

Work- Related Musculoskeletal Pain among Primary School Teachers: A Recommended Health Promotion Intervention for Prevention and Management

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Abstract: Musculoskeletal pain (MP) has a substantial impact on primary school teachers' quality of life that result in frequent sick leave, functional impairment, absenteeism, early retirement and are also costly in terms of treatment, individual suffering and discontinuing work. Thus, a better understanding of MP multiple causative factors will allow school health nurses and policy makers to apply the available resources for prevention, early diagnosis and management in school setting. The aim of this study is first to assess work-related MP among primary school teachers and second to recommend a health promotion intervention for prevention and management. Using a cross sectional descriptive design, four primary schools were randomly selected then a sample size was calculated to be 250. Tools for data collection included anthropometric measurements, a self-administered biopsychosocial MP assessment questionnaire. Results revealed high prevalence of MP as reported by teachers. Low back pain (41%) was the most common MP reported by teachers followed by neck (20%) and shoulder pain (15%). Meanwhile, 84% of teachers believed that the experience of MP have affected their profession. Pain among teachers was associated with personal factors such as age, education, body mass index and smoking at 0.005, 0.005, 0.000 and 0.005 respectively. Significant relationships were also found between occupational variables such as, job demands, job duration and job satisfaction at, 0.000, 0.000 and 0.005 respectively. The findings draw attention toward the need to adopt public policies to improve the working conditions and alleviate suffering of teachers and to test the recommended intervention.

Key words: Musculoskeletal Pain • Teachers • Health Promotion Intervention

INTRODUCTION

“Musculoskeletal pain” in this paper is defined as pain perceived to be related to the musculoskeletal system. Musculoskeletal pain (MP) is normally the body's warning signal when there is risk of tissue damage or when such damage has occurred. Pain can signal that there is a need for recovery of tissue. Pain assessment is critical to optimal pain management interventions. Therefore, pain needs to be studied in a larger context, together with health and quality of life. MP decrease productivity at work due to the substantial impact on the quality of life, frequent sick leave, functional impairment, absenteeism and early retirement and are also costly in terms of treatment and individual suffering [1, 2]. Moreover, MP represents a common health-related reason for discontinuing work and for seeking health care [3].

MP has been mentioned in several studies among school teachers as a relevant health problem. Various risk factors have been previously documented in epidemiological studies. Additionally, several preventable factors are associated with MP in the teaching profession [4]. These factors include high workload, excessive paperwork, class preparation and students' evaluation, lifting heavy load, fixed posture, anxiety level, low peer support and poor mental status [5]. In other studies, lack of social confidence, low level of education, low job satisfaction, inadequacy of income, hard physical work, smoking, obesity and improper posture, were the most important triggering factors [6]. Despite their large demographic and the associated potential for occupational health problems, no studies have investigated a comprehensive musculoskeletal pain assessment that address common risks for primary school teachers. An investigation of these risk factors is

important for appropriate preventative and management strategies to be put in place.

Significance: Although, schools are considered to be an ideal place for teachers to work, the literature review clearly suggests that teachers are at risk for developing musculoskeletal disorders. It is also suggested that musculoskeletal disorders among primary school teachers is most likely an under researched topic, teaching itself represents a high risk occupation for musculoskeletal disorders. Prolonged exposure to unfavorable working conditions during teaching becomes a health risk factor.

School teachers in general, have been demonstrated relative to other occupational groups, to report a high prevalence of MP, with prevalence rates of between 40% and 95%³. During the course of work, teachers may be subjected to conditions that cause physical health problems. The work of a teacher does not only involve teaching students, but also preparing lessons, assessing students' work and being involved in extracurricular activities such as sports [2]. These may cause teachers to suffer adverse mental and physical health issues due to the variety of job functions. The work tasks of school teachers often involves significant use of a 'Head down' posture, such as frequent reading, marking of assignments and writing on a board. Poor posture and improper techniques of lifting or carrying are the two very common causes of low back pain. Meanwhile, lifting heavy loads which ranked as the main contributing factor involved materials such as books, overhead projectors and other equipment [7].

Despite this, the impact of MP specifically within the teaching profession has not been given sufficient attention in the literature. Authors [2] that further studies are required to develop and implement effective intervention strategies that are aimed at reducing the development of MP among teachers. Thus, the aim of this study is therefore, to assess MP among primary school teachers and second to recommend a health promotion intervention for prevention and management.

