



MUSCULOSKELETAL INJURIS IN MUSICAL ARTS PROFESSIONAL: PREVALENCE AND DETERMINANTS

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Background: Musculoskeletal injuries related to the work of professional musicians constitute a real public health problem.

Objectives: To identify the prevalence of musculoskeletal injuries in professional musicians practicing plucked string instruments and to analyze their relationship with sociodemographic variables, health status and characteristics of instrumental practice.

Methods: This was a non-experimental correlation, descriptive and quantitative character study, involving 140 Portuguese musicians living in 3 cities from Portugal, aged 18 to 55 years old. A questionnaire was used that included variables of sociodemographic characterization, health / style and musical practice. For the evaluation of musculoskeletal disorders we used the “Nordic Musculoskeletal Questionnaire”.

Results: Of the musicians studied, 70.0% reported musculoskeletal disorders (MI) that manifested as pain / tingling / numbness in the last 12 months, mainly in the wrists / hands (68.6%) and shoulders (54.3%). We found that MI were more frequent in older musicians with higher Body Mass Indexes, those who consumed alcoholic beverages and did not practice physical activity, those who had excessive performances, those who used heavier instruments and took fewer breaks.

Conclusions: The prevalence of MI in Portuguese musicians of plucked string instruments is high (70%) and these are related to individual characteristics, life styles and instrumental practice demands, which is urgent to modify through preventive measures.

Keywords: Musicians, Prevalence Musculoskeletal injuries, Plucked string instruments.

Introduction

The musculoskeletal injuries related to work (MIRW) are a global issue, with significant implications both in terms of health, social and economic levels of individuals, in various activity sectors.

These injuries constitute the largest and most frequent health problem for workers in the European Union, in general, all sectors and professions (Leite, Serranheira and Sousa-Uva, 2013). Members of the European Union (EU), most of whom are about 25% of workers complain about low back pain and about

23% report it. In Portugal, the risk of illness due to work increased to about 30%, with a predominance of musculoskeletal conditions. According to Mesquita, Ribeiro and Moreira, (2014), Portugal is the third country in the European Union that has the highest disability rate in professional practice due to Musculoskeletal Injuries.

The first epidemiological study conducted in Portugal on the prevalence of MIRW showed that 5.9% of the Portuguese workers (24,269 cases) had clinically significant lesions (Carnide, Miranda & Lopes, 2016), also verifying that besides the pain and the suffering caused, these had repercussions on social and family life, causing a reduction of professional activities, with loss of productivity and high economic costs for society in general (Santos, Martins, & Serranheira, 2016).

This is a cross-cutting issue covering a number of professional groups, including professional musicians, particularly guitarists. We corroborate Batista, Cruz, Deusdará, Silva & Soares (2012), who tell us that when we think of music, we soon associate it with entertainment, well-being and emotional balance, yet the majority of the public is hardly aware of the demands of this activity imposes those who dedicate themselves to it. Musicians represent a risk group particularly sensitive to this type of injury, since a high percentage presents problems, such as pain prevalence, related to instrumental performance, incorrect postures, low ergonomic instrument, excessive force, repetitive activities and insufficient rest (Frank, & Mühlen, 2007).

In fact, the prevalence of MI related to the practice of music varies between 26% and 87% in the musicians' population (Frank & Mühlen, 2007), 55% and 86% in orchestra musicians, quite a few percentages compared to other professions, (...), whose prevalence is around 37% (Lima, 2012).

For Kienen, Marques and Woellner (2013), the profession of musician requires a lot of psychic and physical effort, associated with a lot of flexibility, coordination and fine motor skills. This work overload can lead to several problems that give rise to a clinical condition, known as "overuse syndrome".

A study conducted by Teixeira, Merino and Lopes (2013), in a sample of 32 orchestra musicians, showed that 54% of these had localized pain during the practice of the instrument, and that this pain ceased when they finished the activity. The three main types of injuries found in these musicians were musculoskeletal pain or muscle tendon, syndromes, nerve compression and focal dystonias.

