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Musculoskeletal Disorders Among Iranian Instrumentalists

Amir Houshang Mehrparvar, MD, Mehrdad Mostaghaci, MD, and Raman Fakhr Gerami, BS

Musicians as an occupational group are exposed to various ergonomic exposures which may lead to musculoskeletal problems. In this study we assessed the frequency of musculoskeletal disorders (MSDs) among Iranian instrumentalists (using traditional Iranian and western instruments). **METHODS:** In a cross-sectional study we assessed the frequency of MSDs in 356 Iranian instrumentalists by standardized Nordic musculoskeletal questionnaire according to age group, type of instrument, duration of playing, and playing/sitting position. Data were analyzed using chi-squared, *t*-test and ANOVA. **RESULTS:** Overall, 158 of 356 subjects (44.4%) experienced MSDs, mostly with mild or moderate symptoms. Frequency of MSDs was significantly higher in females but it was not significantly related to body mass index, duration of employment, and duration of playing or teaching. **CONCLUSION:** Our study showed a high frequency of MSDs among Iranian instrumentalists, so paying attention to the ergonomic exposures of instrumentalists as an occupational group is important. To the best of our knowledge, this is the first study on players of different Iranian instruments to have considered ergonomic risk factors. *Med Probl Perform Art* 2012; 27(4):193–196.

A substantial body of evidence shows the association between musculoskeletal disorders (MSDs) and such occupational physical factors as repetitive movements, awkward or static posture, contact stress and so on, which cause work-related MSDs.^{1,2} Annually, approximately 1 million people take time away from work because of repetitive motion or overexertion to treat or recover from musculoskeletal pain or functional loss.^{3,4}

Many occupations such as office work, packaging, and many industrial jobs have risk factors for MSDs. Music-making is mostly considered as a recreational issue, and it is expected that musicians are healthy individuals.⁵ But if we consider music as an occupation, musicians may suffer from certain diseases, especially MSDs, which are known as playing-related MSDs (PRMDs) comparable to other occupational groups.⁴⁻⁶ There is now recognition that musicians suffer health problems derived from their occupation and lifestyle,⁵ but most musicians are unaware of the potential harm associated with overuse and misuse.⁷

It is believed that PRMDs are observed among professional and non-professional players.⁸ Some extrinsic factors may affect the onset of PRMDs, such as instrument type,

technique, awkward posture, contact stress, static posture, and long hours of practice,^{9,10} as well as some intrinsic factors such as size, strength, and tone of the muscles in the hand and wrist, flexibility of the joints and fingers, and presence of any underlying musculoskeletal disease.^{4,8,10}

PRMDs mostly affect the upper extremities, the neck, and back.³⁻⁵ The most common disorders in this category include nerve entrapments, tendinitis, bursitis, and muscle strains.¹¹ Many studies have been conducted on PRMDs in different parts of the world.^{6-8,11-14} Fjellman-Wiklund et al. showed that more than 50% of the female music teachers had suffered from pain in the neck and shoulders during the last 12 months.¹⁵ Paarup et al. reported that 97% of the women and 83% of the men in symphony orchestras experienced symptoms in at least one of nine anatomic regions during the previous year.¹³ Kenny et al. found that only 27% of the music students in their study reported no current pain from a PRMD and 11.3% reported suffering daily or almost daily pain from a PRMD.¹⁶

To the best of our knowledge, there is only one study about the prevalence of MSDs among Iranian musicians, which has assessed only the *setar* and *daf* players.¹⁵ In this study, we aimed to assess the frequency of MSDs among instrumentalists of different musical instruments, especially Iranian instruments.