Theoretical Framework: The biopsychosocial model is the most heuristic approach that uses physical, psychological, social, cognitive, affective and behavioral measures—along with their interactions—to best assess the individual's unique pain condition. It highlights that factors affecting health can be identified at several different levels, e.g., relating to social and economic structures of society; workplaces and families; individual

behaviors and physiological processes within an individual. Thus, treating the "whole" person is far more important than focusing merely on a disease [8]. A biopsychosocial approach takes into account the biological, psychological and social factors that affect the experience of and coping with pain, allowing for and encompassing a wider variety of treatment options [9].

Aim of the Study: First, to assess musculoskeletal pain among primary school teachers and second to recommend a health promotion intervention for prevention and management.

Research Questions:

- What are the characteristics of musculoskeletal pain among primary school teachers?
- What are the factors associated with musculoskeletal pain among primary school teachers?

MATERIALS AND METHODS

Research Design: A quantitative cross-sectional descriptive design was utilized for the study.

Setting: Four primary governmental schools were randomly selected from a list of south Cairo educational directorate schools (36). The selected schools were Taha Husein, Kasr El-Nile and El-Shaheed abed –El Hafez, and Hoda sharawy school.

Sample: A multistage random sampling method was used to include a representative sample of the study population. The sampling frame was a list of governmental primary schools, which was obtained through the Ministry of Education. After the selection of four primary schools randomly, the sample size was calculated using the sample size calculator website to be 250 primary school teachers who were randomly selected from a list in every school.

Tools for Data Collection:

- Anthropometric measurement including height, weight and body mass index using the portable weighing scale and a Stature meter.
- A self-administered biopsychosocial pain assessment questionnaire was developed and field tested by the researcher based on the 12 items

general health questionnaire, the 5 key components of the WILDA pain assessment approach [10] as well as the valid and reliable multidimensional 7 items Von Korff Chronic pain grade scale [11]. The questionnaire had three parts:

1st part collected the participant's personal characteristics that include age, gender, marital status, educational level, habitual physical activity level (Exercises and smoking) and occupational history (Job demands, job duration, medical condition, number of working hours and posture during working activities etc.).

2nd part including musculoskeletal pain history and physical risk factors in the last 3–6 months (Site, onset, duration, occurrence, frequency, a 0-10 numerical visual analog severity rating scale (Mild, moderate and sever), intensity, aggravating and alleviating factors, the impact of the pain on daily, social and work activities (e.g. physical activity changes, sleep disturbances and household activities..etc.). The questionnaire contained a pain diagram of 9 numbered body parts divided into neck, shoulder, upper back, lower back, elbow, arm, hand, thigh, knee and leg then subjects were asked to shade pain area number on the diagram. Dimensions of overall chronic pain severity (Pain intensity and pain-related disability) were assessed. Subscale scores for pain intensity and disability are combined to calculate a chronic pain grade that enables classification of chronic pain into 5 hierarchical categories: grades 0 (No pain) to IV (High disability-severely limiting). To assess disability, all items are scored on an 11-point Likert scale, with responses ranging from 0–10. Scores are calculated for 3 subscales: the characteristic pain intensity score, which ranges from 0–100, is calculated as the mean intensity ratings for reported current, worst and average pain; the disability score, which ranges from 0–100, is calculated as the mean rating for difficulty performing daily, social and work activities; and the disability points score, which ranges from 0–3, is derived from a combination of ranked categories of number of disability days and disability score. characteristic pain intensity = (Response question 1) + (Response question 2) + (Response question 3) / 3 * 10 disability score = (Response question 5) + (Response question 6) + (Response question 7) / 3 * 10 disability points = (Points for disability days) + (Points for disability score) The 3 subscale scores (Characteristic pain intensity, disability score and the disability points score) are used to classify subjects into 1 of the 5 pain severity grades: grade 0 for no pain, grade I for low disability-low

intensity, grade II for low disability-high intensity, grade III for high disability-moderately limiting and grade IV for high disability-severely limiting.

3rd part: psychosocial risk factors assessment questions to identify the severity of psychological distress experienced by teachers; it refers to individual's perception of the job characteristics which can promote positive feedback (Motivation and satisfaction) and stress. It consisted of questions such as have you, felt constantly under strain and though of changing your career due to pain, lost much sleep over worry? and been satisfied with the way you've carried out your task? etc

Inclusion and Exclusion Criteria: Teachers of both sex and gender were included in the current study and who were free from musculoskeletal health problems, neurological problems and acute or post-acute illnesses.

Protection of Ethical and Human Rights: This study was approved by community health nursing department council of the Faculty of nursing; Cairo University. An official permission was obtained from Ministry of Education, the Central Agency for Public Mobilization and Statistics, Cairo educational directorate at Cairo Governorate to conduct the study. An official permission was further obtained from the director of each school.