A quasi-experimental study developed in Spain over a four-year period analyzed 658 musicians and the results showed that 86 (13%) individuals were diagnosed with focal dystonia and that of these 42% were guitarists (Kienen, Marques & Woellner, 2013).

We know that playing any instrument requires precision work on hands and fingers, which requires the musician to maintain a stable neck and shoulder musculature. In addition, the violin and guitar require an extreme position of external rotation of the shoulder, arm elevation and constant maximum supination of the left forearm, which may result in bursitis and tendinopathy of the shoulder muscles. As a consequence, guitarists show a predominance of pathologies in the left upper limb as tendinitis and compressive syndromes (Antunes & Moraes, 2012).

In the opinion of , Santos, Martins, & Serranheira, (2016) the predisposing factors of MI may be individual, (inadequate physical condition, anatomical variations, gender, previous injuries improperly rehabilitated or unrehabilitated and age); Factors related to instrumental practice (error in technique, inadequate postures, choice of instrument and repertoire, type of instrument-weight, size and quality-increase of tests and excessive force exerted, environmental factors (furniture, luminosity) and extrinsic factors Gonçalves (2013), also adds the insufficient knowledge of the musicians about the correct functioning of the body motor system and preventive measures of the injuries.

Prevention is the best strategy to avoid musculoskeletal disorders in musicians, since, as Leite, Serranheira & Sousa-Uva (2013) explains, it is a set of integrated procedures that reduce to an acceptable level the the probability that work and working conditions cause adverse effects on the worker.

The prevention of MI in musicians can be carried out focusing on three key points: behavior towards instrumental practice (posture, training habits / practice, muscular tension exerted); environment (characteristics of the practice site, characteristics of the instrument and its accessories); compensatory work (to compensate repetitive and asymmetrical work through muscle restoration exercises), (Gonçalves, 2013). It is also advisable that the musician avoid unnecessary changes of the instrument and/

or technique, use techniques that facilitate the position and natural movements, make intervals between studies / performances, and at these intervals avoid using the upper limbs; do not increase the test hours at once (maximum increase up to 20 minutes per day) and avoid studying new repertoires at the same time.

The preventive actions in this area are indeed fundamental, but have been adopted in Portugal in a timid manner. The example of this is that only in 2007 was created in the University of Aveiro (for the first time in Portugal) the discipline of “Music and Medicine”, integrated in the academic curriculum of the Masters in Music and in the Vocational Area of Music Teaching.

Methods

Quantitative, cross-sectional, descriptive and correlational study. A non-probabilistic sample was used for convenience, consisting of 140 Portuguese musicians, practitioners of plucked string instruments in three cities of Portugal.

The established inclusion criteria were: to be professional musicians; aged between 18 and 55 years old; plucked string instruments practitioners (electric guitar, acoustic guitar and bass guitar). The exclusion criteria were to exercise a secondary profession (amateur musicians); ages under 18 years and over 55 years old; practitioners of instruments other than, existence of MI associated with secondary diseases or recent traumatic lesions.

Data collection took place between November 2014 and March 2015 and the instrument used included demographic characteristics, health status / life styles, instrumental practice and the Nordic Musculoskeletal Questionnaire, created by Kuorinka et al (1987) , adapted and validated for the Portuguese language by Mesquita et al. (2010), according to Guidelines European Research group on Health Outcomes (ERGHO). It is a self-filling instrument that allows to investigate the musculoskeletal disorders, constituted by questions of binary choice (Yes / No). It has questions applied to nine anatomical regions (neck, thoracic region, lumbar region, shoulders, elbows, wrists / hands, hips / thighs, knees, ankles / feet), including a body diagram that facilitates the identification of anatomical regions. The Portuguese version of the Nordic Musculoskeletal Standardized Questionnaire reveals good reliability coefficients, presenting a strong to very strong correlation (between 0.8 and 1) according to the Kappa correlation coefficient and a good internal consistency (0.855) according to the coefficient Kuder-Richarson.

All procedures were carried out according to a strict ethical conduct (with the completion of informed consent, guaranteeing the anonymity and confidentiality of the data collected respecting the principles of the Helsinki declaration. Statistical treatment was carried out through the program Statistical Package Social Science version 20.0 for Microsoft Windows and Word, and was processed using descriptive statistics and inferential statistics.

