

Incidence of Musculoskeletal Symptoms in Teachers for the Diagnosis and Management of Specific Preventive Physiotherapeutic Strategies

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ABSTRACT

The present study aimed to investigate the epidemiological profile of musculoskeletal disorders and the perspective on preventive physiotherapy in elementary school teachers. This is a descriptive observational study with cross-sectional cohort, which included a total of 61 teachers of both genders, aged 21 to 56 years. It was found that the most affected body anatomical regions, due to the usual work practice performed in the last 12 months, were shoulders (39.3%), lumbar spine (59%), wrist and hands (45.9%), causing a notable negative impact in work tasks performing. It is concluded that these dysfunctions occur due to static postures and inadequate and repetitive movements and highlight the need for ergonomic information that would prevent the development of such disorders, characterized by primary health care promoted by physiotherapists.

Keywords: Prevention and Control; Motor Activity; Primary Health Care; Ergonomics.

Introduction

Studies on teaching work and health in the country are relevant, since evidence shows high data of teachers in Brazil, corresponding to 2,497,918 [1]. In this sense, Cortez et al. [2] report in their study the need for understanding related to aspects of worker's health focused specifically on teachers, as a tool that helps to promote improvements in working conditions and consequently in the development of national collective health, at primary care level. From this perspective, the study by Ceballos and Santos [3] found that the major reasons related to the incidence of pathological conditions and subsequent removal from teaching activities are correlated with psychic, behavioral, respiratory, vocal and musculoskeletal problems, with the last being reported as the most frequent difficulties. Such implications can be extrapolated to other labor populations, since it seems to be inserted in general contexts, marked by internal and external overload.

Also, the study by Ribeiro et al. [4], associates musculoskeletal pain in teachers with occupational factors, which include long

class duration in the same position, incorrect carrying of teacher's materials, inadequate height and length of school furniture, correction of school activities of students in inadequate positions, movements performed in the classroom that compromise posture, prolonged elevation of the upper limb and extension of the cervical spine when writing on the board, large number of classes, high number of students per class, insufficient rest period and high workload weekly. Accordingly, the study by Calixto et al. [5], reveals that the musculoskeletal system, as a result of these factors, suffers static and dynamic overload, which progresses to acute disability to chronic painful syndromes with functional disability, which may limit the performance of work and leisure activities. Still, the study by Fernandes et al. [6], points out that besides the biomechanical factors present in work activities, repetitive movements, ergonomically unfavorable environment for the teacher and high workload, there are the individual physical characteristics and lifestyle, which found in a study that there is a prevalence of symptoms. musculo-

skeletal disorders in young women who perform activities with a higher number of repetitive efforts.

With this in mind, musculoskeletal pain is characterized as a nuisance that encompasses the body segments, with a multifactorial etiology and that can lead to disability or limitation of the individual's daily activities. Dealing this data, several studies relate musculoskeletal pain with negative impact on worker's quality of life [4,7,8]. Regarding the above, preventive physiotherapy is equated with a set of pertinent actions that prevent the development of musculoskeletal disorders and symptoms, since, characterized by health promotion and specific protective measures, it can act in the school environment with teachers of both public and private schools, promoting awareness and ergonomic guidance on the various postural and biomechanical dysfunctions caused by the profession, as well as conducting preventive actions to these dysfunctions by exercising relaxation and stretching exercises with the teaching staff, promoting kinesiotherapy [9]. Therefore, specific evaluations that allow prophylactic conduct seem to be pertinent, in the context of preventive physical therapy, considering the negative impacts on the overall health of the worker, accumulated throughout his career. Thus, the aim of this study was to investigate the epidemiological profile of musculoskeletal disorders in elementary school teachers.

Methods

Participants of Study

A total of 61 participants were included, teachers from the state schools from the city of Aragarças-GO, (52 female and 9 male) aged 21 to 56 years. To be included, participants would have to be in the profession for over 12 months, working in the classroom. Participants who did not complete all evaluation items were excluded.

Ethical Issues

All participants were informed about all procedures and objectives of the study and, after agreeing, were asked to sign a free and informed consent form, assuring their rights. In addition, the study was submitted to the ethics committee for research involving human subjects, from the Federal College of Mato Grosso, Araguaia campus. It is reiterated that all actions employed in this study comply with the Ethics Criteria in Research with Human Beings, according to resolution no. 466/12 of the National Health Council - Brasília - DF, offering no risks and / or any discomfort to the participants.

