

Prevalence of musculoskeletal disorders among instrumental musicians at a Center for Performing arts in South Africa

Adedayo Tunde Ajidahun and Julie Phillips

Abstract

The prevalence of playing-related musculoskeletal disorders (PRMD) is high in various countries of the world, but there is a paucity of literature in Africa. The aim of this study was to determine the prevalence of PRMDs among instrumentalists in South Africa, with specific objectives in determining the distribution, symptoms, and pain severity. The self-administered Nordic Musculoskeletal Questionnaire was used to collect information from the participants regarding the lifetime and current prevalence and the distribution of PRMD symptoms. A visual analog scale was used to collect information on the severity of pain, while the questionnaire designed by Blackie, Stone, and Tiernan (1999) was used to collect information on the symptoms of the PRMDs. Twenty participants took part in this study, and the respondents reported a lifetime prevalence (over a period of 12 months) of PRMDs as 14 out of 17 and the current prevalence (in the last 7 days) as 4. Pain severity was mostly mild, and the most affected region was in the upper extremities, with the shoulders being the most affected. Tightening and soreness were the most reported symptom of PRMDs. The prevalence of PRMDs among this population was high, although severity was mild, with the upper extremities being the most affected area. *Med Probl Perform Art* 2013; 28(2): 96–99.

Musculoskeletal disorders peculiar to instrumentalists have been found to be prevalent in various continents^{1,2} in the world. These disorders are usually diagnosed as cumulative trauma disorders or repetitive strain injuries.^{3,4} However, it is of note that the presence of these disorders affects the performance and playing of musical instruments.⁵ Tingling, pain, and loss of function have all been identified as symptoms of PRMDs,⁶ although pain is usually the most common complaint.⁷ The type of instrument played is a risk factor for injury; various studies have shown different results regarding piano versus string instruments.^{8,9}

It is worthy to note that with all the research emanating from this discipline, little or nothing is recorded from Africa. The aim of this study is to determine the prevalence, pattern, distribution, and severity of PRMDs among instrumental musicians at a Center for Performing Arts in South Africa.

Methodology

This study used a cross-sectional design utilizing quantitative research methods to investigate the prevalence, severity, and distribution of PRMDs among instrumentalists. This study design is best suited for this study because its data collection requires only one contact with the study population regarding the outlined objectives of the study—to determine prevalence, severity and distribution.¹⁰

Population and Sampling

Music students and teachers at the Center for Performing Arts, University of Western Cape, were the research population. All music students ($n=40$) and teachers ($n=8$) were approached to participate in this study. Participants were either playing, learning to play, or teaching how to play a particular instrument at the Centre for the Performing Arts.

Research Instruments

A self-administered questionnaire was used to collect data; the standard Nordic questionnaire was used to determine the prevalence and distribution of PRMDs,¹¹ while a visual analogue scale (VAS) was used to determine the pain severity of the complaints. A questionnaire designed by Blackie, Stone, and Tiernan⁶ was used to determine the symptoms of the musculoskeletal disorder. The Nordic Musculoskeletal Questionnaire has been tested and retested for reliability, and it is widely used in determining the prevalence and distribution of workplace musculoskeletal disorders.¹² Sensitivity and specificity have been found to be highly repeatable with kappa score that ranges from 0.63–0.90.¹³ The VAS's reliability in the measurement of pain is 0.97 (intraclass correlation coefficient, ICC); 90% of pain ratings can be reproduced within 9 mm.¹⁴

Procedure

Ethical approval was obtained from the Ethics Senate Research Grants and Study Leave Committee at the University of the Western Cape. Permission was obtained from the Center of the Performing Arts to conduct the research on their premises and also to approach their students and staff. The objectives and importance of study were then clearly explained to each of the participants, one after the other, and those willing to participate were recruited. Freedom to withdraw, confidentiality of information, and anonymity were also clearly explained, after which the participants were asked to sign an informed and written consent form. Data were collected using the questionnaires in English as soon as permission was granted by the Senate Research Grants and Study Leave Committee at the University of the Western Cape and by the Director of the Center of Performing Art. Instruments were administered at the Center of Performing Arts.

