conducted for a short period and only in two places where the number of teachers responded were only 72 individuals, which may have underestimated the prevalence rate of WMSDs. Most of the findings related to risk factors were self-reported WMSDs, which is a bias. The association of various risk factors like age, gender, duration of employment were not studied.

Conclusion

In the present study, we surveyed WMSD prevalence among school teachers in Eastern and North Eastern part of India. Considering the higher prevalence of WMSDs among school teachers especially pertaining to neck, upper back, the lower back, shoulder, hand and wrists, preventive strategies that minimize the occurrence of these disorders, especially in those who are at increased risk should be practiced by the teachers. As teachers are the main resource for developing the potential of students and making them the useful citizens of the country, their health should be given priority. Thus prevention of WRMDs of teachers at workplace should be an important rehabilitation goal.

Conflict of Interest

There is no Conflict of Interest.

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Author contribution

ZM: Study Implementation, Data collection and analysis, writing the first draft of paper-

DS & PB: Study design and data analysis, editing and confirming the final draft of the paper.

DS: Study design, confirming the final draft of the paper

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