Design Study

This is a descriptive observational study with cross-sectional cohort. Data collection was performed during the classes, with the authorization of the direction in each investigated school. Data were obtained through interviews, where a semi-structured questionnaire was used by the authors of this study, according to the model suggested in Fernandes studies; Rocha et al. [5,7,8]. In addition, the application occurred individually, at times when they were absent from the classroom and during class breaks and had

a maximum duration of 15 minutes. The collection period lasted 10 days, and the morning and afternoon shifts were interspersed during February/2019. Also, evaluations were performed by a single evaluator, previously trained, in order to ensure standardized procedures. Initially, anthropometric evaluation was performed, characterized by the evaluation of height, weight, body mass index (BMI) and waist circumference were verified by measuring tape, stadiometer and digital scale. Then the questionnaire was applied.

Procedures

Nordic Questionnaire of Musculoskeletal Symptoms:

The Nordic Musculoskeletal Questionnaire used was adapted according to the model suggested in the study by Calixto et al. [5]. It is therefore a validated research tool translated into Brazilian language, consisting of a human body figure in the posterior view with nine musculoskeletal structures that the participant had to indicate which or which symptoms of pain, numbness or tingling were present. Such structures are cervical, shoulders, thoracic, elbows, wrist / hands, lumbar, hip / thighs, knee and ankles / feet. In addition to indicating the affected anatomical site, the participant had to inform if in the last 12 months prior to the research there were symptoms, if it was prevented to perform normal activities due to discomfort, if there was a search for health professionals to remedy the condition and if in the last 7 days there were also dysfunctions in the same structures. In order to add understanding of the occurrence of symptoms in the structures possibly mentioned in the Nordic questionnaire of musculoskeletal symptoms, questions were introduced about the existence of injuries diagnosed in these structures by a doctor to the teachers and if for these injuries there was adequate physical therapy treatment with yes answer. or not.

For the negative option, 3 reasons were asked, such as: lack of medical referral, lack of time and financial issues. In addition to the questionnaire suggested by Calixto et al. [5], items related to personal information were investigated that included: name, gender and age; practice of physical activity regularly, specifying the modality and number of times a week; Open-ended questions about hours worked per week, length of professional practice, whether there has been sick leave in the last 12 months for health problems, and knowledge of preventive physical therapy for symptoms and injuries.

Statistical Analysis

The collected data were tabulated, stored and analyzed in Excel 2007 spreadsheets. The results regarding the sample characterization were presented as mean and standard deviation values, stratified by gender. The values regarding the incidence and characteristics of the lesions were presented as percentage values for each domain verified and presented in table and graph.

Result

A total of 61 teachers were included, working in 6 state schools in the city of Aragarças-GO, of which 52 (85.2%) were female and

9 (14.7%) were male. Regarding anthropometric characteristics, information regarding the minimum, maximum, mean, standard deviation and p-values were calculated for age, height, weight, BMI, activity time and hours worked per week. Of these, there was a statistically significant difference between genders for weight ($p = 0.0032$) and height ($p = 0.0002$) variables. The information described regarding the anthropometric characteristics of the participants is presented in Tables 1 & 2 presents the outcomes

related to the Nordic questionnaire of musculoskeletal symptoms, stratified by anatomical region, prevalence in the last 12 months, limitations due to the problem, medical care received and pain symptoms in the last 7 days. Thus, on these data, it was found that the most affected anatomical region in both genders, by the usual labor practice were shoulders, lumbar spine, wrist and hands. All summary data are presented in Table 2.

Table 1: Anthropometric and general characteristics of the participants.

	Women		Men		
	Minimum/maximum	M / SD	Minimum/maximum	M / SD	P-value
Age (years)	23 - 56	42 ± 8,49	21 - 51	46 ± 12,05	0,9032
Height (meters)	1,5 - 1,72	1,62 ± 0,05	1,63 - 1,78	1,72 ± 0,05	0,0001*
Weight (kg)	46 - 98	70 ± 13,1	70 - 129	86 ± 17,7	0,0032*
BMI (kg.m ²)	16,1 - 39,3	27,8 ± 5,14	23,7 - 42,1	29 ± 5,29	0,3071
Abdominal Circumference (cm)	67 - 118	90,5 ± 11,6	92 - 131	102 ± 11,6	0,0325
Weekly hours (hours)	8 - 60	40 ± 16,6	6 - 60	40 ± 20,8	0,5683
Acting time (years)	1 - 32	15,5 ± 8,85	1 - 32	15 ± 9,4	0,9479

Note: Minimum = minimum value; maximum = maximum value; M = media; SD = standard deviation and BMI = body mass index; Kg = kilogram and kg.m² = weight / height²; cm= centimeters. *statistically significant difference ($p < 0,05$). Source: collected data (2019).

