

# Factors associated with musculoskeletal pain among teachers: sociodemographics aspects, general health and well-being at work

*Fatores associados à dor musculoesquelética em professores: Aspectos sociodemográficos, saúde geral e bem-estar no trabalho*

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**ABSTRACT:** *Introduction:* Musculoskeletal pain is one of the most frequent complaints among teachers, compromising their health and quality of life. *Objective:* To estimate the prevalence of musculoskeletal pain among teachers, assessing their occurrence according to sociodemographic characteristics, general health and well-being at work. *Methods:* An exploratory cross-sectional study conducted with 525 teachers. During activities of continuing education, the teachers completed a self-administered questionnaire containing questions about sociodemographic factors, general health, well-being at work and musculoskeletal pain. *Results:* The overall prevalence of musculoskeletal pain was equal to 73.5%. The most common musculoskeletal pains were localized in the shoulders (31.6%), upper back (27.8%), neck (27.2%) and ankles and/or feet (24.0%). Circulatory and respiratory problems and Common Mental Disorders were associated with pain in the shoulders, upper back, neck and ankles and/or feet. Well-being at work is associated with pain in the shoulders, neck and ankles and/or feet. *Conclusion:* It is necessary to deepen the knowledge about musculoskeletal pain among teachers, exploring the biological, ergonomic, occupational and psychosocial mechanisms of teaching, as well as invest in practices that improve the relationship of coexistence between workers and activities that enhance the comfort and reduce referred pain.

**Keywords:** Work. Occupational health. Musculoskeletal system. Musculoskeletal pain. Teaching. Faculty.

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**RESUMO: Introdução:** A dor musculoesquelética se apresenta como uma das queixas mais frequentes entre professores, comprometendo sua saúde e qualidade de vida. **Objetivo:** Estimar a prevalência de dor musculoesquelética em professores, avaliando a sua ocorrência segundo aspectos sociodemográficos, saúde geral e bem-estar no trabalho. **Métodos:** Estudo exploratório do tipo corte transversal realizado com 525 professores. Durante as atividades de educação continuada, os professores responderam a um questionário autoaplicável contendo questões sobre fatores sociodemográficos, saúde geral, bem-estar no trabalho e dor musculoesquelética. **Resultados:** A prevalência global de dor musculoesquelética foi de 73,5%. As dores musculoesqueléticas mais frequentes localizaram-se nos ombros (31,6%), parte superior das costas (27,8%), pescoço (27,2%) e tornozelos e/ou pés (24,0%). Problemas circulatórios e respiratórios e Transtornos Mentais Comuns mostraram-se associados às dores nos ombros, superior de costas, pescoço e tornozelos e/ou pés. Bem-estar no trabalho está associado às dores nos ombros, pescoço e tornozelos e/ou pés. **Conclusão:** É necessário aprofundar o conhecimento sobre a dor musculoesquelética em professores, explorando os mecanismos biológicos, ergonômicos, ocupacionais e psicossociais do trabalho docente, bem como investir em práticas que melhorem a relação de convivência entre os trabalhadores e em atividades que aumentem o conforto e diminuam a dor referida.

**Palavras-chave:** Trabalho. Saúde do trabalhador. Sistema osteomuscular. Dor musculoesquelética. Ensino. Docentes.

## INTRODUCTION

Work has been widely described as a determinant of quality of life. In addition to providing material resources, it helps to define the identity of subjects and their role in society, providing opportunity for personal control, use of skills, building goals and social contact that influence health and well-being<sup>1</sup>.

As in other professional activities, health impairment of teachers may be associated with their working conditions. The main causes of illnesses and absence from work are linked to the occurrence of mental and behavioral disorders, respiratory diseases and musculoskeletal pain (MSP)<sup>2,3</sup>. The latter is referred to as one of the most common problems among teachers, with correlation of occurrence related to low quality of life<sup>4-6</sup>.

Studies conducted with elementary school teachers show high prevalence of MSP complaints, being more common in the lumbar, thoracic and cervical regions, shoulders, wrists and hands<sup>6,7</sup>.

