NEUROMUSCULOSKELETAL PROBLEMS OF UPPER EXTREMITIES IN MUSICIANS-A LITERATURE REVIEW

JASPREEET KAUR¹, SANDEEP SINGH²

¹MPT Student (Neurology), ²Assistant Professor in Physiotherapy, Department of Physiotherapy, Punjabi University, Patiala, India.
Corresponding Author: Jaspreet Kaur; Email: preet52778@gmail.com

ABSTRACT

Background & Objectives
Music, though, considered as a safe occupation but like other professions musicians too can experience variety of health problems due to high physical and psychological demands inherent to their profession. Musicians suffer different set of work related musculoskeletal problems which have been designated with special term known as Playing Related Musculoskeletal Disorders (PRMDs) which include range of problems such as tendinitis, overuse syndrome, focal dystonia and deQuervain tenosynovitis, muscle tendon syndrome, hypermobility syndrome, compressive neuropathy. The purpose of present study was to carry out review of existing literature about the injury profile, types and pattern of injuries sustained by musicians.

Methodology - An English language literature search on Medline, PubMed and Google Scholar was carried out by typing following words and sentences- neuromusculoskeletal problems in musicians, soft tissue injuries in musicians, overuse injuries in musicians, medical problems in musician.

Results - Total 18 studies could be located and retrieved from different search engines. 14 studies were included in literature review.

Conclusion - Literature review suggests musicians sustain various neuromusculoskeletal injuries during their career which have been attributed to poor posture, long hours of practice, excessive force, static loading of instruments.

There is need to generate awareness amongst musicians about types of injuries they are predisposed to so that appropriate preventive measures could be taken to preclude these injuries.

Keywords - Soft tissue injuries, Musicians, Neuromusculoskeletal problems, Overuse injury.

Introduction
Music, though, not normally viewed as dangerous occupation but much like other profession such as assembly line workers, computer keyboardists, musicians too experience variety of health problems due to high physical and psychological demands of their profession [1]. Many of professional musicians suffer at sometime of their career from musculoskeletal and overuse injuries disorder such that about 12% of them have been reported to leave their profession permanently [2].

Musicians suffer from wide spectrum of upper extremity disorders causing significant symptoms such as pain, muscle weakness, numbness and tingling sensations and these manifestations collectively has been designated as playing related musculoskeletal disorders (PRMDs) with prevalence among musicians between 60-80% [1-4].

Operational definition of PRMDs has been derived from qualitative research by Zaza et al., 1998 [1] as "pain, weakness, lack of control, numbness, tingling or other symptoms that interfere with your abilities to play your instrument at the level you are accustomed to" and has been validated as an outcome measure in risk factor study of musicians. Recently worldwide interest in musicians PRMDs has grown paralleled by an international epidemic of work related musculoskeletal disorders (WRMDs). Few studies have been conducted to determine prevalence of related risk factors, types of PRMDs in musicians [5]. PRMD prevalence is approximately 43% in professional musicians and 17% in adolescent music students [1]. However, when considering studies which include mild aches and pains, prevalence estimates range from 6% to 71% in professionals [6, 7] and 11% to 87% in music students [8, 9]. Music as a profession involves high physical...
and psychological demands. A musician has to practice for many hours, more than 10,000 hours before he would be able to give his first concert. Musicians practice intensively playing 25 notes per second. Playing a music instrument implicates about 500 composite movements of hand and about more than 1200 movements per minute leading to chronic overuse and mechanical overload [10].

Few authors have attempted to study injury profile of musicians. Bruno et al conducted a study to determine the prevalence of instrument related musculoskeletal problems in classical piano students and found that prevalence of disabling musculoskeletal disorders for neck (29.3%), thoracic spine (21.3%) and upper limbs (20.0 to 30.4%) [11]. Similarly, study of Allsop and Ackland reported that PRMDs are higher in professional musicians (71.9%) in comparison with (38.1%) of non-professional musicians [12]. Nervous tissue is also vulnerable to overuse injury in musicians, electrophysiologic evidence of median and ulnar neuropathy at or distal to wrist in both upper extremities such as in guitarists, violinists, cellists and pianists [13, 14, 15, 16].

Present study intends to review the existing literature to have overview of types, pattern and profile of injuries prevalent in musicians.

