

Functional analysis with physical focus on upper limbs in teachers with painful syndrome

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Abstract: The labor makes the individual to feel useful, productive and valued. However, labor activity may be associated with injuries due to unsuitable work conditions, awkward postures and repetitive movements. The repetitive strain injuries/work-related musculoskeletal disorders (RSI/WMSD) are among the major occupational diseases. Therefore, pain is the first symptom that may alert to prevent these injuries. Teaching has a number of factors that can result in pains in the upper limbs. This research aimed to identify the incidence of musculoskeletal pains in upper limbs in teachers as well as the relationship with the profession and daily activities. A socio-demographic interview and assessment of the Disorders of the Shoulder, Arm and Hand (DASH) were used as instrument for data collection. The research is characterized as a quantitative cross-sectional study. The Shapiro-Wilk test was used to verify the data normality, the Spearman correlation (p) was applied to the data with asymmetric distribution and the rate of alpha error of 5% ($P<0.05$) considered significant. The results show that there is high prevalence of upper limb pain syndrome in teachers, which may be associated with various factors of the teaching job. The presented pains interfered in the functional activities, impaired quality of life and labor. Thus, it is understood that the prevalence of pains have significant correlation due to teaching labor, which also affect the performance of functional daily.

Keywords: *Daily Activities, Cumulative Trauma Disorders, Occupational Health, Upper Limb.*

Análise funcional com enfoque físico de membros superiores em professores com síndrome dolorosa

Resumo: O labor faz com que o indivíduo se sinta útil, produtivo e valorizado. No entanto, a atividade laboral pode estar associada a lesões devido a condições impróprias para o trabalho, a posturas inadequadas e à realização de movimentos repetitivos. Dentre as principais doenças relacionadas ao trabalho, estão as lesões por esforços repetitivos/doenças osteomusculares relacionadas ao trabalho (LER/DORT). No entanto, as algias são os primeiros sintomas que podem alertar para a prevenção destas lesões. Especificamente no trabalho docente, há uma série de fatores que podem resultar em algias nos membros superiores. Esta pesquisa objetivou identificar a prevalência de algias musculoesqueléticas nos membros superiores em professores, bem como a correlação com a profissão docente e a execução das atividades do cotidiano. Como instrumento, foi utilizada uma entrevista sociodemográfica e o *The Arm, Shoulder And Hand* (DASH). Esta pesquisa se caracteriza por ser um estudo quantitativo e transversal. Foi utilizado o Teste de Shapiro-Wilk para verificar a normalidade dos dados, e a Correlação de Spearman (p) foi aplicada nos dados de distribuição assimétrica, tendo sido considerada significativa a taxa de erro alfa de 5% ($P<0,05$). Os resultados desta pesquisa evidenciam que há alta prevalência de síndrome dolorosa nos membros superiores em professores, associada a diversos fatores da execução do trabalho docente. As algias apresentadas interferiram nas atividades funcionais desses trabalhadores, comprometendo-lhes a qualidade de vida. Assim, entende-se que a prevalência das algias tem significativa correlação com o trabalho laboral docente, as quais também acometem a execução das Atividades de Vida Diária (AVDs) e as Atividades Instrumentais de Vida Diária (AIVDs).

Palavras-chave: *Atividades Cotidianas, Transtornos Traumáticos Cumulativos, Saúde do Trabalhador, Extremidade Superior.*

1 Introduction

Besides being a source of subsistence, the labor activity has an evaluative nature, enabling the individual to feel useful, productive and valuable. Work is understood as a matrix of social integration and constitution of the identity of the individual (DELIBERATO, 2002; LANCMAN, 2004; CASTEL, 1998).

With the technological developments in the world of work, it was believed that there would be a reduction in the workload, the end of drudgery, greater leisure time and better quality of life. However, what can be seen is the reduction of jobs and at the same time, workload and multiplication of those activities that remain on the market (LANCMAN, 2004).

In adult life, individuals are in full development of their labor skills and are subjected to disabling injuries that hinder carrying out meaningful activities into their life. During this period, most individuals are in a productive stage, professionally developing by entering the labor market, constituting the family and, therefore, living a moment of great achievement and very personal commitment (ANDRADE, 2008).