Music teachers and students learning or playing a musical instrument were identified by the Secretary of the Center of Performing Arts. Distribution and collection of questionnaires was conducted on site. Forty-eight questionnaires were distributed to both students and teachers in the department. Follow-up was done with calls and visits, and eventually only 20 questionnaires were returned, yielding a response rate of 41.67%. The results were stored on a SPSS spreadsheet for analysis.

Data Analysis

Analysis was done using the Statistical Package for Social Sciences (SPSS). The questionnaires were translated into statistical figures by strictly adhering to the rules and guidelines of the questionnaires. A 100-mm ruler was used to measure the pain severity of participants on the VAS to the nearest one decimal point in millimeters. Descriptive statistics of mean and standard deviation (SD) of age, average practice hours per week, years of experience, and pain were analyzed. Frequencies of prevalence, distribution, symptoms of musculoskeletal disorders, pain severity, gender, and practice habits were analyzed.

RESULTS

Demographics: The average age of the participants was 19.7 yrs, and the majority of the participants were females ($n=16$). The average years of playing experience was 5.75, with the lowest being 6 months (Table 1). Half of the participants ($n=10$, 50%) played a string instrument, while 7 (35%) played the piano and 3 (15%) played a wind instrument (Table 1).

Prevalence: Only 17 participants responded to the questions in this section. Fourteen of 17 respondents (82.35%) reported a musculoskeletal disorder within the last 12 months, while 4 (23.5%) reported a musculoskeletal disorder within the last 7 days (Table 2).

Severity: A total of 18 participants responded to this section. Pain severity was reported as mild by 13 of 18 (72.2%) of the respondents. One of the respondents reported no history of pain. Categorization into mild, moderate, and severe was done as described by Kelly¹⁵ (Table 3).

Distribution: The neck, shoulder, right elbow, upper back, and lower back were the most common sites of discomfort or pain. The lower extremities were also reported as being sites of musculoskeletal disorder, except that no one reported of any symptom in the ankles/feet (Table 4).

Symptoms: Thirteen of 19 (68.42%) respondents reported symptoms of their musculoskeletal disorder as being tightening, closely followed by soreness by 11 (57.89%). None of the respondents reported symptoms as being sharp, diffuse, chronic, or radiating (Table 5).

DISCUSSION

Four major areas of health concern among musicians have been identified and addressed in the literature: neuromusculoskeletal health, which involves the physical body such as nerve entrapments and pain in the muscle and tendon units; vocal health; hearing conservation, which involves dealing with noise; and psychological health, dealing with issues such as performance anxiety.¹⁶ However, the focus of this study was based on just one of the identified health issues of the musician, neuromusculoskeletal health, which includes the playing related musculoskeletal disorder.

Musculoskeletal disorders in instrumental musicians have been reported to be a problem in Europe, America, and Australia, and it is important to know the severity and prevalence of PRMDs in Africa, including South Africa. The results of this study show a prevalence of PRMDs among instrumental musicians in South Africa, with 14 out of 17 respondents reporting a musculoskeletal disorder in the last 12 months (Table 2). This is consistent with the prevalence of PRMDs among instrumental musicians reported in earlier studies— 77% by Sandell et al. (2009),¹⁷ 83.6% by Abréu-Ramos and Micheo (2007),¹ 54% by Buckley and Manchester (2006),² and 87.7% by Guptill et al. (2000)¹⁸—and with one of a similar sample size (93% by

Blackie et al., 1999).⁶ This is similar to the result of a systematic review conducted earlier, which shows a point prevalence rate of 39–87% in adult musicians and 32–64% in secondary school students (Zaza, 1998).¹⁹

The upper extremities were largely affected, with the shoulders, wrists, and hands being the most commonly cited problem areas. Closely following were the neck and upper back. The lower limbs were the least affected body region (Table 4). Evidence showed that the upper extremities, neck, and back were the most common site of discomfort in instrumental musicians, and this could be due to the work pattern or type of instrument played.^{1,2,6,8,20}

TABLE 1. Demographic Properties of the Participants*

	Mean	SD	Minimum	Maximum
Age (n=20)	19.70	12.363	10	52
Yrs of experience (n=16)	5.75	10.291	0.5	43
Playing hrs/wk (n=20)	6.08	3.310	2	14

*Males = 4, females = 16.