Table 2: Nordic Musculoskeletal Questionnaire.

Anatomical Region	Symptoms in the Last 12 Months (%)		Preventing Normal Activities in the last 12 Months because of this Issue (%)		Consultation with a Healthcare Professional (Doctor or Physical Therapist) because of this Condition (%)		Symptoms in the Last 7 Days (%)	
	(f)	(m)	(f)	(m)	(f)	(m)	(f)	(m)
Neck	50	22,2	0	11,1	13,4	0	30,7	11,1
Shoulders	40,3	33,3	21,1	11,1	19,2	0	26,9	22,2
Thoracic spine	36,5	22,2	9,6	0	15,3	0	15,3	11,1
Elbows	5,7	0	1,9	0	1,9	0	3,8	0
Fist/hands	50	22,2	17,3	11,1	21,1	0	32,6	0
Lumbar spine	63,4	33,3	21,1	11,1	23	0	46,1	22,2
Hip/thighs	19,2	22,2	5,7	0	13,4	11,1	15,3	11,1
Knees	36,5	11,1	13,4	11,1	13,4	11,1	15,3	0
Ankles/feet	36,5	0	15,3	0	19,2	0	25	0

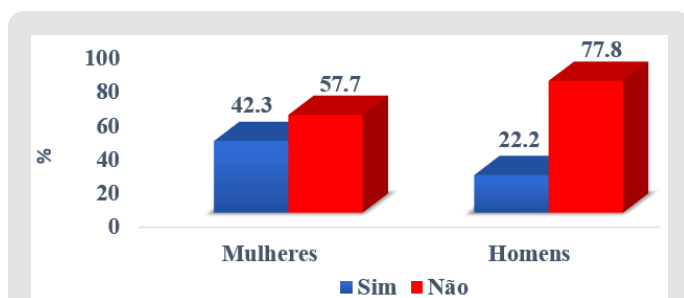
Note: (%) = percentage; (f) = female sex and (m) = male sex. Source: collected data (2019).

From the consultation to a doctor or physiotherapist for symptoms, 23% of the female group sought for lumbar spine, 21.1% for wrists / hands, 19.2% for shoulders and 13.4% for neck. There was no professional search by the male group. In this regard, a recent study shows that there is still male resistance to health care, given a cultural and misinformation difficulty. Because of this, such a population facing a symptom, only decides to seek medical help when the problem gets worse [10]. Unlike the female population evaluated, which were demand for a small portion of the medical consultation is noted, especially the male in the interest to remedy the dysfunction, preventing further damage.

The last question in the Nordic Musculoskeletal Questionnaire referred to symptoms in the last 7 days preceding the survey, being answered positively by 46.1% of the female group and 22.2% of the male group for lumbar spine, 26.9% of the female group and 22.2% of the male group for shoulders, 30.7% of the female group and 11.1% of the male group for the neck and 32.6% of the female group for wrists / hands, not being mentioned by the group male. Similar analyses for Carvalho [11] with 27.4% for lumbar, Fernandes; Rocha and Fagundes [7] with 26.4% for shoulders, Mango et al. [8] with 25.3% for the neck and Carvalho et al. [12] with 14.6% for fists / hands. With these results, it is verified that the pain caused in

these regions in the last 12 months for some teachers has become persistent, rising to a chronic dysfunction.

When asked about the existence of injuries in the last 12 months, there was a positive response from 42.3% of the female group and 22.2% of the male group, shown in Graph 1. The anatomical structures with the highest prevalence of injuries and containing the most reported types were respectively in the female group, the lumbar spine (17.3%) with arthrosis (9.6%), shoulders (13.4%) with bursitis (5.7%) and ankles / foot (11.5%) with sprain (3.8%). In the male group were shoulders (11.1%) with bursitis (11.1%) and knees (11.1%) with meniscus injury (11.1%).



Graph 1: Musculoskeletal injuries incidences among study participants.

Note: % = percentage. Source: collected data (2019).

