

# WORK RELATED MUSCULOSKELETAL DISORDERS AMONG PREPARATORY SCHOOL TEACHERS IN EGYPT

By

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## Abstract

**Introduction:** Preparatory school teachers represent an occupational group who are prone to work related musculoskeletal disorder but its prevalence among teachers in Egypt has not been reported. **Aim of work:** To determine the prevalence of upper limb, lower limb, neck and back musculoskeletal disorders, to determine the relationship between teachers characteristics and musculoskeletal disorders and to investigate the relationship between physical risk factors and musculoskeletal disorders among preparatory governmental school teachers in Cairo, Egypt in the previous 12 months. **Materials and methods:** Convenience sample of 200 preparatory school teachers were selected from governmental schools in Cairo, Egypt, their mean age value was (35.9± 3.34) years, they were asked to answer a modified Nordic questionnaire which assisted musculoskeletal disorder due to their work in last 12 months. **Results:** The prevalence of work related musculoskeletal disorders among Egyptian preparatory school teachers were 96% in the previous 12 months. The prevalence was significantly higher among females compared to males. The neck and back (83.5%) were the most commonly affected parts followed by upper limb. Standing for long periods of time and high workload were significantly related to upper limb, lower limb, neck and back injuries. About 18.9% of teachers took sick leave (from 1 to 7 days) due to their injuries. **Conclusion:** the prevalence of work related musculoskeletal disorders among preparatory school teachers in Cairo, Egypt is high as in comparison to their counterparts around the world. **Key words:** Work related musculoskeletal disorder, Modified Nordic questionnaire, Upper limb, Lower limb, Neck and back injuries.

## Introduction

Work Related Musculoskeletal Disorders (WRMSDs) represent one of the most common occupational health problems in both developed and developing countries. Musculoskeletal disorders (MSD) an umbrella term for which repetitive strain injury, repetitive trauma disorder and cumulative trauma disorder are all used interchangeably. Work related musculoskeletal disorders may progress in stages from mild to severe. The earlier people notice symptoms, the quicker they should respond to them (Szabo & King, 2000).

(MSD) represents one of the most common and important occupational health problems in the teaching profession, which although long neglected, has attracted increasing concern in recent years. By definition, MSD include a wide range of inflammatory and degenerative conditions affecting the muscles, joints, tendons, ligaments, nerves, bones and the localized blood circulation system, that may be caused by or aggravated by work tasks and by the effects of the immediate environment in which work is carried out. School teachers in general, have been demonstrated relative to other

occupational groups, to report high rates of MSD of between 40% and 95%. The work of a teacher involves not only teaching students, but also preparing lessons, assessing students' work. These activities may cause teachers to suffer adverse mental and physical health issues due to their unique and wide variety of job functions (Erick & Smith, 2015).

If there is not enough time for recovery, pain symptoms that account for the high levels of absenteeism due to health conditions in this group of workers are triggered or prompted. Thus, teaching leads to stress, with consequences to physical and mental health and with an impact on professional performance (Jefferson et al., 2009).

The work tasks of school teachers often involve significant use of a 'head down' posture, such as frequent reading, marking of assignments, and writing on a blackboard (Erick & Smith, 2011)

Musculoskeletal complaints, especially of the lower back, neck and shoulders, are also common among teachers due to prolonged desk work, prolonged standing in class and repetitive overhead writing on the board, prolonged sitting resulting from frequent reading,

preparation of lessons and marking of assignments, and working on a computer (Shuai et al. , 2014).

MSD decrease productivity at work due to sick leave, absenteeism and early retirement, and are also costly in terms of treatment and individual suffering(Erick & Smith, 2011).

A study in Ireland showed that one of the leading causes for ill health retirement among school teachers was musculoskeletal problems, which contributed to 10% of the ill health retirement in the population (Mengestu, 2013).

Most of literature used the survey method to ascertain the occupational health problems and risk factors within a population.

### **Aim of work**

To determine the prevalence of upper limb, lower limb, neck and back musculoskeletal disorders, to determine the relationship between teachers characteristics and musculoskeletal disorders and to investigate the relationship between physical risk factors and musculoskeletal disorders among preparatory governmental school

teachers in Cairo, Egypt in the previous 12 months.