Considering MSP as a multifactorial condition, and sociodemographic features, individual characteristics, lifestyle and working conditions as factors that may contribute to the onset or worsening of pain<sup>8,9</sup>, this study aimed to estimate the prevalence of musculoskeletal pain in teachers, assessing occurrences according to sociodemographic aspects, overall health and well-being at work.

## METHODS

This study is part of a broader one entitled *Working conditions and health of teachers*. This is an exploratory cross-sectional study conducted between August and October 2011 with teachers of the kindergarten and elementary grades of the municipal network Guararapes Jaboatão. The municipality comprises the metropolitan area of Recife, capital of Pernambuco State, with approximately 259,000 km<sup>2</sup>, 645,000 inhabitants, and Municipal Human Development Index (MHDI) of 0.717<sup>10</sup>.

Data collection was made during the mandatory continuing education activities promoted by the municipal secretary of education for all school teachers. All teachers were invited to participate. After the presentation of the research group, the teachers who agreed to participate completed a self-administered questionnaire on sociodemographic data, working conditions, general health, mental disorders and well-being at work.

Sample size was calculated using Statcalc Epi Info software (version 6.04) and took into account the 55% prevalence of musculoskeletal pain<sup>4</sup>, and maximum error of 5% for a 95% significance level. A 10% addition in values was made to compensate for any loss or incomplete questionnaires, resulting in a minimum sample size of 356 subjects. However, due to the great increase in the study, the final sample was composed of 525 teachers.

To build the variable well-being at work (WBW), an adaptation of the Well-being at Work Scale (WBWS) validated by Paschoal and Tamayo<sup>11</sup> was used. This assessment tool considers the affective dimensions (positive and negative) and satisfaction/expression to assess well-being at work. However, taking as a basis that the affective dimension is central to building this concept<sup>12-14</sup>, our study considered only the positive and negative affect dimensions of the scale to compose the variable WBW. The values of 9 positive and 12 negative items were summed, being considered the tertiles to compose low and moderate/high WBW.

MSP was self-reported by teachers through the following question: "In the last seven days, in which parts of the body did you feel pain?". Respondents could mark one or more options among the listed: no pain, neck, shoulders, upper back, elbows, wrists and/or hands, lower back, hips and/or thigh, knees, ankles, and/or feet, another part of the body. Teachers were considered without MSP when the option "No pain" was signaled, and with MSP when at least one of the other options was marked.

The variable Common Mental Disorders (CMD) was composed using the Self-Reporting Questionnaire (SRQ20)<sup>15</sup>. Positive responses were summed, being used the 6/7 cut-off point, that is, 0-6 = not suspected, and 7 or more = suspected.

Body Mass Index (BMI) was calculated by dividing the weight by the square of the height. Measurements of weight and height were self-reported by respondents. Continuous variables such as age and length of professional experience as a teacher were categorized.

Data analysis was performed using the Statistical Package for Social Sciences (SPSS, v 9.0.). Initially, the frequencies of variables were described. The most common types of musculoskeletal pain ( $p > 20\%$ ) were selected for the bivariate analysis. To assess the association

between musculoskeletal pain and other variables, the prevalence ratio and 95% confidence intervals (95%CI) were calculated.

Participants signed the informed consent in which the research objectives and the information required were explained, with the guarantee of confidentiality of information obtained. The research protocol was approved by the Ethics Committee of the Health Sciences Center, Universidade Federal de Pernambuco (UFPE) (protocol 008/2011).

## RESULTS

Among 525 teachers who participated in the study, most were female (86.1%) and refers dark brown or black skin (72.2%). Age of teachers was greater than or equal to 40 years (57.0%), and they had been acting as teachers for up to 10 years (58.3%). The predominant

Table 1. Description of the study population according to sociodemographic and work-related variables.

Variable	n = 525	%
Gender		
Female	452	86.1
Male	73	13.9
Self-reported Skin color		
Brown or black	379	72.2
White	146	27.8
Age		
> 40 years	226	43.0
≤ 40 years	299	57.0
Schooling		
Graduate studies (complete or ongoing)	244	46.5
Post-Graduate studies	281	53.5
Per Capita income		
≤ 1.000,00	418	79.6
> 1.000,00	107	20.4
Work experience		
> 10 years	306	58.3
≤ 10 years	219	41.7

education level was graduate studies (53.5%), with mentions of specialization (51.0%) and master's/doctorate degrees (2.5%). When we considered the sum of their family monthly income and the amount of people who depended on this income, per capita income of teachers' households was up to R\$ 1,000.00 (79.6%) (Table 1).