METHODS

In a cross-sectional study, 356 Iranian instrumentalists playing different Iranian and western musical instruments entered the study. Subjects were randomly selected from the members of the Iranian Music Association. This is a nongovernmental organization in which most Iranian musicians are its members. Their musculoskeletal complaints were assessed by standardized Nordic musculoskeletal questionnaire (NMQ), which was modified to be used for instrumentalists.¹⁷

Age, gender, sitting/playing position, duration of playing (total duration and daily playing time), and non-occupational risk factors for inducing work-related MSDs were assessed by another questionnaire. Then, the prevalence of musculoskeletal problems was obtained by NMQ. From 452 instrumentalists who received the questionnaire, 356 subjects answered it, for a response rate of 78.76%.

The frequency of musculoskeletal problems was measured according to the type of instrument, gender, and duration of playing. Iranian instrumentalists play their instrument in different positions (sitting on floor, sitting on a chair with and without a backrest or stool), so we assessed the frequency of MSDs according to their major posture.

Dr. Mehrparvar is Associate Professor and Dr. Mostaghaci is Resident in the Occupational Medicine Department, Shahid Sadoughi University of Medical Sciences, Yazd, Iran; and Mr. Gerami is tar and setar player, Iranian Music Association, Tehran, Iran.

Address correspondence to: Dr. Mehrdad Mostaghaci, Occupational Medicine Clinic, Shahid Rahnamoun Hospital, Shahid Sadoughi University of Medical Sciences, Yazd, Iran. mehrdadmostaghaci@gmail.com.



FIGURE 1. Instrumentalists playing the *daf* (A), *tombak* (B), *setar* (C), and *tar* (D).

We categorized the instruments in six major categories according to their similarity:

1. *Plucked strings*: 184 subjects (51.7%) played different plucked string instruments (with or without plectrum) including *tar*, *setar*, *divan*, *tanbour*, *barbat*, *guitar*, *ghopouz*, *balaban*, and *robab*. Figure 1 shows two instrumentalists playing the *tar* and *setar* (bottom row).
2. *Percussion*: 66 subjects (18.6%) played different percussion instruments including *daf*, *tombak*, and others. Figure 1 shows two instrumentalists playing the *daf* and *tombak* (top row).
3. *Keyboard*: 28 subjects (7.8%) played different keyboard instruments including piano, accordion, and organ.
4. *Bowed*: 22 subjects (6.2%) played different fiddlestick instruments including violin and *kamancheh*.
5. *Santur*: 38 subjects (10.6%) played *santur*.
6. *Wind*: 18 subjects (5.1%) played different wind instruments including *ney*, *sorna*, flute, and trombone.

Data were analyzed by SPSS (ver. 19) using chi-squared, *t*-test, and ANOVA. Informed consent was obtained from all participants. The study was approved by the ethics committee of Shahid Sadoughi University of Medical Sciences. Level of significance was set at 0.05.

RESULTS

In this study we assessed 356 instrumentalists. Table 1 shows their demographic characteristics.

Among all participants, 296 (82.02%) subjects were males and 60 (17.98%) were females. Right-handedness was observed in 320 (89.80%) and the remainder (10.20%) were left-handed. Most of the subjects (70.8%) played intermittently during a day, 25.30% played continuously, and 14 subjects did not clearly answer to this question. The most fre-

quent sitting/playing position was sitting on a chair with a backrest (56.19%); other positions included sitting on the floor (29.77%) or on a chair without a backrest (4.49%). Other players (9.55%) played their instrument in various positions. Among all participants, 156 subjects (43.8%) exercised regularly, and others (56.2%) did not have a regular exercise program.

Table 2 shows the cumulative prevalence of MSDs during last 12 months among all participants. Overall, 158 subjects (44.4%) experienced MSDs. Among these persons, 66 subjects experienced mild symptoms, 66 others experienced moderate symptoms, 12 persons experienced severe symptoms, and 14 subjects didn't answer to this question. Forty-five persons (12.6%) had to leave playing their instrument for a period of time due to MSDs. The mean period of abstinence from playing during the last 12 months was 5.65 (± 8.65) days. Figure 2 shows the cumulative prevalence of MSDs and leaving playing the instruments due to MSDs in different parts of the body.