However, the greatest demand for labor, excessive working hours and increased market demand have led to the illness of individuals. According to Alves and Rubin (2000), this is because the work activity is associated with injuries due to abnormal conditions of work, poor postures and carry out repetitive movements.

Among the main cumulative trauma disorders linked to work, there are the repetitive strain injury/work-related musculoskeletal disorders (RSI/WMSDs) (RICE; LUSTER, 2013). In Brazil, cases of RSI /WMSDs have increased significantly, giving rise to one of the largest epidemics of modern life (OLIVEIRA, 2004; LANCMAN, 2004). Kasch and Nickerson (2005) state that approximately 63% of the 90,000 injuries by RSI in the United States affect the wrist, the hand, and the shoulder.

The injuries of RSI/MSDs are typically considered transitional. However, these injuries can result in permanent disabilities. They are a set of conditions related to professional activities. Some examples include damage to tendons and tendon sheaths, the synovial lubrication of these sheaths, bones, muscles, ligaments, the fascia, blood vessels, nerves, the elbows, the shoulders, the neck, the back and the legs (RICE; LUSTER, 2013).

Gasparini, Barreto and Assunção (2005) state that in the last decade, teaching has become the focus of several studies and research. This is because the fast pace and workload by teachers have generated great impact on public health since there was an increase in illness and sick leave of these professionals (SOUZA et al., 2003).

Teaching characteristics such as constant effort, poorly ergonomically projected environments, high working hours of work in the classroom and extra activities on a daily basis, are a group of factors that may result in pains in the upper limbs. To Longen (2003), these limbs are the most common sites for the onset of RSI/WMSDs. According to Carvalho and Alexandre (2006), teachers are being increasingly affected by several diseases, ignoring their health needs, assuming a conformist and favorable attitude, and not investing or not having conditions to reverse this situation.

Pain associated with disabling injuries can hinder the performance of daily activities. The Activities of Daily Living (ADLs) and Instrumental Activities of Daily Living (IADL) are mentioned among these activities. Taking care of personal hygiene, work, answer the phone, cooking and playing cards with friends are some examples of these activities, which may have different degrees of importance in the everyday life of each person.

According to Foti (2005), the ADL are activities of self-care, mobility, and functional communication, and hardware and real devices management. IADL include housekeeping and life skills in the community. At the moment these significant activities cannot be carried out satisfactorily, the quality of life is consequently compromised. It is noteworthy that The WHOQOL Group (1995, p. 1405) defined the quality of life as

[...] individuals' perception of their position in life in the context of culture and value systems in which they live and about their goals, expectations, standards, and concerns.

Therefore, it is essential to focus health professionals' factors causing problems, as according to Sampaio, Mancini and Fonseca (2002), they can contribute to the need of softening the impact that certain health condition brings to personal, family and social life of an individual. In this context, the Occupational Therapy is highlighted, which is a profession of health area, whose primary objective is to promote and recover the conditions of individuals with temporary or chronic disorders, to carry out

activities that are meaningful in their daily lives (CAVALCANTI; GALVÃO, 2007).

Lancman (2004) states that more research have been addressing ways to improve production, organization and working conditions on workers' health, but that are few research dealing with the content of the work and the personal relationship of the worker. Thus, this research, analyzing the prevalence of musculoskeletal pains in the labor process of teachers and link them with the individual's daily life, aims to bring contributions to the studies of Occupational Therapy in the health area and physical and motor rehabilitation of workers.

Most research in this area emphasize RSI/WMSDs as the only pathologies related to teaching. However, they do not address the events on the functionality and the difficulties in carrying out daily activities. Thus, besides the lack of studies in the literature relating to this issue, what motivated this study was the impact on occupational activities and quality of life of teachers by symptomatic of pains in upper limbs. The purpose of this research is then to identify the prevalence of musculoskeletal pains that affect the upper limbs and the correlation of pains with the teaching profession and the execution of daily activities of teachers of a State School in the city of Santa Maria-RS.

2 Materials and methods

This research is characterized as a quantitative, descriptive and cross-sectional research. Gil (1991) states that the descriptive research uses standardized data collection techniques such as questionnaires and standardized assessment tools. The quantitative research works in levels of reality and aims to bring data, clear indicators and trends (SERAPIONI, 2000).