Results

The study sample is composed of 140 musicians, being 95.7% male and 4.3% female. The ages ranged from 18 to 55 years old, with a mean age of about 29 years old ($Dp \pm 8,749$) and a dispersion high around the mean ($CV = 30.8$).

The majority of the sample (71.4%) is single / divorced, as an academic qualification 45.7% have the 12th year of schooling, 40.0% have a bachelor's degree and only 14.3% have the master's degree. They live entirely in urban areas, especially in large cities (Lisbon and Porto).

On average, respondents presented a body mass index (BMI) of 24.23 kg / m² (considered a healthy weight), with values ranging from a minimum of 15 kg / m² to a maximum of 38 kg / m², ($Dp \pm 3,584$ $CV = 14.8\%$). The female gender had a lower BMI mean value compared to the male gender, however, without significant statistical evidence ($p > 0.05$).

Regarding the practice of physical activity, we found that 15.7% do not practice, 72.9% only do it once a week and only 11.4% practice daily. We also saw that 51.4% of musicians had smoking habits, consuming up to 10 cigarettes per day (80.6%). Regarding the consumption of alcoholic beverages, 55.7% admit that they drink alcoholic beverages at times, 34.3% rarely and 4.3% admit to consume daily. Coffee consumption is a daily practice for the great majority of musicians (87.1%).

From a health perspective, the majority (88.6%) consider themselves healthy, but 11.4% report having diseases ranging from psoriatic arthritis, asthmatic bronchitis, diabetes, chronic migraine, and Meniere syndrome. Only 21.4% of those who have these illnesses take daily medication. The symptoms that refer to the instrumental practice are a large number of respondents (70.0%), with a higher proportion of pain (51.4%), muscle fatigue (32.9%), paresthesia (14.3%) and tremor (2.9%). To control the symptoms, physicians preferentially (31.4%) to physiotherapists (28.4%) and osteopaths (14.3%).

The history of instrumental practice shows that on average they are musicians for about 10 years ($Dp \pm 8,371$), they are mostly dexters (92.9%) and play the three types of guitar: electric (27.2%) acoustic (25.7%) and bass guitar (35.7%). The size of the instrument used varies between 70 cm and 184 cm, with an average value of 116.49 cm (± 20.508) and for the weight, for 88.6% of the respondents is over 3 kg.

They spend an average of 14.49 hours (± 12.449) a week to be tested, with values ranging from 2 hours to 74 hours. It was found that 91.4% of the musicians used a strap or other type of guitar support during their practice, adopting 54.3% of the sitting position and 45.7% of the standing position. They perform on average 33 shows per year, but only 40.0% take breaks during instrumental practice. The most frequent warm-up exercises are joint mobilization (23.5%), stretching (27.6%) and muscle relaxation (11.8%).

Concerning our central variable (prevalence of MI), we observed that 70.0% of the studied musicians reported musculoskeletal disorders that manifested through discomfort, pain and numbness (in the last 12 months), mainly in the wrists / hands (68.6%), shoulders (54.3%), neck and lower back (44.3%). With lower relief they present the ankles / feet (12.9%), the thighs / hip (11.4%) and the elbows (10%). As to the quantification of pain, we found that it was moderate for most of the respondents, being located essentially in the wrists / hands (24.3%), lumbar region (14.2%) and neck / shoulders (11.4%). On the other hand, severe pain is more frequent in wrists / hands (7.1%), shoulders (4.3%) in the elbows and lower back (3.1%).

The results of the inferential analysis show that the LME in the pinched musicians of our sample (with statistically significant differences) were more frequent in older musicians ($p = 0.032$), in those with higher Body Mass Indexes ($p = 0.036$), those who consumed alcoholic beverages ($p = 0.0427$) and did not practice physical activity ($p = 0.036$), those who had excessive performances ($p = 0.034$), and less pauses ($p = 0.041$).

Conversely, the remaining sociodemographic variables, health, life styles and instrumental practices, were not associated ($p > 0.05$) with the musculoskeletal injuries of these individuals.

