

## Musculoskeletal symptoms in professional musicians

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### ABSTRACT

The objective of this study was to evaluate the presence and severity of musculoskeletal (MS) symptoms in the trunk and upper limbs of keyboardists. A cross-sectional study, including volunteers of both genders, aged 18-40 years, who practiced for at least 2 years, excluding those with systemic diseases, were assessed for MS pain using the Nordic Musculoskeletal Questionnaire. The  $\chi$ -squared test was used for statistical analysis and a significance level of 5% was adopted. This study was approved by the Ethics Committee of the Ceuma University (opinion n° 2,627,609). Thirty-nine volunteers were evaluated, and all (100%) reported experiencing pain or discomfort. The regions of greatest complaint of chronic pain/discomfort in the trunk were the thoracic and lumbar spine (n = 27, 69.24%; p <0.05) and in the upper limbs were the wrist/hand (n = 23, 58.9%). The highest acute complaint was in the lumbar spine (n = 12, 30.76%; p <0.05), and in the wrist/hand and upper limbs (n = 9, 23.07%). A severity index of 1 was the most frequent (n = 14, 36%). It can be concluded that keyboardists have MS mainly in the spine, wrist, and hands, although the severity of the symptoms is mild; the high frequency of complaints suggests the importance of prevention and treatment of musculoskeletal symptoms before aggravation.

**Keywords:** Musculoskeletal pain; Musicians; Injuries

### 1 INTRODUCTION

Musculoskeletal (MS) pain may occur due to musculoskeletal disorders related to repetitive work and exaggerated use of the musculature. Consequently, these injuries involve several disorders which cause pain in the bones, joints, muscles, cartilages, ligaments, tendons, tendon sheaths, and bursae. MS pain is the most

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frequent in the global population, being able to present in an acute or chronic and diffuse or focal form. The pathophysiology of MS pain is still unclear, but inflammation, fibrosis, and neurosensory disorders may be involved (COSTA, 2009).

According to the study by Ferreira (2011), it was found that the prevalence in Brazil of MS disorders reached the same degree as cancers (6%) when assessed in Disability Adjusted Life Years (DALYs). Therefore, MS pain affects 33% of the adult population, which accounts for 29% of work-related absenteeism. Therefore, it can lead to the incapacity or limitations in the ability to perform daily living activities.

The presence of trigger points may also impair or perpetuate the presence of muscular pain. These are localized and irritable nodules in a tight muscle band, which consequently cause pain, sensory alterations, motor dysfunction and anatomical manifestations (LAVELLE; LAVELLE; SWITH, 2007). Being classified as active or latent for local pain and referred, both associated with muscular dysfunction, muscle weakness and decreased range of motion (BRON; DOMMERHOLT, 2012). It is estimated that its prevalence in the general population is 85% (Fleckenstein *et al.*, 2010).

MS symptoms are reported among several classes of professionals. It is most prevalent among teachers (93.0%) (FERNANDES; ROCHA; OLIVEIRA, 2009), who experience pain in the spine and upper and lower limbs. As a consequence of these factors, the performance of activities of daily living (BRANCO *et al.*, 2017), such as household tasks, self-care, and leisure (MANGO *et al.*, 2012), become restricted. Public transport professionals, drivers, and collectors, are vulnerable to daily stress and reduced quality of life (BARCZAK; DUARTE, 2012) because of their long working hours (ROSSI; QUICK; PERREWÉ, 2009) and sub-optimal postures during the day (FASSA; FACCHINI; BREITENBACH, 2008).

The evaluation of MS pain can occur through behavioral analysis characterizing the intensity and quality of the perceived pain, through the Visual Analog Scale and Verbal Descriptor Scale. Physiological analysis using pressure algometry and surface electromyography is also conducted (BAILEY; GRAVEL; DAOUST, 2012; SOUSA *et al.*, 2017; HADDAD)

The most common way of assessing MS discomfort is by manual palpation, as Bragatto (2015) used in his study to evaluate the prevalence of this dysfunction in a computer user. The McGill Pain (QDM; COSTA, 2009) and the Nordic Questionnaire (QNM) are also used. Abreu (2016) measured the osteomioarticular pain manifestations and identified the affected areas through the Nordic Musculoskeletal Questionnaire (NMQ), translated by Pinheiro *et al.* (2002), which consists of dichotomous questions about anatomical regions for situations presented in the last 7 days and in the last 12 months.

