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Original Article

Verbal Aggression Against Teacher and Upper Extremity Musculoskeletal Pain

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ABSTRACT

Background: This study investigated the relationship between verbal aggression against school teachers and upper extremity (neck, shoulder, upper limb, and/or upper back) musculoskeletal pain.

Methods: This was a cross-sectional study of 525 elementary school teachers from Jaboatão dos Guararapes, Northeast Brazil.

Results: The prevalence of upper extremity musculoskeletal pain among teachers who reported verbal aggression in the past six months (67.7%) was higher than that among those who did not report verbal aggression (51.7%): (prevalence ratio = 1.21; 95% confidence interval = 1.04–1.40). The prevalence of upper extremity musculoskeletal pain was associated with verbal aggression, sex, and common mental disorders, controlled by skin color, age, monthly income, teachers' education, years working as a teacher, workload, and obesity. Furthermore, the measure of the association between verbal aggression and upper extremity musculoskeletal pain was modified by sex and common mental disorders, considered altogether. Teachers who suffered verbal aggression, of the feminine sex, and also having common mental disorders reported high prevalence (85.4%) of upper extremity musculoskeletal pain.

Conclusion: The association between verbal violence in the school and complaints of upper extremity musculoskeletal pain was strong and modified by teachers' sex and common mental disorders.

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1. Introduction

Musculoskeletal disorders are a common occupational health problem, accounting for about 50% of the cost of all work-related health issues in Europe [1]. The prevalence of musculoskeletal disorders among school teacher populations ranged from 40% in Sweden [2], 55% in Brazil [3], 66% in Estonia [4] to 95% in China [5].

Musculoskeletal pain symptoms are the most important consequences of musculoskeletal disorders [6]. Musculoskeletal pain in the neck and shoulder, upper limb, and upper back pain are frequently referred by school teachers [7]. A review study among teachers reported that the prevalence of neck/shoulder pain varied from 40.4% to 80.1%, upper limb discomfort from 67.2% to 91.3%, and upper back pain from 33.3% to 56.4% of teachers [8]. The neck, shoulder, upper limbs, and upper part of the human body can be seen as functional units, given the difficulty in specifying the origin of symptoms that affect certain segments in this region [9,10].

Work-related musculoskeletal pain not only may be a consequence of harmful physical activities or exertion [11] but might also be associated with psychological factors such as mood, satisfaction, and job stress [12]. Among teachers, the following factors have all been associated with musculoskeletal pain: feminine sex, age above 40 years, the number of years working as a teacher, workload in terms of time, low social support from colleagues, anxiety, and high levels of perceived stress [7].

Violence at work has been associated with adverse health outcomes, such as long-term sickness absence [13], sickness presenteeism [14,15], as well as increased turnover intention and reduced job satisfaction [16].

Violence against teachers is manifested through threats, harassment, and physical and verbal aggression [17–19]. Verbal abuse or verbal aggression is the most common form of victimization [20–24]. Verbal abuse occurs when another person yelled or swore at the educator or uses other words intended to control or hurt [25].

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Approximately 80% of teachers report being the victim of some kind of violence [26]. Verbal aggression was reported by 33.4% to 60.7% of teachers [27,24]. Among the victims of verbal violence at school, women and non-white teachers are the most likely to be attacked [18].

Although some studies have described the frequency of violence against teachers at school, it is necessary to understand the factors associated with this phenomenon and its consequences for victims' health and well-being. This study aimed to investigate the association between verbal aggression against the teacher at school and upper extremity (neck, shoulder, upper limb, and/or upper back) musculoskeletal pain.

2. Materials and methods

2.1. Participants and data collection

This study is part of a wider project investigating the work and health of teachers in elementary public schools from Jaboatão dos Guararapes, Northeast Brazil [28]. At the time of the study, the public education system was composed of 111 schools and 2,237 teachers [29]. All teachers who participated in a training activity event promoted by the municipal education department, during August to November 2011, were invited to participate in the study. These training activities occur twice a year, and all teachers in the education network are invited to attend. Teachers filled a three-page self-administered questionnaire with 99 questions about sociodemographic and occupational issues, and violence at school, which they completed in their homes during the training activity event. Teachers could easily fill the questionnaire in five minutes.

The whole questionnaire used was not validated, including the main dependent and main independent variable and covariables.