Procedure: Questionnaires were distributed and collected over three months between Septembers till December 2014. Weight and height were obtained first then questionnaires were personally distributed to teachers during school break time or spare time classes. The researcher remained in the class during the completion of the questionnaires, which took an average of 20 minutes and collected all questionnaires when all participants had finished. BMI was calculated as weight (In kg) divided by the square of height (In meters). BMI was classified into three categories as underweight <18.5, Normal/healthy weight 18.5-25, over weight > 25 and obesity > 30. At the end of the study every participant was provided with an Arabic copy of Health promotion intervention educational booklet for prevention and management of MP. This booklet was developed by researcher after extensive literature review and it includes content such as simple anatomy and physiology of musculoskeletal system, causes and risk factors of MP, preventive measures of MP such as health promotion elements (Activity, exercises, stress management, nutrition and

sleep and rest) and lifestyle modification, proper body mechanics, proper posture and pain relief measure. Another copy of the booklet was left to the director of each school.

Validity, Reliability and Scoring System of Study Tools:

Tools were submitted to a panel of five experts in the field of community health nursing to test face and content validity of the study tools.

Pilot Study: A pilot study was conducted on (10%) teachers to check clarity of items and determine the feasibility of the study. Pilot sample was included in research sample.

Statistical Data Analysis: Collected data were coded, scored, tabulated and analyzed by computer using the “Statistical Package for the Social Sciences” (SPSS) program version 16. Descriptive statistics were used to describe the quantitative. A p value of <0.05 was considered as statistically significant.

Limitations of the Study: Subjective assessment of pain from the self-reported information provided by participants, effect of confounding factors and the relatively small sample size.

RESULTS

Part I: Description of personal data and occupational history among primary school teachers n= 200:

Results revealed that 56 % of primary school teachers were female while 44% were males. Moreover, 62.5% of teachers age ranged from 40 to 49 years old while 32% of them aged from 30 to 39 years old ($X \pm SD = 40.52 \pm 4.957$). Furthermore, 92% were married and had children. Only 39.5% had university education whereas, 60.5% had diploma education. Additionally, 89% were nonsmokers and only 11% were smokers. Concerning BMI, 54.5% of teachers was obese > 30 while 36% were overweight > 25 and only 9.5% were within the normal/healthy weight 18.5-25. In relation to job duration, 44% of teachers have worked for more than 10 years while 47.5% have worked for more than 20 years.

As such, 87% of teachers have worked 6-8 hours/ school day while 13% worked more than 8 hours/ school day. As regards to the average number of students per class, it ranged from 30 to more than 40. Surprisingly, 96% of teachers reported that their job demand necessitate

prolonged standing more than half of work time. In addition to that, 81.5% of teachers mentioned that they had to have sick leave due to MP. Furthermore, 48.5%, 16%, 15% and 10% respectively stated that they have chronic fatigue, allergy, sore throat and headache because of their job demands.

Part 2: MP assessment data among primary school teachers n= (200):

It was found that, almost all teachers (98%) had experienced MP during their career time. As regards to onset of pain, 78.5% of teacher reported that pain started gradually while 21.5 % reported that it started suddenly. Pain intensity ranged from mild (1.5%), moderate (49.5%) and severe (47%) and unbearable (2%). Whereas, regarding MP duration, teachers reported that MP was developed since 1-4 weeks, 1-3 months, 4-6 months and more than 6 months among (2.5%), (10.5%), (11%) and (76%) of teachers respectively.

Regarding MP frequency, 64.5%, 28.5% and 7% of teachers reported that they had pain 1 time per week (Frequently), 1 time per month (Sometimes) in and once every 2-3 months (Rarely) respectively. In relation to pain type, it was found that, 33%, 23%, 25.5, 8.5% and 10.5% of teachers describes pain as weight bearing, burning, shot like, numbness and cramp. Moreover 56.5% of teachers mentioned that they have suffered from movement limitation while 36% had leg numbness and 7.5% reported hotness at the affected site. Causes of MP as perceived by teachers were standing for prolonged periods, inadequate infrastructure, lifting heavy loads, obesity and non-cooperative work atmosphere in 53%, 33%, 21%, 15% and 20% respectively.

Long standing, awkward posture, school furniture, excessive workloads were mentioned by 51.5%, 29.0%, 16.5% and 12.0% of teachers as the aggravating factors of MP. In contrast 67.5 %, 24%, 4.5%, 5% of teachers reported that alleviating factors of MP were lying on the back, taking rest periods, taking a warm bath and exercising. It is worth saying that, 33% of teachers mentioned that they didn't take any precautions to prevent MP pain while 37.5 %, 21% and 8.5 % of teachers respectively stated that they are used to take adequate rest periods, maintain good posture and sit with back well supported to prevent PM.