Music professionals are also affected by MS discomfort while maintaining high physical and mental exertion, which requires a strong relationship between motor control, musicality, and expressiveness (SILVA; LÃ; AFREIXO, 2015). For this reason, these professionals have several predisposing factors for occupational diseases (ARAUJO and CARDIA, 2005), such as their technique, the time and work dedicated to their instrument, poor posture during performances, technical defects during execution, and the risk of muscular and joint diseases (WOELLNER, MARQUES, KIENEN, 2013).

According to Lima and Simonelli (2014), musicians exhibit the same amount of muscular activity as athletes. Consequently, these factors can lead to problems in performing daily living activities or even cause early career termination (WU, 2007), as individuals tend to underestimate the pain and symptoms which require treatment or rest (SUSKI, 2005). Among these disorders that are often irrecoverable are compressive syndromes, focal dystonias, repetitive stress injuries, tendinitis, and tenosynovitis (SILVA *et al.*, 2012). Keyboardists may develop MS pain in the upper limb and cervical spine regions as they maintain the same position for long periods while performing repetitive hand movements. Another factor that may cause MS symptoms, in addition to repetitive movement, is a lack of specialized instructions as some of these musicians are self-taught. Within this context, the main objective of this study was to evaluate the presence of MS symptoms in the trunk and upper limbs (MMSS) of keyboard players.

## 2 MATERIALS AND METHODS

This is a descriptive, quantitative, cross-sectional observational study, in which the researcher observes and measures at a single timepoint (BADARÓ, 2011). The present study was carried out in the city of São Luís, Maranhão. Instrumentalists of both genders, ages 18-40 years old, who have been practicing keyboard for at least 2 years for at least 8 hours a week. Individuals with a previous history of trauma in the MS system or rheumatic, neurological and systemic diseases were excluded. As a collection instrument, a questionnaire developed by the authors was used, consisting of questions about sociodemographic data (age, marital status, schooling), labor data (workload and study, where they learned their instrument) and clinical data (physical activity and smoking / alcoholism).

The presence and severity of MS symptoms were evaluated using the Nordic Musculoskeletal Questionnaire. The results of the questionnaire allow us to determine the percentage of individuals with MS in the different regions investigated and the most prevalent intensity of symptoms. The severity index ranges from 0 to 4, where 0 represents the absence of symptoms; 1 indicates reports of symptoms noted in the preceding 7 days or 12 months; 2, symptoms in the last 7 days or 12 months; 3, symptoms in the last seven days or 12 months and withdrawal from activities; 4, symptoms in the previous 7 days or 12 months and avoidance of activities (PINHEIRO, *et al.*, 2002).

Data were processed using SPSS software version 18.0 (IBM, Chicago, IL, USA). Descriptive statistics were performed by calculating the measures of frequency, mean, and standard deviation. The data showed a normal distribution using the Shapiro-Wilk W test. The difference in the percentage of reported MS pain in the last 12 months by anatomical region was analyzed using the  $\chi^2$ -squared or Fisher's Exact test. For all analyses, a significance level of 5% was adopted. This research was approved by the Committee of Ethics in Research with Human Beings of the University CEUMA - UNICEUMA (opinion number: 2,627,609).

### 3 RESULTS

Questionnaires were given to 44 keyboardists, but 6 people were excluded because of a previous history of fibromyalgia or accidental knee fracture/injury. Of the participants, 38 were male (97.44%), with a mean age of  $28.38 \pm 6.26$  years, mean occupational time of  $8.41 \pm 2.11$ , mean weight of  $76.04 \pm 12.84$  kg and mean height of  $1.71 \pm 0.06$  meters. Of the musicians surveyed, 14 only played the keyboard (35.90%; Fig. 1). Twenty-eight participants cited music as their only employment (71.79%). Regarding the weekly time (in hours) for practices and performances, 23 (59%) played for 8 to 12 h, 11 (28%) for 12 to 16 h, and 5 (13%) for more than 16 h (Fig. 2).