The research was conducted in a State School, in the city of Santa Maria-RS. In the first contact with the School, the governmental authorization was asked to carry out this research.

There were 45 teachers interviewed working at the time of the research in the State School of Elementary and High School. Exclusion criteria were: not to be teaching at the State School in which the survey was conducted, be under 18 years old, not to mention the pain in the upper limbs and not signing the Informed Consent Form. Of the 45 teachers interviewed, 15 were excluded for not

having any pain symptoms in the upper limbs, totaling 30 teachers in the sample.

The participants are teachers of elementary and high school performing teaching activities, for example, preparing lessons, use of the blackboard, correction of tests, attendance to classes and use of the computer.

A questionnaire was used for data collection, which allowed the collection of demographic information and questions directed to the purpose of the research, such as age, gender, place of birth, nationality, teaching profession time, daily work hours, activities at work and what activities besides teaching they perform every day, achievement and frequency of physical activity, pain in the upper limbs, the place of the pain, if they have previous medical diagnosis, treatment performed, if they relate to pain with teaching, influence of pain on ADLs and if they already received instructions for stretching, posture, and proper positioning while performing the work.

It was also used The Arm, Shoulder and Hand (DASH), an instrument that reflects the functional impact of various diseases affecting the upper limbs. The DASH is divided into three parts: the first part refers to the ADLs and IADLs; the second part concerns the activity of sports and musical practice, and the third part is related to work activities. In this research, only the first part was used, with 30 questions, and the third part, with four questions. The DASH is a good evaluation since it is specific to the upper limb and can be used in patients with different disorders in this region, and allow comparisons between different conditions and cultural realities (BEATON et al., 2005).

After acceptance and agreement by teachers to participate in the study and signed the Informed Consent Form (TCLE) during April and May 2014, the questionnaire and the DASH instrument were used in the interviews. This interview occurred in their workplace, with approximately 30 minutes to prevent fatigue and unfavorable conditions from interfering with the research results.

The collected data were analyzed and interpreted from the perspective of quantitative research. DASH values were transformed into a score of 100, subtracting 1 and multiplying by 25: $[(\text{Sum of answers}/n) - 1] \times 25$.

This transformation is performed to relate the DASH to a scale of 0 to 100, so the higher

the score, the greater the level of dysfunction (KENNEDY et al., 2011).

Data are presented according to the mean, standard deviation (SD), in absolute numbers and their respective percentages. Data normality was verified by the Shapiro-Wilk test. The Spearman correlation (ρ) was applied to the asymmetric distribution data. The alpha error rate of 5% ($P < 0.05$) was considered significant.

This research was focused and conducted by the ethical principles recommended by Resolution 466/2012 of the Ministry of Health (BRASIL, 2012), which regulates research involving human beings. It was approved and authorized by the Research Ethics Committee of the Federal University of Santa Maria (CAAE 26665714.0.0000.5346).

3 Results

Of the total of 45 teachers interviewed, only 15 did not have pain symptoms and, therefore, were excluded from the study because they fit with the exclusion criteria. Among the 30 participating teachers, two were physical educators and 28 teachers were from the elementary school subjects, from 1st to 9th grade, and in high school, from 1st to 3rd grade. Table 1 shows the sociodemographic characteristics of the sample, in which there is a predominance of women (86.6%) compared to men (13.4%); ages ranged from 24 to 60 years old, with a mean of 45.6 (± 10.3) years old; there were more right-handed (86.6%) compared to left-handed teachers (13.4%); the average length of the teaching profession was 17.3 (± 10.2) years, and the weekly duration of 37.5 (± 15.0) hours/class.

Table 2 shows that the highest prevalence of pain was located on the shoulder (73.3%) and in

the other joints of the upper limbs - elbows, wrist, and fingers - 26.6%. Most of the sample (90.0%) listed the pain with teaching. The reported activities performed during teaching were: the use of the blackboard, the correction of tests, attendance to classes and the use of computers. Of the participants, 56.6% had a previous medical diagnosis, but only 30.0% underwent treatment. The performance of regular physical activity was reported by 56.6%, including walking, bodybuilding, and dancing, and only 10.0% had received instructions (stretching, posture and correct positioning) during their

Table 1. Sociodemographic characteristics of the sample.