Grading the severity of chronic pain based on its characteristics and its impact on teachers' ADL (Disability grade) among teachers was graded as grade II followed by grade III, I and IV among 55%, 22%, 19% and 4% of

Table 1: Frequency distribution of Musculoskeletal part affected by musculoskeletal pain among primary school teachers (n= 200):

Musculoskeletal part	No (%)
Neck	51 (20)
Shoulder	30 (15)
Upper back	25 (12.5)
Lower back	82 (41)
Upper limbs:	
Arms	10 (5)
Elbow	16 (8)
Wrist	10 (5)
Lower limbs:	
Knee	25 (12.5)
Legs	10 (5)
Heel	10 (5)

*all responses are mutually exclusive

Table 2: Correlation between MP and biopsychosocial factors among school teachers n= (200)

----- Musculoskeletal Pain -----			
Variable	X ± SD	T test	P value
Age	40.52 ± 4.957	145.344	.005*
BMI	31.15±.4.482	98.297	.000*
Job duration	17.52±5.219	47.490	.000*
Working hours	3.0200±.40050	106.639	.000*
Student number	35±7.663	62.207	.001*

Table 3: Correlations between MP and biopsychosocial factors among primary school teachers (n=200)

----- Musculoskeletal Pain -----		
Variable	Chi-Square	P value
Gender	2.880	.090
Education	1.086	.005*
Chronic disease	89.65	.000*
Physical inactivity	28.880	.001*
Awkward posture	2.211	.001*
Smoking	1.217	.005*
Job demand	169.280	.005*
Job satisfaction	399.150	.000*
Absence form work	103.600	.005*
Uncooperative work climate	31.400	.005*
Disability grade	1.784	.000*
School furniture	1.114	.004*

teachers respectively. The result of this study also indicated that, 84% of teachers believed that the experience of MP have affected their profession. As such, 33%, 30% and 22% of teachers were unable to work due to the pain for 2 hours, 1 day long and more than 1 day respectively.

Moreover, 37%, 12.5% and 3 % of teachers stated that they were absent for 3-7days, 8-15days and 16-30 days from work because of MP. Furthermore, 85% and 78% of teachers reported that MP has affected their personal life and interfere with their sleep.

Surprisingly, 24% of teachers have thought of changing the teaching profession because of the MP whereas, 96% of teachers reported that they have worked with the sustained MP. Regarding MP management measures taken by teachers, physiotherapy, taking analgesics, traditional medicine and cupping were practiced to manage MP by 35.5 %, 70%, 6.5% and 5% of teachers respectively.

As shown in Table 1. Lower back pain was reported by 41% of teachers followed by neck (20%), shoulder (15%), upper back (12.5%) and knee pain (12.5%). Furthermore, pain of arms (5%), elbow (5%), wrist (5%) legs (5%) and heel (5) was the least reported.

Part3: Correlations of MP associated factors among primary school teachers n= (200):

As shown in table 2, significant relationships were found between MP and age, BMI, job duration, working hours and student number in the class at. 005*,.000*,.000*,.000* and.001* respectively.

Table 3 shows that significant relationships were found between MP and level of education, chronic diseases, physical inactivity, Awkward/fixd posture, smoking, job demand, job satisfaction, Absence from work,, disability grade and satisfaction with school furniture at.005*,.000*,.001*,.001*,.005*,.005*,.000*,.005*,.000* and.004* respectively.

DISCUSSION

Out of the 250 distributed questionnaires, 200 primary school teachers have responded to the questionnaire with a response rate of 80%. Moreover, one third of teachers' were in their forty's while; almost all teachers were married and had children. The findings confirm the higher percentage of female teachers (More than half of participants) in the educational sector [13].

The current study has found a significant relationship between MP and obesity. These results are supported by author [14] who confirmed that increased BMI is a risk factor for back pain. In spite that, the evidence supporting an association between obesity and low back pain (LBP) continues to grow, less than one third of teachers perceived obesity as a cause of MP. As such, majority of teachers worked six to eight hours per school day. Almost all teachers reported that their job demand necessitate prolonged standing more than half of work time. In addition to that, majority of teachers mentioned that they had to have sick leave due to MP.

This goes with a similar study done by author [15] who reported that MP symptoms among teachers have contributed to high levels of absenteeism. Furthermore, around half of teachers stated that they have chronic fatigue due to their job demands.