The five health problems most frequently reported were voice problems (49.9%), allergies (47.5%), common mental disorders (37.1%), circulatory (36.0%) and digestive problems (32.0%). Overweight or pre-obesity was present in 25.7% of the sample. Most subjects reported not consuming alcohol (62.5%) and being non-smokers (90.1%). The WBW was considered moderate or high by 61.3% of respondents (Table 2).

The prevalence of musculoskeletal pain was 73.5% (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. The spots of the most common musculoskeletal pain were shoulders (31.6%), upper back (27.8%), neck (27.2%), ankle and/or feet (24.0%) (Table 3).

Shoulder pain was statistically associated with allergies (prevalence ratio – PR = 1.27), digestive problems (PR = 1.38), circulatory problems (PR = 1.24), vocal problems (PR = 1.34), breathing problems (PR = 1.29), CMD (PR = 1.42) and WBW (PR = 1.53). Pain in the upper back was statistically associated with gender (PR = 1.98), race (PR = 1.14), allergies (PR = 1.17), digestive problems (PR = 1.19), circulatory problems (PR = 1.24), vocal problems (PR = 1.36), respiratory problems (PR = 1.20), CMD (PR = 1.23), BMI (PR = 1.15) and smoking habit (PR = 1.37) (Tables 4 and 5).

Neck pain was statistically associated with gender (PR = 1.76), race (PR = 1.10), allergies (PR = 1.29), digestive problems (PR = 1.30), circulatory problems (PR = 1.30), vocal problems (PR = 1.31), respiratory problems (PR = 1.32), CMD (PR = 1.58) and WBW (PR = 1.44). Pain in the ankles and/or feet was associated with length of professional experience as a teacher (PR = 1.10), circulatory problems (PR = 1.37), respiratory problems (PR = 1.30), CMD (PR = 1, 23), and WBW (PR = 1.86) (Tables 4 and 5).

## DISCUSSION

Studies with elementary and high school teachers in Brazil showed results on sociodemographic and work data (gender, ethnicity, age, income and time of professional experience) Yesilar to those reported in this study (Table 1)<sup>2,5,16-18</sup>.

As for education level, it is noteworthy that over half of the teachers were postgraduates. Unlike earlier reports and studies showing low schooling of Brazilian teachers, the percentage of post-graduate teachers has increased: 15.1<sup>2</sup>, 30.4<sup>19</sup>, 42.4<sup>5</sup> and 59.0%<sup>18</sup>. As to the study population, we can infer that a law enacted in the city in 2002<sup>20</sup>, establishing job, career and remuneration planning for professionals in the teaching occupational group, has encouraged them to pursue postgraduate courses due to career progression and consequent increase in salaries.

Table 2. Description of the study population according to variables related to health and well-being at work.

Variable	n = 525	%
<b>Diabetes</b>		
Yes	18	3.4
No	507	96.6
<b>Arterial hypertension</b>		
Yes	97	18.5
No	428	81.5
<b>Allergies</b>		
Yes	249	47.5
No	276	52.6
<b>Digestive problems</b>		
Yes	168	32.0
No	357	68.0
<b>Circulatory problems</b>		
Yes	189	36.0
No	336	64.0
<b>Vocal problems</b>		
Yes	262	49.9
No	263	50.1
<b>Breathing problems</b>		
Yes	120	22.9
No	405	77.1
<b>CMD</b>		
Suspected	195	37.1
Not Suspected	330	62.9
<b>BMI</b>		
Obese (BMI > 29.9)	71	13.5
Pre-obese (BMI 25.0 – 29.9)	135	25.7
Normal weight (BMI 18.5 – 24.9)	298	56.8
Low weight (BMI < 18.5)	21	4.0
<b>Alcohol consumption</b>		
Yes	197	37.5
No	328	62.5
<b>Smoking</b>		
Yes	52	9.9
No	473	90.1
<b>Well-being at work</b>		
Low	203	38.7
Moderate to high	322	61.3

CMD: Common Mental Disorders; BMI: Body Mass Index.