Variable	n (%)	Average \pm SD
Gender female (n)	27 (86.6)	
Gender male (n)	3 (13.4)	
Age (years old)		45.6 \pm 10.3
Right-handed (n)	27 (86.6)	
Left-handed (n)	3 (13.3)	
Teaching experience (years)		17.3 \pm 10.2
Weekly working hours		37.5 \pm 15.0

Values expressed in n (%), average \pm SD.

Table 2. General characteristics of the sample.

Variable	n (%)
Shoulder pain (n)	22 (73.3)
Elbow, wrist and finger pain (n)	8 (26.6)
Relating the pain with their work (n)	27 (90.0)
Medical Diagnosis (n)	17 (56.6)
Treatment (n)	9 (30.0)
Physical activities (n)	17 (56.6)
Received instructions (n)	3 (10.0)
Pain during ADLs (n)	24 (80.0)

Values expressed in (%). ADLs: Activities of daily living.

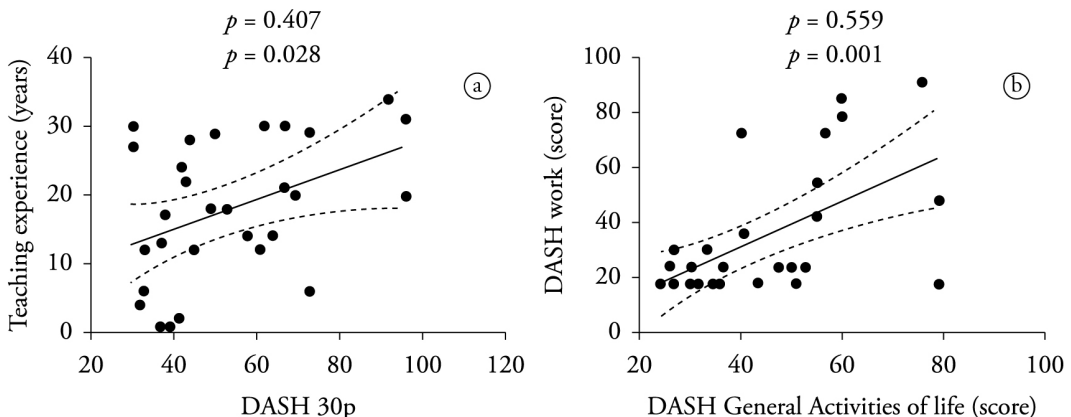


Figure 1. Correlations of teaching experience DASH variables with pain syndrome of the upper limbs.

professional work. Most of the sample (80.0%) reported that pain influences ADLs, among which prevailed home activities, such as sweeping the house, mop the floor and carry market bags.

The correlation of the data showed that the teaching experience is directly related to the DASH score ($p=0.407$; $P=0.028$) (Figure 1a). The same happened to the DASH of work and the general activities of daily living ($p=0.559$; $P=0.001$) (Figure 1b).

4 Discussion

The results of this research show that there is a high prevalence of pain syndrome of the upper limbs in teachers, which may be associated with several factors of their job execution. Therefore, the findings of Dul and Weerdmeester (2004), Miranda, Vera and Pereira (2002), highlighted the fact that the use of the blackboard requires many hours of work with a suspended upper limb and a short movement in the work environment requiring the implementation of activities in a static position, which may cause fatigue.

Porto et al. (2004) stated pain syndromes related to tasks that require strength and repetitive finger movements, extension and wrist flexion, arm elevation above shoulder height, static contraction of the fingers for a long time, among other positions required by the teaching profession as important factors of pains.

The predominance of females in teaching has also been found in other studies (MELO; CAIXETA; CAIXETA, 2010; DUTRA et al., 2005).

This predominance is justified in the study of Delcor et al. (2004) by the historical presence of women in the domestic environment, and the act of teaching considered a continuation of that environment.

Shoulder pain was observed in 73.3% of the sample that according to Coelho et al. (2010), it is related to the way they teach their classes. Corroborating this finding, the study of Dutra et al. (2005), Martins and Oesterreich (2013) and Coelho et al. (2010) pointed to the shoulder as the biggest complaint of pains region. This is explained: the pain in the shoulder joint is a common symptom because the glenohumeral joint has great mobility, being usual the development of degenerative changes in this structure (CORRIGAN; MAITLAND, 2000).