### **Materials and methods**

- **Study design:** it is cross sectional study
- **Place and duration of the study:** the study was carried out in governmental preparatory schools in Cairo, Egypt during the period from October 2015 till May 2016.
- **Study sample:** Two hundred (males and females) teachers participated in the study. They were selected by using convenience sampling technique from preparatory governmental schools who work for full time in Cairo, Egypt.

Inclusion criteria for the study group:

1. Age ranged between 30 and 40.
2. Both males and females.
3. Teachers who work in preparatory governmental schools for full time ( 7 hours per day almost) in Cairo, Egypt.
4. Teachers experience from 5 to 10 years.

Exclusion criteria for both groups:

1. Teachers who had musculoskeletal abnormalities due to other causes not work related (i.e. congenital, traumatic).

2. Teachers with previous operation involving locomotors system.

#### - Study methods:

A self-administered **questionnaire** is a valid and relatively inexpensive way to establish baseline risk identification information for an occupational group (Adegoke et al.,2008, Alrowayeh et al., 2010). Standardized Nordic Musculoskeletal Questionnaire is a valid and reliable questionnaire (Kuorinka et al., 1987 , Crawford, 2007) was developed from a project funded by the Nordic Council of Ministers , because they need standardized questionnaire methodology allowing comparison of low back , neck , shoulder and general complaints for use in epidemiological studies (Palmer et al, 1999)

#### - Procedure of the Study:

Two hundred copies of the questionnaire were given to selected teachers who work for full time in preparatory governmental schools in Cairo, Egypt for self-administration.

#### Consent

Authors declare that verbal consent was taken from the studied group before making the study.

#### Ethical approval

The ethical committee of Faculty of Physical Therapy approved the study protocol.

#### Data management

- Descriptive statistics was used to estimate the prevalence of work related musculoskeletal disorders , demographic characteristics and physical risk factors.
- Chi- square tests also were used to assist relationship between work related musculoskeletal disorders and teachers' characteristics and between musculoskeletal disorders and physical risk factors of work.
- Frequencies and cross-tabulations were used to compare musculoskeletal disorders prevalence and demographics, work history and physical risk factors. Frequency and percentages of responses to the Nordic Questionnaire also were calculated.

- Arithmetic averages: It was calculated the 4 points Liker scale through:
- The arithmetic average (weighted mean) =  $K(\text{Always}) \times 4 + K(\text{Often}) \times 3 + K(\text{Sometimes}) \times 2 + K(\text{Never}) \times 1 / n$
- After calculating the weighted mean, the attitude was measured according to 4 points like scale measure as following:

Weighted mean	Level
from 1.00 to 1.74	Never (1)
from 1.75 to 2.49	Sometimes (2)
from 2.50 to 3.24	Often (3)
from 3.25 to 4.00	Always (4)

- Correlation between the ranked data variables was calculated by Spearman's.
- Level of significance will be set at  $\leq 0.05$ .

## Results

The study was performed on a convenience sample of 200 subjects 83 (41.5%) males and 117 (58.5%) females.

**Table (1): Demographic characteristics of the preparatory governmental school teachers:**

Number	Age	Height	Weight	BMI	Years of experience	Classes per day	Classes per week	No. of students in the class
Mean	35.93	167.54	76.82	27.20	7.19	5.20	25.99	40.61
S.D. ±	3.34	7.94	12.55	3.39	2.65	0.70	3.60	4.71
Max.	40	185	110	38	10	6	36	50
Min.	30	152	47	18	2	3	15	30

Table (1) : showed that the mean ages of the studied group was ( $35.9 \pm 3.34$ ) years, Height was ( $167.54 \pm 7.94$ ), Weight was ( $76.82 \pm 12.55$ ), BMI was ( $27.2 \pm 3.39$ ), Classes per day was ( $5.20 \pm 0.70$ ), and Classes per week was ( $25.99 \pm 3.60$ ) and No. of students in the class was ( $40.61 \pm 4.71$ ).