2.2. Variables

The dependent variable was upper extremity (neck, shoulder, upper limb, and/or upper back) musculoskeletal pain. The questionnaire asked literally: "In the last seven days, have you felt pain in any parts of your body?" The following options were available: (a) I felt no pain; (b) Neck; (c) Shoulder; (d) Upper back; (e) Elbows; (f) Hand and wrist; (g) Lower back pain; (h) Hip or thigh; (i) Knee; (j) Ankles and/or feet; and (k) Other (please specify). (We did not use a body picture). The dependent variable was created from the sum of pain reported in each of these body segments in the seven days before the study. The variable was dichotomized as Yes = neck and/or shoulder and/or upper back and/or upper limb pain or No = no pain.

The main independent variable was verbal aggression and/or threat against the teacher at school in the six months before the study. Answers could be Yes or No.

Covariables were as follows: sex (feminine or masculine), age (≤ 40 or > 40 years), skin color (mulatto/black or others), monthly income ($> 2,500$ or $\leq 2,500$ Brazilian reais, equivalent to ≤ 644 or > 644 US dollars), education level (high school/college or graduate/post graduate), the number of years working as a teacher (≤ 10 or > 10 years), weekly workload in classroom in this school (≤ 20 or > 20 hours per week), obesity, and common mental disorders. Obesity was evaluated by body mass index (BMI = weight in kilograms divided by height in square meters) from values reported by the teachers [30]. For the purposes of the statistical analyses of this study, individuals with BMI ≥ 30 were considered obese and those

Table 1
Prevalence ratios (PRs) of upper extremity (neck, shoulder, upper back, and/or upper limbs) musculoskeletal pain in the last seven days in accordance with verbal aggression against the teacher in the last six months and covariables among 525 teachers.

Variable	Upper extremity musculoskeletal pain						PR	[95% CI]*
	N	Yes		No				
		n	%	n	%			
Verbal aggression								
Yes	225	141	62.7	84	37.3	1.21	[1.04-1.40]	
No	300	155	51.7	145	48.3		1	
Sex								
Feminine	452	268	59.3	184	40.7	1.55	[1.14-2.09]	
Masculine	73	28	38.4	45	61.6		1	
Common mental disorder								
Yes	195	142	72.8	53	27.2	1.56	[1.35-1.80]	
No	330	154	46.7	176	53.3		1	
Skin color								
Mulatto/black	373	221	59.2	152	40.8	1.20	[1.00-1.44]	
Others	152	75	49.3	77	50.7		1	
Age								
> 40 years	299	177	59.2	122	40.8	1.12	[0.96-1.31]	
≤ 40 years	226	119	52.7	107	47.3		1	
Monthly income								
$\leq 2,500$ reais	400	231	57.8	169	42.2	1.11	[0.92-1.34]	
$> 2,500$ reais	125	65	52.0	60	48.0		1	
Teacher education								
High school/college	173	99	57.2	74	42.8	1.02	[0.87-1.20]	
Graduation/postgraduation	352	197	56.0	155	44.0		1	
Time working as a teacher								
> 10 years	268	152	56.7	116	43.3	1.01	[0.87-1.18]	
≤ 10 years	257	144	56.0	113	44.0		1	
Workload								
> 20 hours per week	287	153	53.3	134	46.7	0.89	[0.76-1.03]	
≤ 20 hours per week	238	143	60.1	95	39.9		1	
Obesity								
Yes	70	40	57.1	30	42.9	1.02	[0.82-1.26]	
No	455	256	56.3	199	43.7		1	

Bivariate analysis was conducted.

* Prevalence ratio and the respective 95% confidence interval.

Table 2

Stratified analysis for the association between the prevalence (%) of upper extremity musculoskeletal pain in the last seven days and verbal aggression against the teacher in the last six months in accordance with covariables among 525 teachers.