The obtained results showed that primary school teachers are much affected by work-related MP and that they represent an occupational group with a high prevalence of MP. Almost all teachers have reported MP during their career time. School teachers, especially primary school teachers, are very vulnerable to MP because of their nature of work. They spend most of the time standing and moving around to monitor progress in teaching and ensuring their students' comprehensibility of lessons. Regarding site of MP, the most affected part was lower back (Among around half of teachers) followed by neck (Among one third of teachers).

A similar study was done by author [16] who concluded that the teaching community is very much affected by the occupation-influenced physical illness. Among the various illnesses observed, the neck and shoulder pain, back pain and throat pain scored the top most position. Authors also added that this kind of physical disabilities found among the teachers might be due to their prolonged standing and repeated walking inside the class room and also repeated lifting of the hand during writing in the board. In the current study, shoulder pain was documented in less than one third of our study subjects. This is lower than the high percentage reported in a study done by author [6, 17 and 18]. However, in the current study, pain in lower limbs of knee, legs and heel has accounted for around one fourth of reported MP among teachers. Whereas, upper limb pain of elbows and wrists were the least affected parts reported by teachers similar to that reported by author [19].

In another study, authors [20] found the same results, with a low back pain prevalence of around two thirds of the studied sample. They also noted that lack of physical exercise, provisions of office at work and satisfaction with working environment were the factors associated with high prevalence of low back pain among teachers. In the same context, authors [18] also support these findings in a study titled prevalence of musculoskeletal pain and its associated factors among female Saudi school teachers.

Regarding disability grade among teachers, it was grade II followed by grade III, I and IV in more than half and around one fourth of teachers. This goes with Tessa, 2010 who found that teachers involved to a considerable

physical load, established by the educator remaining in the orthostatic position during up to 95% of activities and with varied levels of flexion of the backbone resulted in several types of physical inability.

This goes with the systematic review study by authors [21]; about musculoskeletal disorders among school teachers suggesting a high prevalence of self-reported MSD that ranges between 39% and 95%.

Regarding the association between MP and student number, Labor Organization (ILO) recommends not to surpassing 25 students per class because this scenario directly influences the quality of teaching, leading to worse learning conditions for students and health hazards to teachers [22]. Meanwhile, school furniture was also associated with MP. In this respect, author [23] mentioned that lack of or inappropriately ergonomically designed chairs and tables may develop positions unfavorable to the musculoskeletal system for teachers such as sitting 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.

It was clear from my study that awkward posture was significantly associated with MP among teachers. Poor posture of teachers either during seating or standing includes twisting such as turning from the board to the class and back again [24]. In order to avoid the occurrence of such kind of MP among teachers, sufficient infrastructure should be launched inside the class rooms and it should be modernized. Traditional method of teaching should be switched over to modern method of teaching. Refreshment to both teachers and students at frequent intervals may improve the condition to a greater extent [25].

Physical exertions during teaching, prolonged standing in an inappropriate way for several hours inside the class room resulted in back pain and musculoskeletal pain among teachers [12]. Standing up is not the only factor contributing to MSP, but other situations such as carrying material to school or to the classroom, installation of equipment/teaching resources, walking inside and outside the school may further aggravate the occurrence of pain. Lifting of hands and head during writing in the board [26]. Evidence suggests that low back pain was due to minimum work place support and low job satisfaction. It is a global health issue resulting into chronic pain, functional impairment, frequent sick leaves and absences from work [27].

CONCLUSION

Overall, this study found very high prevalence of musculoskeletal pain among school teachers which is affecting their work, by missing out working days and eventually affecting the education system as a whole. The findings of the study strengthen the assumption that characteristics of certain work activities have negative effects on the health of teachers. Primary school teachers herein reported a high prevalence of musculoskeletal pain in upper limbs, lower limbs and back. The association between personal, occupational factors was also analyzed. This research has shown a strong correlation between MP and individual, physical and psychosocial factors. Individual factors such as gender, age, job duration, working hours, smoking and body mass index were found. Among physical factors, prolonged standing, awkward postures and inappropriate furniture have been shown to be significant risk factors for MP. Psychosocial factors included low job satisfaction. The identification of these factors may contribute to the adoption of public policies aimed at preventing disease and promoting the well-being of this professional category. A health promotion intervention was recommended to curb the development of MP among teachers. Further intervention strategies may include ergonomically designed workplaces, proper equipment and training and reasonable job demands and workload.

Recommendations:

- Increase the awareness of work-related MP prevention and management among primary school teachers
- Implementing the health promotion MP prevention and management intervention
- Further researches to investigate the association between psychosocial factors and MP among teachers in different school levels

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