**Table (2): Frequency distribution and mean value of total response to musculoskeletal risk factors (MSRF) questionnaire among teachers in Egypt:**

	Response								Weight Mean	P value	Rank
	Never		Sometimes		Often		Always				
	F	%	F	%	F	%	F	%			
<b>1. Standing for long period</b>	9	4.5	22	11.0	90	45.0%	79	39.5%	3.20	< 0.05*	1
<b>2. Sitting for long period</b>	53	26.5	123	61.5	22	11.0%	2	1.0%	1.87	< 0.05*	12
<b>3. Working prolonged periods in the same posture</b>	26	13.0	71	35.5	73	36.5%	30	15.0	2.54	< 0.05*	6
<b>4. Inappropriate furniture</b>	27	13.5	66	33.0	60	30.0	47	23.5	2.64	< 0.05*	4
<b>5. Using computer per day</b>	61	30.5	92	46.0	35	17.5	12	6.0	1.99	< 0.05*	11
<b>6. Working in head down posture for long periods</b>	21	10.5	72	36.0	81	40.5	26	13.0	2.56	< 0.05*	5
<b>7. High anxiety</b>	49	24.5	65	32.5	58	29.0	28	14.0	2.33	< 0.05*	7
<b>8. Very low colleague support</b>	61	30.5	63	31.5	51	25.5	25	12.5	2.20	< 0.05*	9
<b>9. High workload</b>	15	7.5	47	23.5	78	39.0	60	30.0	2.92	< 0.05*	2
<b>10. Bending and /or twisting with your upper body</b>	52	26.0	78	39.0	45	22.5	25	12.5	2.22	< 0.05*	8
<b>11. Helping students into flexing posture</b>	59	29.5	81	40.5	39	19.5	21	10.5	2.11	< 0.05*	10
<b>12. Repeating the same movement of your arms or hands many times per minute</b>	11	5.5	56	28.0	86	43.0	47	23.5	2.85	< 0.05*	3

\*:Statistically significant.

**Table (3): Correlation between works related musculoskeletal disorders and teacher's general characteristic in Egypt:**

	Pain in upper limb	Pain in lower limb	Pain in back
	Correlation Coefficient	Correlation Coefficient	Correlation Coefficient
Age	0.144	0.229*	0.185
Height	-0.333**	0.084	-0.085
Weight	-0.332**	0.249**	-0.105
BMI	-0.172	0.247*	-0.014
Years of experience	0.140	0.224*	0.147
Classes per day	0.056	-0.192*	-0.102
Classes per week	0.046	-0.229*	-0.130
No. of students in the class	0.039	-0.088	-0.111

(\*) P-value < 0.05

(\*\*) P-value < 0.01

**Table (4): Prevalence of work related musculoskeletal disorder in one two or three body parts among teachers in Egypt.**

From total number of 200 teachers	Response							
	Have no problem		Have problem in one body part		Have problem in two body parts		Have problem in three body parts	
	F	%	F	%	F	%	F	%
Have you ever complaint due to work in one two or three body parts?	8	4.0%	47	23.5%	102	51.0%	43	21.5%

Table (4) showed that 102(51%) of teachers had complaints in two body parts.



## Discussion

School teachers represent an occupational group, in which the prevalence of musculoskeletal disorders, in different body sites, appears to be high.

The findings from the current study are alarming as it is much higher than results of previous studies. About 96 %of the participating teachers complained of WRMSDs which is higher in comparison with the reported prevalence of WRMSDs among teachers in china 85% (Yue, Liu, & Li, 2012), in Botswana83.3% (Erick & Smith, 2014) in Recife the capital of Pernambuco State in Brazil 73.5%(de Ceballos & Santos, 2015) ,Turkey 51.4%(Korkmaz, Cavlak, & Telci, 2011).The school teachers of Turkey, China, Australia, Brazil, Sweden, USA, Germany, Estonia, Japan, Malaysia, Philippines, France and Greece have proven that related to other working groups, a great occurrence of MSD was noted between 40% and 95% among them (Mesaria & Jaiswal, 2015). In Hong Kong (Ey & Ah, 2010) detected that 99.5% of respondents suffered at least one type of complaint .