The prevalence of MSDs was not significantly related to body mass index (BMI), duration of employment, and duration of playing or teaching ($p = 0.90, 0.95, 0.76,$ and 0.94 , respectively). The prevalence of MSDs was significantly lower in males (odds ratio [OR] = 0.41, 95% confidence interval [CI] = 0.22–0.76, $p = 0.005$), but it was not significantly different between right-handed and left-handed instrumentalists ($p = 0.74$). Regular exercise did not significantly affect MSDs ($p = 0.21$).

We divided the subjects into two groups according to age (≤ 33 yrs, > 33 yrs). MSDs were more frequent in the first group (57.7% vs 42.7%) and the difference was statistically significant (OR = 1.8, 95%CI = 1.2–2.8, $p = 0.012$). However, duration of playing was not significantly associated with the

TABLE 1. Demographic Characteristics of the Subjects

	Minimum	Maximum	Mean	SD
Age (yrs)	16	69	34.58	10.26
Weight (kg)	42	120	74.60	13.33
Height (cm)	150	197	173.78	8.26
BMI (kg/m ²)	17.30	35.06	24.67	3.79
Employment duration (yrs)	2	55	16.59	9.19
Playing time per day (hrs)	1	12	4.22	2.43
Playing days per week (day)	2	7	5.74	1.55
Practice time per day (hrs)	0.5	10	2.85	1.92
Teaching time per day (hrs)	0.5	10	2.46	1.91

prevalence of MSDs (OR = 1.3, 95%CI = 0.83–2.04, $p = 0.3$). MSDs were significantly associated with the type of instrument ($p < 0.005$), so that those playing fiddlestick (bowed) instruments showed the highest frequency of MSDs. Figure 3 shows the cumulative prevalence of MSDs according to the instrument type.

Sitting position significantly affected the cumulative prevalence of MSDs, so that the worst position was sitting in various positions (61.5%) and the best one was sitting on a chair without a backrest (49.4%), and the difference was statistically significant ($p < 0.001$).

We compared the cumulative prevalence of MSDs among those playing Iranian traditional music instruments vs western instruments, and the prevalence was significantly higher among traditional instrumentalists (OR = 0.42, 95%CI = 0.19–0.91, $p = 0.039$).

DISCUSSION

Some ergonomic exposures in the workplace, such as repetitive movements, contact stress, and awkward postures, may contribute to MSDs. Instrumentalists as an occupational group are exposed to most of these ergonomic exposures. So in this study we assessed musculoskeletal problems in this occupational group.

We found a high prevalence of MSDs among Iranian instrumentalists (44.4%). Most studies have shown a high prevalence of MSDs or PRMDs among instrumentalists—i.e., 33% in Kenny et al.,¹⁶ 53% in Sadeghi et al.,¹¹ 38.4% in Bruno et al.,¹⁸ 73% in Lockwood et al.⁹—although these studies have evaluated different populations of players and we could not compare them.

TABLE 2. Cumulative Prevalence of MSDs During Last 12 Months

Body Area	No.	%
Neck	52	14.1
Shoulder	46	12.9
Elbow	10	2.8
Wrist/hand	54	15.2
Back	52	14.1
Low back	66	18.5
Buttock/thigh	26	7.3

The most important cause of MSDs is repetitive movements and a combination of duration and intensity of activity, which is clearly observed among instrumentalists.¹⁰ The prevalence of MSDs was significantly higher in females, which was consistent with most other studies,^{9,19,20} although Bruno et al. did not find this difference.¹⁸