TABLE 2. Prevalence of PRMDs Among Participants

	No. of Respondents
Lifetime (in the last 12 months) (n = 17)	14
Current (in the last 7 days) (n = 17)	4

TABLE 3. Severity of PRMDs among Participants

	Mild	Moderate	Severe
No. of respondents (n = 18)	13	3	1

TABLE 4. Distribution of PRMDs

Have you had pain in the last 12 months in:	
Neck	5 (n* = 17)
Right shoulder	2 (n = 17)
Left shoulder	2 (n = 17)
Both shoulders	6 (n = 17)
Right elbow	4 (n = 17)
Left elbow	0 (n = 17)
Both elbows	1 (n = 17)
Right wrists/hands	0 (n = 17)
Left wrists/hands	3 (n = 17)
Both wrists/hands	2 (n = 17)
Upper back	5 (n = 16)
Lower back	4 (n = 17)
Hips/thighs	2 (n = 16)
Knees	3 (n = 16)
Ankles/feet	0 (n = 16)

*n indicates the total number who responded to the question.

TABLE 5. Symptoms of Musculoskeletal Disorders (n=19)

	No. of Respondents
Is your discomfort or pain:	
Tightening	13
Fatigue	3
Pins and needles	4
Burning	4
Tingling	2
Weakness	4
Soreness	11
Cramps	5
Aching	5
Dull	2
Sharp	0
Diffuse	0
Localized	1
Numb	7
Chronic	0
Radiating	0

Among the participants of this study, the strings (violins) were the most commonly played instrument (50% of participants), followed by percussion (piano) (35%). This is similar to other studies which have shown that the shoulder is the most common site of discomfort for upper string instrumentalists¹ and that the wrists and hands are the most common site of discomfort for pianists.²¹ This may account for the higher distribution of symptoms in the shoulder, wrists, and hands. Non-instrument-specific pain or discomfort at the neck, back, and shoulder is usually a result of bad posture and positioning.²²

Tightening and soreness are the most common symptoms of PRMDs. Also, less than half of the participants reported numbness, cramps, aching, pins and needles, burning, weakness, fatigue, tingling, dull, and localized pain (Table 5). This corresponds to results of a similar study carried out by Blackie et al.⁶ of piano students in a university, which reported that tightening, aching, soreness, and localized pain were the most common symptoms of PRMDs affecting participants; numbness and chronic symptoms were the least reported. Pain and tenderness, common symptoms of over-use syndrome, suggest that the majority of the participants in this study could have been suffering from overuse syndrome—tightening and soreness occur with repetitive activity over a variable course of time.²³ Pain severity was categorized as mild (≤ 30 mm), moderate (31–69 mm), or severe (≥ 70 mm).^{15,24} The majority of participants reported pain severity as being mild (Table 3).

Conclusion and Recommendations

The presence of PRMDs among instrumentalists is a thing of concern, and various prevention strategies have been implemented in various parts of the developed world. Further studies should be carried out in various parts of Africa to establish the prevalence of PRMDs, especially with a larger population, and also to identify risk factors that may be peculiar to this society, especially with respect to the type of musical instruments unique to the African community.