For these injuries, 15.3% of the female group and 11.1% of the male group sought treatment with a physical therapist and reported improvement of the problem. Already 26.9% of the first and 11.1% of the second group did not seek, for predominant reason for both, being respectively 17.3% and 11.1% for lack of medical referral. Regarding the search for physiotherapeutic treatment, it was found that the female group surpassed the male group and regarding non-seeking, the reason why the doctors consulted did not choose to refer them to physiotherapy.

Discussion

Regarding the predominance of females in this profession, other studies also verify the same characteristic [4,7,8,11,13,14]. In this sense, the high prevalence of females in the teaching profession of primary education seems to be related to a persistent labeling of study and work areas, associated with gender segregation, being such profession mistakenly considered by many as “feminine”. Therefore, there is a decline in male participation due to a resistance exerted by them for mainly cultural reasons [15-17]. Regarding this fact, if this ideology maintains a continuous character in this area, it is believed that research with females will have more reliable verification than males, due to the higher prevalence of one over the other in teaching. It is pertinent that thoughts that correlate profession with gender should be extinguished in our society, since both genders are qualified at a similar level to exercise such a profession. Regarding the age range between genders, there was little discrepancy, with a total average of 40.7 ± 8.98 years. This finding is similar to other studies [4,12-14]. Thus, it can be noted

that teachers working in basic education are in greater number aged 40 years.

For the variables weight and height, there was a statistically significant difference between genders. Referring to these results, previous studies reported differences in body composition. Such data are justified by intrinsic physiological issues, caused by hormonal and genetic levels, and complemented by extrinsic habits, characterized by adopted nutrition and physical exercise practice. Thus, of course, men have more muscle mass and tend to be heavier than women. Regarding height, women tend to be shorter and men taller, justified by skeletal maturation and early closure of female growth discs [18]. Regarding the number of hours worked per week, it was observed that there was no statistically significant difference between genders ($p = 0.5683$), with a total average of 37.4 ± 17.1 hours. In this regard, similar studies have observed similar mean values. In this scenario, a study by Carvalho et al. [6] reported values of 34.6 ± 9.61 , Fernandes; Rock; Oliveira [6] of 31.91 ± 14.82 and Santos and Marques [14] of 31.7 ± 10.5 . These data corroborate the outcomes of the present study and are also based on issues related to labor laws in force in the country.

Still, with regard to the workload, laws recommend that the weekly workload should not exceed 44 hours and with respect to teachers, article 67 of the Law of Guidelines and Bases 9394/96, item V [19], states that the time to prepare classes, activities, make corrections and studies should be included in the total weekly hours worked. Regarding this data, the outcomes verified in the present study showed that a portion of the interviewed professionals (29.5%) disregard such regulation, since they adopt workloads that exceed the recommended 40 hours. This condition raises levels of physical, mental stress, anxiety and exposure on the incidence of musculoskeletal symptoms. Therefore, informative measures are essential to make clear to these professionals about the imminent risks triggered by overwork.

In terms of working time in years, similarity was observed between genders and the total average is 14.8 ± 8.85 years. Closest averages were obtained in the study by Ribeiro et al. [4] with 14 ± 8.4 , Mango et al. [8] with 12.8 ± 7.0 , Carvalho et al. [12] with 16.4 ± 6.82 and Santos; Marques [14] with 12.4 ± 9.5 years. It is noticed that the vast majority of teachers are within the correct amount in years of labor contribution, which is 25 years for women and 30 for men [20]. The musculoskeletal symptomatology index in the last 12 months investigated in the elementary school teachers of the state network of the city of Aragarças-GO, regardless of the affected body region, was 95%. Other studies obtained approximate values, such as Carvalho et al. [12] with 94.4%, Mango et al. [8] with 91% and Fernandes; Rocha and Fagundes [7] with 93%.

In this sense, the high incidence of musculoskeletal symptoms is attributed to the set of the following factors: structural overloads suffered due to ergonomic, anthropometric factors, weekly hours and length of work. Thus, the body regions with the highest number

of complaints in women were the lumbar spine (63.4%), neck (50%), wrists / hands (50%) and shoulders (40.3%). For men they were lower back and shoulders (33.3%), being lighter for neck and wrist / hands (22.2%). In both sexes, it was reported involvement in more than one region. In other studies, such regions were also prevalent [3,7,8]. These structures, correlated to the profession, tend to suffer greater overload, affecting the symptomatology, being higher in females when compared to males.