Conclusion

MI are an important health problem in Portugal, since they affect the working age population, contributing to an increase in health disturbances, absenteeism at work, a decrease in workers' productivity and quality of life.

The profession of musician is associated with a complex motor neuro activity, with frequent overload of the musculoskeletal system, which makes them susceptible to the appearance and development of high rates of MI (70.0%) as we can see. In this context, MI in professional musicians presents as a complex problem, which can be explained by the multifactorial nature of the associated risk factors and the relationship between them that can also be verified in this study.

The assertion that musicians constitute one of the main professional groups at risk of occupational disease, points out the lack of awareness on the part of the musicians and little demand for the information to preserve the necessary conditions for the professional exercise. Although there have been several advances in this area, (in Portugal) we have seen a slow course in the prevention sector.

In this way, it is very important to deepen knowledge about the relationship between musical practice and the emergence of MI, so that preventive measures can be instituted. Portuguese rehabilitation nursing presents itself in this context as a professional group endowed with technical and scientific knowledge and acting capacities with professional musicians, in the sense of implementing programs that involve evaluation, intervention and continuous prevention.

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References

1. Antunes, A. & Moraes, C., (2012). *Desordens musculoesqueléticas em violinistas e violistas profissionais: Revisão Sistemática*. Brasil: Acta Ortopédica, 20(1), p. 453-457.
2. Batista, J. C., Cruz, I. R., Deusdará, F.F., Silva, F. C., Soares, W. D. (2012). Músicos e o Superuso do Músculo Esquelético. *Coleção de Pesquisa em Educação Física*, v.11, n.3, p.133-142.
3. Carnide M. F., Lopes M. F. & Miranda L.C. (2016). Prevalência De Lesões músculo-esqueléticas relacionadas com o Trabalho: Dimensão do problema em Portugal. Sociedade Portuguesa de Medicina do Trabalho. Lisboa.
4. Frank, A., & von Mühlen, C.(2007). Queixas Músculo-esqueléticas em Músicos: Prevalência e Fatores de Risco. *Revista Brasileira de Reumatologia* , 47 (3), 188-196.
5. Gonçalves, A. (2013). *A consciência corporal na prevenção de lesões em instrumentistas*. Universidade Estadual de Santa Catarina (UDESC) Arquivos Catarinenses de medicina. Brasil.
6. Kienen, M. L., Marques, D.& Woellner, S. S. (2013). Distonia focal da mão em músicos: implicações para a reabilitação. Arquivos Catarinenses de medicina, 42 (3), p.82-88.
7. Kuorinka, I., Jonsson, B., Kilbom, A., Vinterberg, H., Biering-Sorensen, F., Andersson, G., et al. (1987) Standardised Nordic Questionnaires for the Analysis of Musculoskeletal Symptoms. *Applied Ergonomics* , 18(3), 233-237.
8. Leite, E., Serranheira, F. & Sousa-Uva, A. (2013). Trabalho e Saúde/Doença: o desafio sistemático da prevenção dos riscos profissionais e o esquecimento reiterado da promoção da saúde. *Revista Brasileira de Medicina do Trabalho*, 11: 1. 43-49.
9. Lima, S. R. A. (2012). *A Cadeira Ergonómica Na Prática e Ensino do Violoncelo. Dissertação de Mestrado em Ensino da Música*. Universidade de Aveiro.
10. Mesquita, C. C., Ribeiro, J. S., Moreira, P. (2014). Portuguese version of the Standardized Nordic Musculoskeletal Questionnaire: cross cultural and reliability. *Journal of Public Health Springer*, p.461-466.
11. Santos, P. M., Martins, R. & Serranheira, F. (2016). Prevalência da Dor Lombar em Enfermeiros em Contexto Hospitalar. *Gestão e Desenvolvimento*, (24), 161-171.
12. Teixeira, C., Merino, E. A. D., Lopes, L. F. D. (2013). *Superuso musculoesquelético e fatores associados em músicos de orquestra*. Motriz, Rio Claro, V. 16, nº 1, p. 17-27.