Covariable	N	%	Verbal aggression	Upper extremity musculoskeletal pain				PR	[95% CI]	
				Yes		No				
				N	%	N	%			
Sex	Feminine	452	76.2	Yes	125	66.1	64	33.9	1.22	[1.05-1.41]
				No	143	54.4	120	45.6		
	Masculine	73	23.8	Yes	16	44.4	20	56.6	1.37	[0.76-2.47]
				No	12	32.4	25	67.6		
Common mental disorder	Yes	195	37.1	Yes	90	78.3	25	21.7	1.20	[1.00-1.45]
				No	52	65.0	28	35.0		
	No	330	62.9	Yes	51	46.4	59	53.6	0.99	[0.77-1.27]
				No	103	46.8	117	53.2		
Skin color	Mulatto/black	373	71.0	Yes	98	65.3	52	34.7	1.18	[1.00-1.40]
				No	123	55.2	100	44.8		
	Others	152	29.0	Yes	43	57.3	32	42.7	1.38	[0.99-1.92]
				No	32	41.6	45	58.4		
Age (years)	>40	226	43.0	Yes	57	59.4	39	40.6	1.25	[0.98-1.59]
				No	62	47.7	68	52.3		
	≤40	299	57.0	Yes	84	65.1	45	34.9	1.19	[0.99-1.43]
				No	93	54.7	77	45.3		
Monthly income (reais)	≤2,500	400	76.2	Yes	109	67.3	53	32.7	1.31	[1.11-1.59]
				No	122	51.3	116	48.7		
	>2,500	125	23.8	Yes	32	50.8	31	49.2	0.95	[0.68-1.34]
				No	33	53.2	29	46.8		
Teacher education	Graduation/postgraduation	352	67.0	Yes	100	61.0	64	39.0	1.18	[0.98-1.42]
				No	97	51.6	91	48.4		
	High school/college	173	33.0	Yes	41	67.2	20	32.8	1.30	[1.01-1.67]
				No	58	51.8	54	48.2		
Time working as a teacher (years)	>10	268	51.0	Yes	72	59.5	49	40.5	1.09	[0.89-1.35]
				No	80	54.4	67	45.6		
	≤10	257	49.0	Yes	69	66.3	35	33.7	1.35	[1.09-1.67]
				No	75	49.0	78	51.0		
Workload (hours per week)	>20	287	54.7	Yes	63	55.3	51	44.7	1.06	[0.85-1.32]
				No	90	52.0	83	48.0		
	≤20	238	45.3	Yes	78	70.3	33	29.7	1.37	[1.16-1.69]
				No	65	51.2	62	48.8		
Obesity	Yes	70	13.7	Yes	16	59.3	11	40.7	1.06	[0.70-1.60]
				No	24	55.8	19	44.2		
	No	455	86.5	Yes	125	63.1	73	36.9	1.24	[1.06-1.45]
				No	131	51.0	126	49.0		

CI, confidence interval; PR, prevalence ratio.

with BMI <30 were considered nonobese. Common mental disorders were evaluated by using the Self-Reporting Questionnaire-20. The 6/7 cutoff point was adopted, as in other studies among teachers from Brazil [31].

2.3. Statistical analyses

We only considered questionnaires with a complete set of answers. The bivariate and stratified analyses used OpenEpi [32] to

Table 3

Results of multivariable logistic regression equations (prevalence ratios and 95% confidence intervals*) for the association of upper extremity (neck, shoulder, upper back, and/or upper limbs) musculoskeletal pain in the last seven days with selected variables, including an interaction term, among 525 teachers.

Variables (referent)	Equation 1		Equation 2	
	PR	[95% CI]	PR	[95% CI]
Verbal aggression (no)	1.13	[0.96-1.33]	—	—
Sex (masculine)	1.45	[1.07-1.96]	—	—
Common mental disorder (no)	1.49	[1.28-1.73]	—	—
(Verbal aggression * Sex * Common mental disorder)	—	—	1.53	[1.33-1.76]
Skin color, mulatto/black (others)	1.17	[0.97-1.41]	1.19	[0.98-1.43]
Age (≤40 years)	0.92	[0.77-1.10]	0.89	[0.75-1.06]
Monthly income (>2,500 reais)	1.09	[0.88-1.35]	1.08	[0.88-1.33]
Teacher education (graduation/postgraduation)	1.01	[0.83-1.22]	0.99	[0.82-1.20]
Time working as a teacher (≤10 years)	1.07	[0.89-1.28]	1.07	[0.89-1.29]
Workload (≤20 hours per week)	0.93	[0.78-1.09]	0.93	[0.79-1.10]
Obesity (no)	0.98	[0.77-1.24]	0.98	[0.78-1.24]

Regression corrected according to Oliveira et al [34].

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* Prevalence ratio and respective 95% confidence interval estimates for logistic.

calculate prevalence ratio (PR) and 95% confidence interval (95% CI). Initially, all variables (verbal aggression, sex, common mental disorders, age, skin color, monthly income, teacher education, the number of years working as a teacher, weekly workload, and obesity) were inserted in the multivariable logistic regression model having upper extremity musculoskeletal pain as the dependent variable. Subsequently, the same variables were tested for interaction, using first-order interaction terms with verbal aggression. Only two first-order interaction terms were identified by the equations. Finally, a second-order interaction term (Verbal aggression * Sex * Common mental disorders) was tested in the model that included age, skin color, monthly income, teacher education, the number of years working as a teacher, weekly workload, and obesity. Multivariable analysis used the RStudio, version 1.1.463, package [33]. Rstudio is a software for statistical data analysis was developed by a company called GNU and is a free licence program. It is part of an open source platform called R. RStudio is a good alternative to perform descriptive and inferential statistics, bivariate and multivariate analysis. The delta method [34] was used to estimate the PR and respective CIs in the logistic regression.