Table 3. Description of the study population according to self-reported musculoskeletal pain.

Variable*	n	%
Pain complaint		
No (no complaints)	139	26.5
Yes (one or more complaints)	386	73.5
Neck		
No	382	72.8
Yes	143	27.2
Shoulders		
No	359	68.4
Yes	166	31.6
Upper back		
No	379	72.2
Yes	146	27.8
Elbows		
No	502	95.6
Yes	23	4.4
Wrists/hands		
No	431	82.1
Yes	94	17.9
Low back		
No	429	81.7
Yes	96	18.3
Hips/thighs		
No	467	89.0
Yes	58	11.0
Knees		
No	430	81.9
Yes	95	18.1
Ankles/feet		
No	399	76.0
Yes	126	24.0

\*Participants could report more than one complaint

Table 4. Association between demographic and work-related variables and self-reported musculoskeletal pain in the shoulder, upper back, neck and ankles and/or feet.

Variable	Shoulders				Upper back				Neck				Ankle/feet			
	Yes	No	PR	95%CI	Yes	No	PR	95%CI	Yes	No	PR	95%CI	Yes	No	PR	95%CI
Gender																
Female	147	305	1.25	0.83 – 1.88	135	317	1.98	1.12 – 3.47	131	321	1.76	1.03 – 3.01	113	339	1.40	0.83 – 2.35
Male	19	54	1.00		11	62	1.00		12	61	1.00		13	60	1.00	
Skin color																
Brown or black	142	255	1.06	0.93 – 1.19	116	263	1.14	1.03 – 1.27	111	268	1.10	1.01 – 1.23	97	282	1.07	0.97 – 1.19
White	42	104	1.00		30	116	1.00		32	114	1.00		29	117	1.00	
Age																
> 40 years	68	158	0.96	0.85 – 1.08	63	163	1.00	0.90 – 1.11	48	178	0.87	0.78 – 0.96	68	158	1.15	1.04 – 1.28
≤ 40 years	98	201	1.00		83	216	1.00		95	204	1.00		58	241	1.00	
Schooling																
Graduate studies	73	171	0.95	0.85 – 1.07	64	180	0.96	0.86 – 1.06	65	179	0.98	0.88 – 1.09	56	188	0.97	0.88 – 1.07
Post-Graduate studies	93	188	1.00		82	199	1.00		78	203	1.00		70	211	1.00	
Per capita income																
≤ 1.000,00	137	281	1.20	0.86 – 1.69	119	299	1.12	0.78 – 1.61	118	300	1.20	0.83 – 1.75	102	316	1.08	0.73 – 1.60
> 1.000,00	29	78	1.00		27	80	1.00		25	82	1.00		24	83	1.00	
Work experience																
> 10 years	103	203	1.07	0.95 – 1.20	87	219	1.02	0.91 – 1.13	84	222	1.00	0.90 – 1.12	83	223	1.10	1.03 – 1.21
≤ 10 years	63	156	1.00		59	160	1.00		59	160	1.00		43	176	1.00	

PR: prevalence ratio; CI: confidence intervals.

Table 5. Association between health-related variables and well-being at work with self-reported musculoskeletal pain in the shoulder, upper back, neck and ankles and/or feet.