Figure 1 - Number of instruments played by volunteers

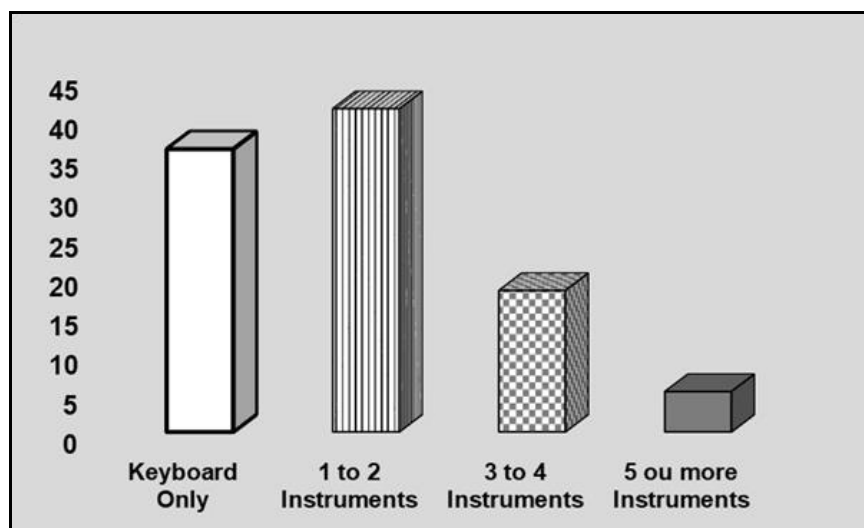
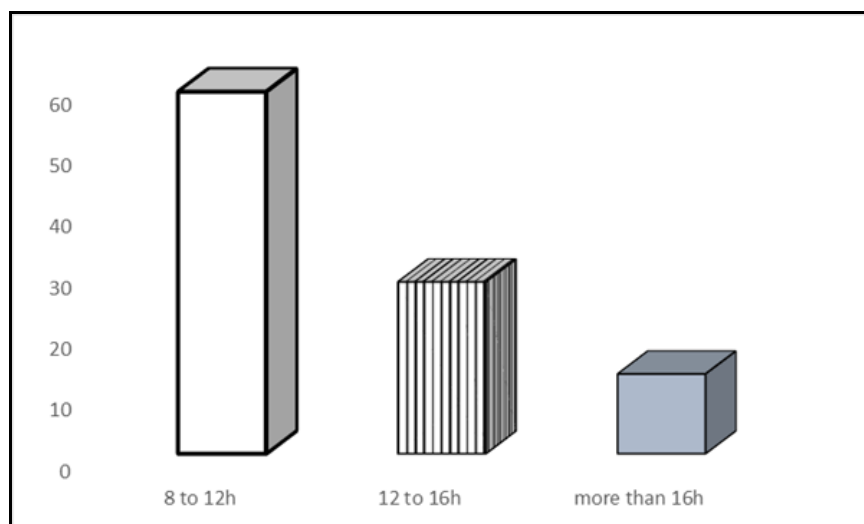


Figure 2 - Hours of weekly shows performed by volunteers evaluated



About 29 participants (74.36%) reported feeling discomfort upon touch, such as tingling, pain and muscle tension. In regards to knowledge of proper prevention form, only 23 (58.98%) had information on how to prevent MS, and only 19 (48.72%) stretched before playing their instruments, computer use  $n = 25$  (64.11%) and  $n = 13$  (33.33%) performed physical activity only and day-day activity ( $n = 22$ ) (56.41%), (5,12%) did not do any (table 1). (33.33%) performed physical activity only and day-day activity ( $n = 22$ ) (56.41%), (5,12%) did not do any (table 1).

Table 1 – Information on discomfort, activity and prevention in the keyboardist musician sample

Variables	N	%
<b>Discomfort after touching</b>		
Yes	29	74,36
No	10	25,64
<b>Access to information on how to prevent</b>		
Yes	23	58,98
No	16	41,02
<b>Streching before music practice</b>		
Yes	19	48,72
No	20	51,28
<b>Other professional activity</b>		
Yes	16	41,02
No	23	58,98
<b>Regular physical activity</b>		
Yes	13	33,33
No	26	67
<b>Day-day activity</b>		
Domestic activity	22	56,41
Computer	25	64,11
None	2	5,12

All volunteers had MS in some region in the last 12 months and 27 (69.24%) presented pain in the last 7 days. A significant difference was observed for lumbar spine pain in the last 7 days ( $n = 12$ , 30.76%) and in the last 12 months ( $n = 27$ , 69.24%), and thoracic pain in the last 12 months ( $n=27$ . 69.24%). The sites with the most complaints were the thoracic spine and lumbar spine.