3. Results

The study population contained 525 teachers. The prevalence of upper extremity (neck, shoulder, upper limb, and/or upper back) musculoskeletal pain in the last seven days was 42.8%, while the prevalence of verbal aggression against the teacher at school in the past six months was 56.4%. The 225 teachers victimized through verbal aggression reported that the agent of aggression was a student (76.9%), someone from outside the school (15.1%), a teacher (2.7%), or another agent (5.3%).

Table 1 demonstrates that the prevalence of upper extremity musculoskeletal pain among teachers who reported verbal aggression in the past six months (67.7%) was higher than that among those who did not report verbal aggression (51.7%): (PR = 1.21; 95% CI = 1.04-1.40). Table 1 also shows that, beyond verbal aggression, sex (PR = 1.55; 95% CI = 1.14-2.09) and skin color (PR = 1.20; 95% CI = [0.00-1.44]) were also strongly related with upper extremity musculoskeletal pain prevalence.

Table 2 presents the relationships between upper extremity musculoskeletal pain and verbal aggression stratified by the selected covariables. Teachers who reported being victimized by verbal aggression usually presented higher PRs for the pain outcome, except for those in the strata >2,500 Brazilian Reals (PR = 0.95) and no common mental disorders (PR = 0.99). The association measures were more precise (95% CI equals to or higher than 1.00) in the strata feminine sex (PR = 1.22; 95% CI = 1.05-1.41), with common mental disorders (PR = 1.20; 95% CI = 1.00-1.45), mulatto/black (PR = 1.18; 95% CI = 1.00-1.40), ≤2,500 monthly income (PR = 1.31; 95% CI = 1.11-1.59), high school-level/college-level education (PR = 1.30; 95% CI = 1.01-1.67), ≤10 years working as a teacher (PR = 1.35; 95% CI = 1.09-1.67), workload of ≤20 hours per week (PR = 1.37; 95% CI = 1.16-1.69), and no obesity (PR = 1.24; 95% CI = 1.06-1.45).

Table 3 presents the results of two multivariable logistic regression equations where the outcome was prevalence of upper extremity musculoskeletal pain. Equation 1 revealed that the prevalence of upper extremity musculoskeletal pain associated with verbal aggression, sex, and common mental disorders, adjusted by skin color, age, education, years working as a teacher, workload, monthly income, and obesity. Equation 2 shows that the measure of the association between upper extremity musculoskeletal pain and verbal aggression was modified by sex and

common mental disorders, considered altogether, as revealed by the second-order interaction term (PR = 1.31; 95% CI = 1.12-1.52).

The substrata (N = 81) of teachers of the feminine sex, who have common mental disorder, and who suffered verbal aggression reported high prevalence (85.4%) of upper extremity musculoskeletal pain.

4. Discussion and conclusion

The most relevant result of this study is that teachers who were victims of verbal aggression, of the feminine sex, and also have common mental disorders presented the greatest prevalence (85.4%) of upper extremity musculoskeletal pain. In general, scientific studies describe the isolated effects of variables on upper extremity musculoskeletal pain. Our study identified the relevance of the joint effect of these three variables on that outcome.

Musculoskeletal disorders have a complex and variable etiology. As well as factors related to stress, such as violence, awkward posture, repetitive movements and forceful exertion, work-life interaction, and, in particular, work-family conflict, have also been recognized as contributors to the development of musculoskeletal disorders [35]. A study of teachers from Northeast Brazil described the double working day and the significant overload of domestic work on female teachers. Female teachers also presented higher prevalence of musculoskeletal pain and other health complaints [36]. Gender acts as an important predictor of emotional distress for victims of verbal abuse [26]. Studies from a number of countries show that teachers of the feminine sex are more frequently victimized through verbal aggression than males [18,24,27].

Common mental disorders were associated with upper limb musculoskeletal symptoms in a sample of 530 elementary-level Brazilian teachers [37]. A study among Malay teachers has reported the association of musculoskeletal pain in the neck and/or shoulder with poorer mental health and with anxiety [38].