References

1. Abréu-Ramos A, Micheo W. Lifetime prevalence of upper-body musculoskeletal problems in a professional-level symphony orchestra: age, gender and instrument specific results. *Med Probl Perform Art* 2007; 22(3):97–104.
2. Buckley T, Manchester R. Overuse injuries among non-classical recreational instrumentalists. *Med Probl Perform Art* 2006;21:80–87.
3. Sadeghi S, Kazemi B, Shooshtari SM. A high prevalence of cumulative trauma disorders in Iranian instrumentalists. *BMC Musculoskelet Disord* 2004;5(35):1–5.
4. Fry H. Prevalence of overuse (injury) syndrome in Australian music schools. *Br J Ind Med* 1987;44:35–40.
5. Zaza C, Charles C, Muszynski A. The meaning of playing-related musculoskeletal disorders to classical musicians. *Soc Sci Med* 1998;47(12): 2013–2023.
6. Blackie H, Stone R, Tiernan A. An investigation of injury prevention among university piano students. *Med Probl Perform Art* 1999; 14(3):141–149.
7. Antonopoulo, MD, Alegaki AK, Hadjipavlou AG, Lionis CD. Studying the association between musculoskeletal disorders, quality of life and mental health: a primary care pilot study in rural Crete, Greece. *BMC Musculoskelet Disord* 2009;10:143 doi: 10. 1186/1471-2474-10-143.
8. Kaufman-Cohen Y, Ratzon N. Correlation between risk factors and musculoskeletal disorders among classical musicians. *J Occup Med* 2011;61(2):90–95.
9. Davies J, Manginon S. Predictor of pain and other musculoskeletal symptoms among professional instrumental musicians: elucidating specific effect. *Med Probl Perform Art* 2002;17:155–168.
10. Kumar R. *Research Methodology. A Step-By-Step Guide for Beginners*. Thousand Oaks, CA: Sage Publications; 2005.
11. Kuorinka I, Jonsson B, Kilbom A, et al. Standardised Nordic questionnaires for the analysis of musculoskeletal symptoms. *Appl Ergon* 1987;18(3):233–237.
12. Dickinson C, Champion A, Foster S, et al. Questionnaire development: an examination of the Nordic Musculoskeletal questionnaire. *Appl Ergon* 1992;23(3):197–201.
13. Palmer K, Smith G, Kellingray S, Cooper C. Repeatability and validity of an upper limb and neck discomfort questionnaire: the utility of the standardized Nordic questionnaire. *Occup Med* 1999;49:171–175.
14. Bijur PE, Silver W, Gallagher EJ. Reliability of the visual analog scale for measurement of acute pain. *Acad Emerg Med* 2001;8 (12):1153–7.
15. Kelly A. The minimum clinically significant difference in visual analogue scale pain score does not differ with pain severity. *Emerg Med J* 2001;18:205–207.
16. Palac J. Promoting musical health, enhancing music performance: wellness for music students. *Music Educ J* 2008;94(3):18–22.
17. Sandell C, Frykman M, Chesky K, Fjellman-Wiklund A. Playing-related musculoskeletal disorders and stress-related health problems among percussionists. *Med Probl Perform Art* 2009;24(4):175–180.
18. Guptill C, Zaza C, Paul S. An occupational study of physical playing-related injuries in college music students. *Med Probl Perform Art* 2000; 15(2):86–90.

19. Zaza C. Playing-related musculoskeletal disorders in musicians: a systematic review of incidence and prevalence. *Can Med Assoc J* 1998; 158(8):1019–25.
20. Yeung E, Winnie C, Pan F, et al. A survey of playing-related musculoskeletal disorders among professional orchestral musicians in Hong Kong. *Med Probl Perform Art* 1999;14(1):43–47.
21. Pak C, Chesky K. Prevalence of hand, finger, and wrist musculoskeletal problems in keyboard instrumentalists: the University of North Texas musician. *Med Probl Perform Art* 2001;16(1):17.
22. Williamson A, Thompson S. Awareness and incidence of health problems among conservatoire students. *Psychol Mus* 2006;34(4):411–430.
23. Hartmann J. Overuse syndrome. In Aghababian R (ed): *Essentials of Emergency Medicine*, 2nd ed. Sudbury: Jones & Bartlett Learning; 2011: p356.
24. Collins S, Moore R, McQuay H. The visual analogue pain intensity scale: what is moderate pain in millimetres? *Pain* 1997;72:95–7. June 2013