Regarding structural overloads, a recent study [11] demonstrates that activities perceived by teachers themselves as being stressful for the lumbar spine correspond to the activity of performing table-to-table correction of student notebooks in the standing position, in which the anterior inclination is performed. column, stand upright throughout the class and carry weights from the closet to the desk. With a high demand of the mentioned tasks, added to the lack of physical conditioning, causes overload of the musculoskeletal structures in the lumbar spine. Already considered exhausting activities for neck, shoulders and wrist / hands in this same study were writing on the board, which is with the upper limb extended above the head, raised neck and generates repetition of movements. However, static postures and inadequate and repetitive movements in this population lead to musculoskeletal disorders [5,21,22]. Still, regarding the prevalent body regions, it is assumed that the male gender has a reduced symptomatological index in relation to the female due to the level of physical activity, in which it was found in the present research, that there are more physical activity practitioners among men. (88.8%), especially women (55.7%), with a frequency of 3 times weekly for both. The most cited modalities were walking (18%), weight training (13.1%) and dancing (6.5%). About this, it is observed that the musculoskeletal structures of the male group tend to be more resistant to dysfunctions than the female group, considering the practice of physical exercises.

In the study by Santos and Marques [14], the health condition of public-school teachers was assessed through the perception of general health (PSG) on a scale with five ordered categories (poor, fair, good, very good and great). Individuals who practiced regular physical activity (65.2%) had a very good / excellent PSG prevalence. There is evidence regarding the importance of physical exercise in prevention, maintenance and health promotion, reducing risks of systemic pathologies, obesity and contributing to stress control.

Regarding the impediment to perform normal activities of daily living in the last 12 months due to the presence of symptoms in the above structures, the female group prevailed with 21.1% for the lumbar spine and shoulders and 17.3% for the wrist / hand, in which the male group were 11.1%. In the neck region, the male group prevailed with 11.1% and the female group did not report any impairment. Accordingly, the study by Mango et al. [8] reported in the same structures, 26.9% for the lumbar spine, 15% for shoulders, 18.2% for wrist / hand and 16.6% for neck. The painful

symptom is capable of causing a productive fall, limitations in daily life functions, changes in work routine and leisure programs that promote work leave, which cause social security expenses [8].

Teachers who tend to have difficulty performing their tasks in the classroom due to health issues need a leave of absence to reestablish themselves. Thus, the participants were asked if there was a request for such reasons in the last 12 months and a positive report was obtained from 28.8% of the female group and 11.1% of the male group. musculoskeletal system, organ removal surgery and maternity leave (4.9%). Due to the movement performed to perform the profession, teachers tend to develop Repetitive Strain Injury (RSI), which is currently called Work-Related Musculoskeletal Diseases (WRMS), mainly in distal joints of the upper limb (hand and wrist), due to repetitive movements, postures and inadequate ergonomic conditions, which may be progressive and difficult to resolve [8]. Concerning the existence of preventive physiotherapy knowledge among state schoolteachers, it was found only in 11.5% of the female group and 22.2% of the male group.

About this result, there is a certain decline of relevant information to prevent the health of these workers, which could be solved by physiotherapists working in the Extended Family Health and Primary Care Center (Nasf-AB) of the city of Aragarças-Go. Since these professionals among their duties, can perform an interdisciplinary work in schools in the city, focused on disease prevention, education and promotion of individual and collective health.

Regarding the above, there are some limitations regarding the manuscript. First, the outcomes are limited to the investigated population, and should not be extrapolated to participants with different characteristics. In addition, a longer follow-up of participants could provide more robust data. On the other hand, the strengths are related to the high methodological quality adopted, within the proposed initial objective. Moreover, it is believed that similar studies, characterized by providing detailed diagnosis of specific populations, are indispensable for proposing specific strategies and preventive and therapeutic management. Furthermore, it is suggested that future studies propose specific interventions as well as longer longitudinal follow-up of participants.

Conclusion

From the outcomes presented, it is possible to conclude that the regions with the highest prevalence of pain were lumbar spine, neck, wrists / hands and shoulders, with greater involvement in females. Given this, the influence on the execution of work and daily tasks, the low demand for medical help and the existence of chronic dysfunctions represent a significant problem for these professionals. Finally, it is believed that the relevance of this study to the class of professional educators, in proposing a solution to the painful problems faced in detriment of the lack of ergonomic guidelines that would help in the prevention of dysfunctions,

consequently acting for the good performance of their work functions and points out solutions, stressing the pertinent and necessary action of physical therapy in schools.

Conflicts of Interest

None declared. The authors declare that the research was conducted with no features that could be construed as a potential conflict of interest.

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