Variable	Shoulders				Upper back				Neck				Ankle/feet			
	Yes	No	PR	95%CI	Yes	No	PR	95%CI	Yes	No	PR	95%CI	Yes	No	PR	95%CI
<b>Diabetes</b>																
Yes	9	9	1.38	0.86 – 1.33	5	13	1.00	0.74 – 1.33	5	13	1.08	0.75 – 1.34	8	10	1.38	0.91 – 2.09
No	157	350	1.00		141	366	1.00		138	369	1.00		118	389	1.00	
<b>Arterial hypertension</b>																
Yes	36	61	1.10	0.93 – 1.30	36	61	1.18	1.00 – 1.39	35	62	1.17	0.99 – 1.37	39	58	1.33	1.12 – 1.57
No	130	298	1.00		110	318	1.00		108	320	1.00		87	341	1.00	
<b>Allergies</b>																
Yes	100	149	1.27	1.12 – 1.43	84	165	1.17	1.04 – 1.30	92	157	1.29	1.15 – 1.44	68	181	1.08	0.98 – 1.19
No	66	210	1.00		62	214	1.00		51	225	1.00		58	218	1.00	
<b>Digestive problems</b>																
Yes	77	91	1.38	1.19 – 1.61	61	107	1.19	1.05 – 1.36	67	101	1.30	1.14 – 1.49	52	116	1.14	1.00 – 1.28
No	89	268	1.00		85	272	1.00		76	281	1.00		74	283	1.00	
<b>Circulatory problems</b>																
Yes	77	112	1.24	1.08 – 1.41	71	118	1.24	1.09 – 1.40	74	115	1.30	1.15 – 1.48	73	116	1.37	1.21 – 1.55
No	89	247	1.00		75	261	1.00		69	267	1.00		53	283	1.00	
<b>Vocal problems</b>																
Yes	109	153	1.34	1.18 – 1.51	102	160	1.36	1.22 – 1.52	97	165	1.31	1.17 – 1.46	82	180	1.21	1.00 – 1.33
No	57	206	1.00		44	219	1.00		46	217	1.00		44	219	1.00	

Continue...

Table 5. Continuation.

Variable	Shoulders				Upper back				Neck				Ankle/feet			
	Yes	No	PR	95%CI	Yes	No	PR	95%CI	Yes	No	PR	95%CI	Yes	No	PR	95%CI
Breathing problems																
Yes	53	67	1.29	1.08 – 1.53	45	75	1.20	1.03 – 1.39	50	70	1.32	1.12 – 1.55	46	74	1.30	1.12 – 1.51
No	113	292	1.00		101	304	1.00		93	312	1.00		80	325	1.00	
CMD																
Suspected	90	105	1.42	1.23 – 1.64	72	123	1.23	1.09 – 1.39	91	104	1.58	1.37 – 1.81	66	129	1.23	1.10 – 1.38
No Suspected	76	254	1.00		74	256	1.00		52	278	1.00		60	270	1.00	
BMI																
Overweight/ obesity	76	130	1.13	1.00 – 1.28	70	136	1.15	1.02 – 1.29	60	146	1.04	0.93 – 1.16	58	148	1.09	0.98 – 1.21
Low/normal	90	229	1.00		76	243	1.00		83	236	1.00		68	251	1.00	
Alcohol consumption																
Yes	68	129	1.07	0.94 – 1.21	64	133	1.11	0.99 – 1.24	57	140	1.03	0.93 – 1.15	43	154	0.95	0.86 – 1.05
No	98	230	1.00		82	246	1.00		86	246	1.00		83	245	1.00	
Smoking																
Yes	17	35	1.01	0.83 – 1.24	24	28	1.37	1.06 – 1.78	18	34	1.12	0.91 – 1.38	17	35	1.14	0.94 – 1.39
No	149	324	1.00		122	351	1.00		125	348	1.00		109	364	1.00	
WBW																
Low	82	121	1.53	1.32 – 2.79	62	141	1.17	0.84 – 1.83	68	135	1.44	1.12 – 2.44	68	135	1.86	1.52 – 3.44
Moderate to high	84	238	1.00		85	238	1.00		75	247	1.00		58	264	1.00	
Moderate to high																

PR: prevalence ratio; CI: confidence interval.

As for morbidity, main complaints reported were vocal problems, mental and behavioral disorders, diseases of the respiratory, circulatory and digestive systems. These results corroborate those of other studies, reinforcing the similarities involving teaching activities and the health status of these professionals in various areas of the country<sup>2,5,16,17</sup>.

The prevalence of musculoskeletal pain in this study (73.5%) reached an intermediate values compared to that found in other studies (55.0<sup>4</sup>, 63.2<sup>5</sup> and 90.4%<sup>6</sup>), demonstrating the relevance of pain in teaching practice. However, considering the study named “healthy worker effect” as a limitation, musculoskeletal pain complaints are likely to be underestimated. That is, the ones complaining the most may be relieved of their work activities, absent or licensed for health reasons.