The prevalence of MSDs was related to the type of instrument, which was consistent with some other studies.^{9,21} Because the position of playing is completely different for different instruments, it is expected that instrument type affects the prevalence of MSDs. We found a significant difference in the prevalence of MSDs regarding the sitting position, so that sitting on a chair without a backrest was the position with the lowest prevalence of MSDs. In the present study fiddlestick (bowed) instrument players showed the most frequent symptoms, although in the study of Lockwood et al., subjects playing string instruments showed the most frequent PRMDs.⁹ The difference is probably due to this fact that in our study, most of the string instruments were *tar* and *setar* players which cause a less awkward posture than guitar. In our study most subjects reported mild to moderate symptoms which was consistent with some other studies.^{9,18}

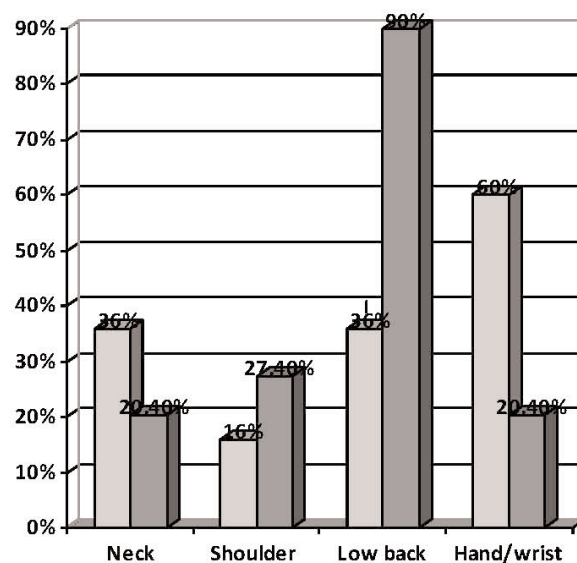


FIGURE 2. Cumulative prevalence of MSDs (light bars) and leaving playing the instrument (dark bars) due to MSDs in different parts of body.

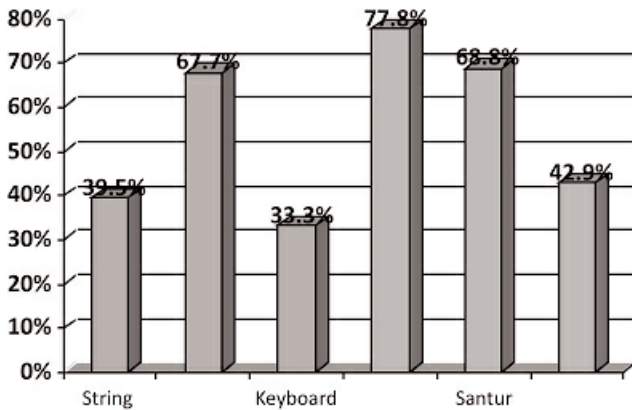


FIGURE 3. Cumulative prevalence of MSDs according to the instrument type.

In the present study, MSDs were associated with age, so that younger players were more frequently affected. This result is due to the number of hours of playing, which was significantly higher in the younger group (5.25 vs 3.81 hrs, $p = 0.002$, 95%CI = 0.5–2.4). This result was inconsistent with Bruno et al.'s study¹⁸ in which older subjects had a higher prevalence of MSDs because of a higher level of playing in the older instrumentalists. Hand/wrist was the most common site of MSDs in this study, which was in agreement with some other studies.^{10,11}

Our study had some limitations. It is possible that some of the instrumentalists had stopped playing before our study (healthy worker effect). We evaluated instrumentalists who played different kinds of musical instruments with different playing risk factors, so it was impossible to precisely relate the MSDs with their playing method. About 22% of the instrumentalists did not return the questionnaire, so we may have underestimated or overestimated the prevalence of MSDs. Some players played more than one instrument and we considered their main instrument in our analysis.

In conclusion, our study showed a high prevalence of MSDs among Iranian instrumentalists, so paying attention to the ergonomic exposures of instrumentalists as an occupational group is important. Further studies with larger sample sizes are recommended to more accurately compare MSDs among instrumentalists of different instruments.

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