In the study population, the prevalence of upper extremity musculoskeletal pain in the last seven days was higher (42.8%) than that reported in a large study with teachers from Salvador city, Brazil (23.7%) [3]. A comprehensive study estimated the prevalence of work-related upper extremity musculoskeletal symptoms (shoulder, elbow, wrist, and hand/finger, but not neck), in the last 30 days, in 50,218 individuals with data from 2006, 2009, and 2014 United States National Health Interview Surveys. The prevalence was significantly higher among males (8.84%) than among females (7.54%) [39].

The prevalence of common mental disorders in the study population was 37.1% and higher than the prevalence of 25.1% found among 3,495 teachers from Salvador city, Brazil, using the same cutoff point (6/7) of the Self-Reporting Questionnaire-20 [40]. A study carried out in Brazilian schools reported that teachers of the feminine sex showed 2.6 times more common mental disorders than male teachers [31].

The studies cited earlier in this article denote how strongly interlaced are sex, verbal aggression, and common mental disorders in their relationship with upper extremity musculoskeletal disorders. Furthermore, we must keep in mind the possibility of reverse causality. In our theoretical model, we assumed that common mental disorders could cause upper extremity musculoskeletal pain, but the reverse could also occur.

Violence is common in Jabotão dos Guararapes. In 2011, the homicide rate was 43.75/10,000 inhabitants, while it was 27.40/100,000 inhabitants in the whole country [41]. Although most of this violence occurs on the streets, at home or in contexts outside school, we believe that people living in violent environments, especially the young, tend to manifest violent behavior in other places and reproduce, albeit on a different scale, the aggression

they witness. In other words, the experience of violence against women is reproduced within the school environment. The greatest challenge for schools is to promote a culture of peace and well-being for those who work inside them, while serving as an example for society as a whole.

Bivariate analysis for the whole population of the 525 teachers revealed that those working >20 hours per week presented lower prevalence of upper extremity musculoskeletal pain than those who worked ≤20 hours per week (PR = 0.89; 95% CI = 0.76-1.03). This unexpectedly lower PR remained, even after controlling for confounding in the logistic model (PR = 0.93; 95% CI = 0.79-1.10). A PR lower than the unity would suggest a protective effect for teachers with higher weekly workload. Indeed, the interpretation of this PR must take into account that the variable weekly workload referred to the time spent in classroom, in this particular job. Probably, teachers working ≤20 hours per week had other jobs that would contribute to increase their total weekly workload. Finally, it must be noted that workload had a remarkable confounding effect on the relationship between verbal aggression and upper extremity musculoskeletal pain. The crude PR was 0.89 in the 525 teachers, but in the stratified analysis, it was higher than the unity: 1.06 and 1.37 in the two strata (≤20 hours per week and >20 hours per week, respectively). Confounding was adequately controlled by using the multivariate logistic regression method.

A limitation of the study is the difficulty in establishing the time sequence of the verbal violence and musculoskeletal pain events; this is inherent in cross-sectional studies. The low proportion of teachers studied (525/2,237 = 23.5%) is another limitation. These 525 teachers cannot be considered as a representative, randomly selected sample from the universe of teachers from the city. They simply represent a sample of individuals who were attending to a short-duration event promoted by the municipal education department. A third important limitation of this study was the lack of evaluation of psychosocial factors on the prevalence of upper extremity musculoskeletal pain. Studies among 4,496 teachers from Salvador city, Brazil, have identified several factors related to the prevalence of upper extremity musculoskeletal pain: work schedule >40 hours per week, working for more than 5 years in that school, having no other paid job, more than 30 students per class, heat, and intense physical exertion at work [3]. The prevalence of upper extremity musculoskeletal pain was the highest in teachers in active jobs, with heavier psychological demand, with limited job control, and in high-stress jobs and the lowest in teachers in low-stress jobs [42]. Finally, comparability of our results with those of other studies is limited because we did not use standard, validated questionnaires.

We conclude that upper musculoskeletal pain in the neck, shoulder, upper limbs, and/or upper back is associated with verbal aggression against the teacher at school and that this association is modified by sex (feminine) and skin color (mulatto/black), even after controlling for some relevant variables.

Ethical statement

The study was approved by the Research Ethics Committee of the Science Health Center at the Federal University of Pernambuco (registration number CAAE 0489.0.172.00011). All participants participated in the study voluntarily and gave informed consent. The research was anonymous and guaranteed privacy of participants.

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Conflict of interest

The authors declare no conflict of interest.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.shaw.2020.02.003>

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