Another factor to consider in the study of pain prevalence is the measurement of the variable itself, because, even though there are some measurement scales of general use (verbal, numerical, face scales) and clinical use (McGill multidimensional<sup>21</sup> and WHO analgesia<sup>22</sup>), the pain is always self-reported and, therefore, its measurement can be influenced by subjective aspects of participants, which maximizes or minimizes their perception.

The body parts of higher MSP incidence in this study were similar to that of previous studies<sup>5-7</sup>. Although the relationship between MSP and working conditions of teachers has not been the object of this work, other studies claim that working conditions are determinants of health impairment among teachers. The prevalence of MSP is related to variables of teaching activities, including working time, number of students per class, weekly schedule, physical exertion, heat, furniture, high demand and low decision-making capacity<sup>4,23</sup>.

The conditions under which the work is performed by educators can be a source of personal wear with consequent impairment of perception of well-being at work<sup>24-26</sup>. In this investigation, more than a third of teachers had low levels of WBW. Pain in the neck, shoulders, ankles/feet showed positive association with low WBW, similarly to other findings which show that pain in the neck, shoulders, hands/wrists and lower back are significantly lower in individuals with high levels of well-being compared to those with low levels<sup>7</sup>.

Another study assessing WBW among educators in primary and secondary education found that the three symptoms most commonly cited were pain in the neck and shoulders, lower back, and headache. Teachers aging 48 – 55 years had a tendency to higher levels of emotional exhaustion at work, with negative results on well-being<sup>28</sup>.

Although the biological mechanisms linking emotions and moods to health conditions are not fully known, studies have shown increasing evidence that affective statuses can affect health through changes in the functioning of the central nervous system, as well as immune, endocrine and cardiovascular systems<sup>29-31</sup>. In this sense, common mental disorders were associated with all four types of pain surveyed in this study. One can also infer that people with depression and anxiety may have sensitivity to pain increased and more health complaints.

When considering the association of WBW and CMD with musculoskeletal pain, studies have shown that negative emotions arising from depressive states, anxiety, anger and hostility increase the risk of heart attack, bone mineral loss and loss of muscle strength, increased levels cortisol and increased cytokines secretion<sup>30</sup>, while positive emotions reflect in lower levels of cortisol, lower heart rate, lower psychological stress and depression, and lower secretion of inflammatory markers<sup>29,31</sup>, which could explain the relationship between variables .

Although this study agree with the statements of the previous paragraph, due to the limitation inherent to the cross-sectional design, it is not possible to draw a time sequence showing the development of musculoskeletal pain as well-being is changed, which requires further studies to further deepening the problem.

Considering the presence of CMD as related to sociodemographic and work-related variables for the areas of the body, this study showed an association between age and pain in the neck and ankle and/or foot, the latter being also associated with length of work time greater than 10 years. Another study found that MSP on the back, upper limbs and lower limbs were positively associated with length of work time greater than 5 years<sup>23</sup>; thus, it is possible to think that aging and consequent increase in time of work as a teacher lead to the accumulation of wear situations that can contribute, over time, with the onset of musculoskeletal symptoms, causing more pain to teachers.

Musculoskeletal pain can be traumatic, inflammatory, ischemic, related to tumors or functional overload, and it is aggravated or mitigated by emotional factors. Thus, several discussion points can be highlighted in order to explain the association between MSP in teachers and factors such as allergies, circulatory, respiratory, digestive and vocal problems, overweight/obesity and smoking.

Although this research has been presented to teachers as a study on overall health, not specifically about musculoskeletal pain or well being at work, and has included all the teachers of the public schools in the placed searched, with only 4 refusals registered, we cannot rule completely the possibility of bias in the selection of respondents. Thus, it is necessary to explore other analytical study models that can bring more evidence on the relation between teaching and physical pain.

## CONCLUSION

Musculoskeletal pain is often reported by teachers, with emphasis to shoulder, upper back, neck and ankles and/or feet pain, as the most common complaints, all of them being associated with sociodemographic factors, physical and mental health, and well being at work.

We must deepen the knowledge about musculoskeletal pain in teachers, exploring the biological, ergonomic, occupational and psychosocial mechanisms of teaching, as well as invest in practices that improve the coexistence relationship between workers and activities that increase comfort in the working environment to reduce the referred pain.

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