

## Comparative Study of the Risk Factors for Musculoskeletal Disorders among Primary and Secondary School Teachers in the City of Cotonou (Benin)

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### ABSTRACT

The objective is to compare the risk factors for MSDs among primary and secondary school teachers in Cotonou city. Cross sectional prospective study with a descriptive and analytical focus on 340 teachers: 170 in primary and 170 in secondary schools. Data collection was done using the standard Nordic MSDs questionnaire and a systematic physical examination. A logistic regression was done. Primary school teachers suffered more MSDs than secondary school teachers (80% vs. 69.4%,  $p=0.0025$ ); scapulargia (59.4% in primary school and 55.9% in secondary school) and neck pain (41.8% in primary school and 34.1% in secondary school) predominated in both categories. Factors associated with MSDs in both education sub-sectors were: seniority in employment ( $p=0.0006$ ); stress ( $p=0.00135$ ) and job dissatisfaction ( $p=0.0098$ ). Job dissatisfaction and stress predominated among elementary school teachers ( $p<0.001$ ). The prevalence of MSDs is higher among primary school teachers than among secondary school teachers. This may be related to the prevalence of psycho-social problems among primary school teachers. A reevaluation of their working conditions is necessary to ensure their development at work and limit MSDs among them.

**Keywords:** Musculoskeletal disorders, Teachers

### INTRODUCTION

Musculoskeletal disorders (MSDs) are a group of painful conditions associated with the overload of soft tissues in the periarticular, limbs and spine. They represent the most common cause of chronic pain and physical disability in the world [1] with more than 43,000 cases compensated in France in 2011, including 42% with sequelae [2]. These are multifactorial diseases involving individual susceptibility factors and work-related factors including stress and psychosocial factors. No socio-professional category is spared; neither are teachers. Indeed, the teaching profession requires the mobilization of physical, cognitive and emotional capacities, thus exposing students to many occupational diseases, including MSDs. While the literature traditionally describes the stress and burnout of teachers, there is little written about MSDs in teachers. This study aims to compare the factors associated with MSDs among elementary and secondary school teachers.

### METHODS

This was a descriptive and analytical cross-sectional prospective study that took place from January to May 2015. The target population was teachers from public primary and

secondary schools in the commune of Cotonou who met the following criteria:

- Has been a teacher for at least one year
- Work in the commune of Cotonou
- Agree to participate in the study

The commune of Cotonou has four (4) school districts and 18 secondary schools; primary schools have been selected

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by lot in each district. Teachers were then recruited from schools selected according to the inclusion criteria. Similarly, five colleges were randomly selected from the 18; each college selected was a cluster; teachers were also recruited from these colleges based on the inclusion criteria. They were subjected to the standardized Nordic questionnaire [3,4] and a physical examination. The variables studied were: socio-demographic characteristics, anthropometric data, existence of work-related pain, location of pain, mechanical or inflammatory nature, postures adopted; existence of family concerns, job satisfaction and perceived stress. Data analysis was performed using STATA/IC 11.0 statistical software. Comparisons were made using the  $\chi^2$  test or the exact FISHER test. The significance threshold was 5%.

**RESULTS**

A total of 340 teachers, 170 from primary and 170 from secondary schools were selected as the size of our sample.

**General characteristics**

The population was predominantly male in both sub-sectors of education: 58.8% for primary and 74.1% for secondary. The average age was 39+9.5 (22-60 years) for primary and 35.6+8.3 (23-55 years) for secondary.

Primary school teachers had more seniority than secondary school teachers (12.8+8.9 years compared to 9.3+7 years) and a higher average weekly working time (36.9+16.1 h compared to 23+8.5 h). With respect to psycho-social factors, elementary school teachers felt more dissatisfied at work than those in secondary school ( $p=0.001$ ). However, there was no significant difference in work-related stress between the two groups of teachers ( $p=0.12$ ) (**Table 1**).