From the result of this survey, it could be noticed higher prevalence

neck and back, upper and lower limbs complaint among females than males. These findings were consistent with the study done by (Erick & Smith, 2011) who detected that the prevalence of MSD is positively associated with female gender as they found a significant higher prevalence of WRMSDs among females compared to males between school teachers in Botswana (Erick & Smith, 2014). Also in a study done by Jefferson et al, 2009, they found that the prevalence of MSDs in Poland was higher among females then males.

The result of our study reported that the work related musculoskeletal disorders had no relationship with age. The fact is concerning, because younger teachers seem to be having pain early. A study done by (Jefferson et al., 2009) showed that younger workers face greater work demands, being exposed to risk factors, as they take over more activities and tasks in the beginning of the career.

The result of our study indicate high prevalence of work related musculoskeletal disorders due to the daily work being performed by the teachers which may contribute to stress in these anatomical areas, such as prolonged

standing, high work load, working in the same position for long periods, working in head down posture for long periods, repeating the same movement in hand many times per minute (Table 2).

The prevalence of MSDs is related to variables of teaching activities, including working time, number of students per class, weekly schedule, physical exertion, heat, furniture, and high demand (de Ceballos & Santos, 2015).

There is no statistically significant relationship between body mass index (BMI) and upper limb, neck or back pain. There was statistically significant relationship between pain in lower limb and BMI (Table 3). Our results were similar with the study done by (Rottermund et al., 2015); who found that there is no association between the BMI and disability of the spine back and neck.

There was statistically significant relationship between pain in lower limb and classes per day and classes per week with P-value  $<0.05$  (Table 3). There was no statistically significant relationship between pain in neck, back, upper limb and classes per day, classes per week (Table 3) These results were similar to

a study done in China about the relation between hours of work per week and MSDs, they detected that there were no association with both neck, shoulder, low back pain and hours of work (Yue et al., 2012). These results contradicted with previous studies that found long weekly working hours expose teachers to factors such as prolonged standing, prolonged sitting or awkward posture all of which have been associated with back pain (Murthy & Mitra, 2015)

There was no statistically significant relationship between pain in neck and or back, upper limb and lower limb with number of students in the class (Table 3). These results are contradicted with a previous studies which found that there is a significant relationship between pain in neck and or back, upper limb and lower limb and more than 30 students per class (Jefferson et al., 2009).

About 96% of the studied group was complaining of MSD. Out of these, 47(23.5%) had only one complaint, 102(51%) had two complaints, 43(21.5%) had three complaints (Table 4).

This was concomitant with the study done by (de Ceballos & Santos, 2015) on 386 teachers. Out of these, 152 (29.0%)

had only one complaint, 151 (28.8%) had two or three complaints, and 83(15.9%) had more than three complaints.

These results were consistent with previous results in other countries: a Chinese study was done on school teachers which reported a high prevalence of neck pain (68.9%) and shoulder pain (73.4%) in the previous month. Another study declared that 42.5% of Turkish school teachers experienced neck pain and 28.7% experienced shoulder pain in the previous month. (Erick & Smith, 2011)

### **Conclusion**

There were key findings in this study:

1. WRMSDs among teachers in Egypt were common, the back followed by lower limb followed by upper limb disorders.
2. Upper limb disorders were related to, age and BMI but lower limb disorders was not. Professional experience and number of class per day were not related to back, upper limb disorders but were not related to lower limb disorders. Back, upper limb and lower limb were relating to number of students in the classes.

3. Work related musculoskeletal disorders were related some physical risk factors. Back, upper limb and lower limb disorders were affected by standing long periods, high workload and repeating the same movement of the arms or hands many times per minute and inappropriate furniture.

4. These findings underline the importance of having WRMSDs education and prevention programs in Egypt. Early access of treatment and prevention programs may prove effective in reducing these disorders.

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### **Conflict of interest**

Authors have declared that no conflict of interest exists.

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