Only 2 participants (5.12%) sought health services because of symptomatology in the neck and shoulder regions, and one participant (2.56) for the wrist/hands. Six participants (15.38%) were unable to perform activities for work or leisure due to symptoms in the wrist/hand region (Table 2). As to the perceived relationship between symptoms and work, 24 (61.54%) of those who reported symptoms perceived this relationship in the region of the lumbar spine.

Table 2 – Frequency of MS by anatomical region in keyboardist musicians sample

	Neck	Shoulder	Thoracic spine	Elbow	Wrist/hand	Lumbar spine
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Pain in the last 7 days	7 (17,95)	5 (12,82)	9 (23,07)	3 (7,70)	9 (23,07)	12 (30,76)*
Pain in the last 12 months	19 (48,72)	17 (43,59)	27 (69,24) *	4 (10,26)	23 (58,98)	27 (69,24)*
Impedimento of activities	2 (5,12)	1 (2,56)	2 (5,12)	0 (0)	6 (15,38)	3 (7,70)
Sought professional care due to pain	2 (5,12)	2 (5,12)	0 (0)	0 (0)	1 (2,56)	1 (2,56)

$P < 0,05$

#### 4 DISCUSSION

In this work, it was observed that 100% of participants complained of pain or discomfort with a higher percentage of symptoms in the spinal regions, similar to another study by Lourenço e Silva (2014), also performed in keyboardists, who observed a higher percentage of pain in the lumbar region.

Carvalho *et al.* (2016) showed that complaints of low MS symptoms (53.8%), followed by shoulder (46.2%), lower back (34.6%), neck (34.6%), or wrist and hand

(34.6%) pain are also frequent in musicians. Simeon and Borisch (Trélha *et al.* 2004) observed that 74% of 130 orchestral musicians presented MS disorders, mainly in the shoulders, neck, lumbar spine and hands.

The high frequency of MS symptoms observed in keyboard players may be due to the posture (orthostatic or sitting position) acquired during use of the instrument, repetitive and rapid movements, lack of ergonomic orientation during instrument learning, or even due to the fact that only a small minority adopt preventive measures, like stretching before practices and performances, or even possess previous knowledge of injury prevention techniques. This reality is also observed in the literature, where 70% of volunteers stated that they knew about the forms of prevention, but did not practice it (CASSAPIAN AND PELLEZZI, 2010).

Although the highest frequencies of pain in the last 12 months have been reported in the spine, there is also an expressive complaint in the wrist and hand region, making it the third most frequent site. This result can be due to the fact that these professionals use a lot of these structures to perform their activities. Similar results were found by Reijani and Benetti (2016), where symptoms of pain, tingling/numbness in the wrist/hand region were also highly prevalent. However, the high frequency of MS, especially in the wrist/hand, observed in this study should be viewed with caution since most of the volunteers frequently used the computer, which may be a factor that considerably increases pain symptoms in these structures. More controlled studies are required to validate these observations.

Another fact that draws attention is that most professionals report having access to information on how to prevent MS symptoms, but most do not adopt preventative measures such as stretching before practice. Studies by Silva *et al.* (2012) and Costa (2004) show that performing stretches before activities acts palliatively for MS pain.

Another aggravating factor of MS is the lack of physical activity habits. Bruce, Fries and Lubeck (2005) showed an intrinsic relation between absence or minimal practice of physical activity with symptoms of MS pain. They observed that physically active individuals had 25% less occurrences of MS pain compared to more sedentary individuals.



One of the limitations of this study was the fact that the sample was reduced and unbalanced, since most subjects were male. However, the scarcity of studies aimed at the population of musicians and the use of a validated tool for the Portuguese and internationally used language can be pointed out as strengths of this work.

## 5 CONCLUSION

The frequency of MS disorders in the trunk region and MMSS is high in keyboard players as all participants presented at least one region with discomfort or pain. In light of this, the role of the physiotherapist in the health of musicians is of great importance. Elimination of vicious postures during performance, implementation/orientation of correct posture as well as the correct ergonomics of the instrument are vital for not only postural correction, but also the quality of life of musicians.

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