**Table 1.** General characteristics.

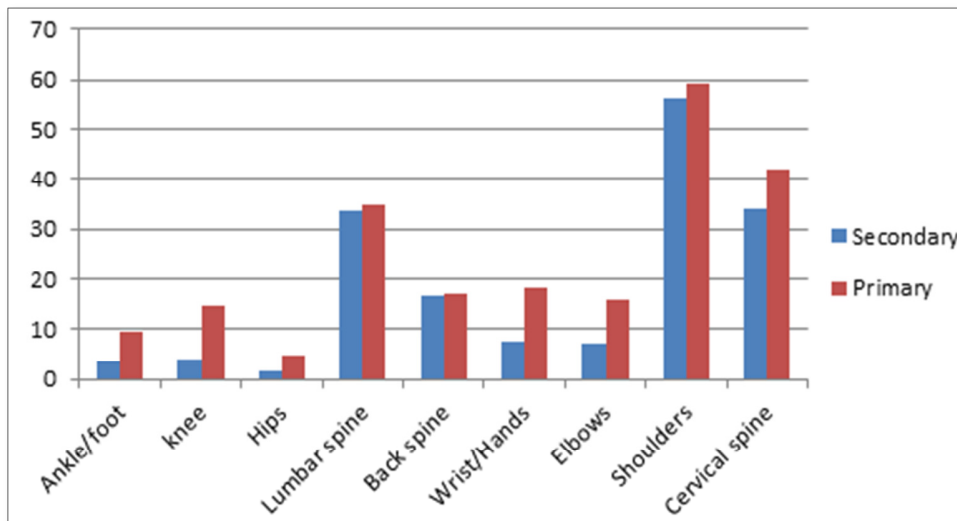
Variables	Teaching sector		p <sup>†</sup>
	Primary n (%)	Secondary n (%)	
<b>Age (Years)</b>			
≤ 30	24 (14.1)	50 (29.4)	0.009
30-35	42 (24.7)	37 (21.8)	
35-40	38 (22.3)	34 (20.0)	
40-45	20 (11.8)	20 (11.8)	
<45	46 (27.1)	29 (17.0)	
<b>Gender</b>			
Male	100 (58.8)	126 (74.1)	0.003
Female	70 (41.2)	44 (25.9)	
<b>Seniority in the trade</b>			
≤ 5 years	34 (20.0)	64 (37.6)	0.002
5-10 years	52 (30.6)	52 (30.6)	
10-15 years	35 (20.6)	28 (16.5)	
15-20 years	20 (11.8)	10 (5.9)	
>20 years	29 (17.0)	16 (9.4)	
<b>Average hour/week</b>			
≤ 20 h	00 (00.0)	61 (35.9)	<0.001

20-30 h	28 (16.5)	63 (37.1)	
30-40 h	109 (64.1)	41 (24.1)	
>40 h	33 (19.4)	05 (2.9)	
<b>Not satisfied by the work</b>			
Yes	115 (67.7)	76 (44.7)	<b>&lt;0.001</b>
No	55 (32.3)	94 (55.3)	
<b>Stress</b>			
Not at all	44 (25.9)	52 (30.6)	<b>0.12</b>
Sometimes	99 (58.2)	103 (60.6)	
Often	27 (15.9)	15 (8.8)	

**Comparative prevalence of MSDs in the two education sectors**

The prevalence of MSDs was 74.7% for all teachers. It was significantly higher among primary school teachers at 80% compared to 69.4%; p=0.025. The most affected regions in

the two education sub-sectors were shoulders (59.4% in primary and 55.9% in secondary), neck (41.8% in primary versus 34.1% in secondary) and lumbar spine (34.7% in primary and 33.5% in secondary) (**Figure 1**).



**Figure 1.** Prevalence of MSDs by body region in both education sub-sectors.

**Factors associated with MSDs in both categories of teachers**

Primary education was more associated with the risk of MSDs. Teachers with less than 5 years seniority did not suffer from MSDs; between 5 and 15 years seniority the risk of MSDs occurring was multiplied by 4. Job dissatisfaction doubled the risk of MSDs (odds ratio=2.3); stress multiplied the risk by five (odds ratio=5.5) (**Table 2**).