Of the evaluated teachers, 90.0% listed the pains with teaching and reported being aware of the correlation between the demands of the movements resulting from the work process and the problems they can cause, especially if not executed properly. Similar data were reported by Branco et al. (2011): in his studies, where 79.5% of teachers also interviewed believe that the painful symptoms are related to work.

The small rate of teachers who perform treatment indicates that most of them perform their work activities even with pain. However, as stated by Mango et al. (2012), it is known that persistent pain affects the quality of life of teachers.

A study by Coelho et al. (2010) on the quality of life of teachers and musculoskeletal symptoms revealed that the quality of life was affected negatively by Painful Shoulder Syndrome (SOD), and the prevalence of the shoulder pains occurred in women. Mense, Simons and Russel (2008) related the injury rate in the shoulder in women with factors such as menopause and lower muscle mass in the upper limbs to support the shoulder joint. This may also be associated with long working hours and the ADLs and IADLs. Kraciunas (2007) reported that the workday accumulation of teachers tends to double due to the activities performed at home.

Concerning the physical activity, 56.6% of the sample perform regular physical activity, similar result to Mango et al. (2012), Carvalho and Alexandre (2006), who related the incidence of lack of time, the double workday or socioeconomic issues.

The fact that only 10% of teachers received guidance for stretching, posture, and proper positioning while performing their professional work shows the importance of occupational therapy professionals in this area. The occupational therapist can work in ergonomic analysis of instruments and securities used in the daily lives of teachers proposing adaptations to the environment and equipment, advising on the most appropriate use of body mechanics and offering the use of specific therapy for the purpose to combat the emergence or evolution of pain symptoms (OLIVEIRA, 2004; LANCMAN, 2004). According to Kraciunas (2007), the best way to prevent work-related musculoskeletal disorders is the stretching of the muscles, new awareness of pains and body awareness.

Similar to the data found in the study of Melo, Caixeta and Caixeta (2010), 96.3% of teachers interviewed said that the presence of painful symptoms prevented the performance of the Activities

of Daily Living. Thus, musculoskeletal symptoms are associated with the impairment of activities of daily living and represent an occupational risk for teachers (MANGO et al., 2012; CARVALHO; ALEXANDRE, 2006; MACIEL; FERNANDES; MEDEIROS, 2006; SANTOS; BARRETO, 2001).

In this study, there was a significant correlation ($p=0.407$; $P=0.028$) between teaching experience and the high score of DASH data: the higher the teaching experienced by teachers, the greater the presence of dysfunction in the shoulder, arm, and hand. These data confirm the results found by Cardoso et al. (2009), in which the teacher labor work is associated with higher incidence of musculoskeletal pain.

The overall score of DASH related to shoulder, arm and hand disorders in the performance of the general activities of daily living also correlated to the DASH related to work ($p=0.559$; $P=0.001$). The data indicated significant proportionality in the score of the two evaluations, which means that when there is a dysfunction that impairs the performance of ADLs and IADLs, there is an impact on the implementation of labor activity. Supporting this idea, Melo, Caixeta and Caixeta (2010) argued that the increase in occupational disabilities affect the performance of teachers in performing their work, resulting in decreased productivity.

5 Conclusion

Teachers interviewed in this study showed a high prevalence of pains in the upper limbs, especially in the shoulder area. The possible factors leading to this pain are linked to gender, lack of exercise to increase resistance, fatigue of the upper limb muscles by staying for a long time and writing motion repetition on the blackboard/whiteboard with shoulder flexion and abduction above 90°.

Therefore, it was observed that the prevalence of pain has significant correlation with the teacher's labor work, which also affect the performance of ADLs and IADLs, and hence the quality of life of teachers. These results are relevant to the teaching profession, alerting them to the prevention as developing RSI/WMSD and discussing possible measures for the prevention and treatment with specialized professionals.

It is suggested to carry out new research, mainly of qualitative type, to include other data about suffering and psychological burden on teachers

who work in public and private schools in the Brazilian context, assessing how this occurs in different regions of the country. It is believed that these factors possibly influence the increased prevalence of upper limb pains in teachers.

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Author's Contributions

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