**Table 2.** Predictors of the occurrence of MSDs among teachers in Cotonou.

Predictive variables	Teaching sector		RC <sub>b</sub> (IC <sup>‡</sup> <sub>(95%)</sub> )	RC <sub>aj</sub> (IC <sup>‡</sup> <sub>(95%)</sub> )	p <sup>†</sup>
	Primary	Secondary			
<b>MSDs</b>					
Yes	136 (80.0)	118 (69.4)	1.0	1.0	0.03
No	34 (20.0)	52 (30.6)	0.6 (0.3-0.9)	0.4 (0.2-0.9)	
<b>Seniority in the trade</b>					
≤ 5 years	60 (20)	64 (37.6)	1.0	1.0	0.0025
5-10 years	52 (30.6)	52 (30.6)	2.4 (1.3-4.4)	3.5 (1.7-7.3)	
10-15 years	35 (20.6)	28 (16.5)	3.0 (1.4-6.6)	4.4 (1.8-10.8)	
15-20 years	20 (11.8)	10 (05.9)	3.2 (1.1-9.0)	3.3 (1.0-10.6)	
>20 years	29 (17.0)	16 (09.4)	2.2 (1.0-5.0)	1.7 (0.7-4.5)	
<b>Not satisfied by the work</b>					
Yes	115 (67.5)	76 (44.7)	2.0 (1.2-3.3)	2.3 (1.3-4.1)	0.0055
No	55 (32.3)	94 (55.3)	1.0	1.0	
<b>Stress</b>					
Not at all	44 (25.9)	52 (30.6)	1.0	1.0	0.0135
Sometimes	99 (58.2)	103 (60.6)	1.2 (0.7-2.0)	1.2 (0.6-2.1)	
Often	27 (15.9)	15 (8.8)	5.6 (1.6-19.7)	5.5 (1.4-20.7)	

RC<sub>b</sub>: Gross Odds Ratio; RC<sub>aj</sub>: Adjusted Odds Ratio; ‡ CI (95%): 95% Confidence Interval; †: Wald's chi-square p-value

**DISCUSSION**

The overall prevalence of MSDs among teachers is 74.1%. It is similar to the 79.2% reported by Magdy et al. [5] among female teachers in Saudi Arabia; and to the 73.4% reported by Chong et al. [6] in Hong Kong among elementary and secondary teachers. Scapulargia and neck pain predominated over other MSDs, our findings are those of Chong et al. [6] in Hong Kong, Phil et al. [7] in Estonia, Kormaz et al. [8] in Turkey; these results could be explained by the fact that writing on the board, preparing the cards and correcting the copies require keeping constraining postures (arms above the shoulders, neck bent and stretched) so a greater stress on the neck and shoulders, source of pain.

The prevalence of MSDs is significantly higher among elementary school teachers; this is the same as that of Chong et al. [6]. Primary education is the foundation of the education system, the acquisition of knowledge (language, writing...) by schoolchildren requires a greater physical and mental investment on the part of the teacher, which may explain this difference. Similarly, job dissatisfaction problems were more prevalent among elementary school

teachers. The latter must teach all disciplines (French, spelling, mathematics...) to schoolchildren. They can only have one class at a time and are paid less than their high school counterparts who have only one subject and can teach in different colleges to improve their incomes. This may explain the job dissatisfaction problems reported by elementary school teachers and job dissatisfaction being correlated with the occurrence of MSDs, the higher proportion of MSDs among elementary school teachers observed in our study. Teachers with more seniority had more MSD problems; the cumulative effect of years of work can be a risk factor for MSDs [9]. Stress and job dissatisfaction are identified as causes of MSDs; our data confirm most of those in the literature [10,11] and show that in addition to biomechanical factors, psychosocial factors are also implicated in the occurrence of MSDs.

**CONCLUSION**

MSDs are a reality in education and prevalences are high, especially at the primary level. This article also highlights the disparities (related to mental and physical demands, job satisfaction problems) between the two categories of

education. The prevention axes must take into account these psychosocial aspects for the development of teachers at work, which will ensure a more efficient education system.

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