**Methodology**

Relevant articles in English were retrieved through a search on electronic databases - Medline, PubMed, Google, Google Scholar. Key search terms were neuromusculoskeletal problems in musicians, soft tissue injuries in musicians, overuse injury in musicians and medical problems in musicians. Research studies published in English language, were included in the present study.

**Results**

Total 18 studies could be retrieved, out of which 14 studies have been included in literature review. Studies retrieved are being presented in tabular form (table.1) describing, about authors, sample, title /nature and findings of studies.

<table>
<thead>
<tr>
<th>Author(s) / Sample</th>
<th>Title / Nature</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ackermann (2015)</td>
<td>Musculoskeletal pain and injury in professional orchestral musicians in Australia. (Cross sectional survey design)</td>
<td>PRMDs came out to be common complaint in classical musicians as 84% had experienced pain or injuries that had interfered either with playing their instrument or participating.</td>
</tr>
<tr>
<td>Kim (2012)</td>
<td>The prevalence of musculoskeletal disorders of traditional Korean string instrument players (Correlation study)</td>
<td>Concluded that symptoms of playing-related musculoskeletal disorders of traditional Korean musical players were prevalently observed at neck, shoulder, back and knee</td>
</tr>
<tr>
<td>Kaufman-Cohen &amp; Razon(2011)</td>
<td>Correlation between risk factors and musculoskeletal disorders among classical musicians (Cross sectional study)</td>
<td>They concluded that using the Rapid Upper Limb Assessment(RULA) showed significantly higher scores in string musicians compared with woodwind and brass players and regression analysis revealed that biomechanical risk factors, instrument weight, average playing hours per week were the main predictors of PRMD.</td>
</tr>
<tr>
<td>Allsop and Ackland(2010)</td>
<td>The prevalence of playing-related musculoskeletal disorders in relation to piano players playing techniques and practising strategies. (Survey study)</td>
<td>214 piano players reported PRMDs. Respondents who played with elevated shoulders and maintained a neutral wrist posture were more likely to report PRMDs</td>
</tr>
<tr>
<td>Hernandez (2010)</td>
<td>An investigation of the prevalence of upper limb neuropathies in different types of college musicians by use of neurometrix device. (Epidemiological study)</td>
<td>Found that brass players have the highest risk of developing cubital or carpal tunnel syndrome</td>
</tr>
<tr>
<td>Reference</td>
<td>Study Title</td>
<td>Study Details</td>
</tr>
<tr>
<td>-----------</td>
<td>-------------</td>
<td>---------------</td>
</tr>
<tr>
<td>Ignatiadis et al. (2008)</td>
<td>Disorders of the musicians hand (3 epidemiological studies)</td>
<td>They concluded that musicians were prone to overuse injuries, tendinitis, focal dystonia and compression nerve syndromes. The most vulnerable group of musicians were the pianists, followed by violinists and guitarists.</td>
</tr>
<tr>
<td>Bruno et al. (2008)</td>
<td>Playing-related disabling musculoskeletal disorders in young and adult classical piano students (Cross sectional study)</td>
<td>Showed that musculoskeletal disorders were common problem among young classical piano.</td>
</tr>
<tr>
<td>Kennedy et al. (2006)</td>
<td>Median and ulnar neuropathies in university guitarists (Descriptive study)</td>
<td>Found that 4 musicians (17%) had electrophysiologic evidence of median neuropathy at or distal to the wrist or carpal tunnel syndrome.</td>
</tr>
<tr>
<td>Gohl et al. (2006)</td>
<td>Median and ulnar neuropathies in university pianists (Descriptive study)</td>
<td>On comparison of same and opposite hand it was found that 3 of 19 pianists had early evidence of median neuropathy at or distal to the wrist.</td>
</tr>
<tr>
<td>Furuya et al. (2006)</td>
<td>Prevalence and causal factors of playing-related musculoskeletal disorders of upper extremity and trunk among Japanese pianists and piano students (Survey study)</td>
<td>Results showed that 77% of pianists suffered from PRMDs in at least one of their body portions.</td>
</tr>
<tr>
<td>Logue et al. (2005)</td>
<td>Median and ulnar neuropathies in university cellists (Descriptive study)</td>
<td>Study concluded that subjects had normal upper extremity neural and musculoskeletal function. There was no evidence of median or ulnar neuropathy at or distal to the wrist.</td>
</tr>
<tr>
<td>Bowie et al. (2000)</td>
<td>Median and ulnar nerve conduction studies in young adult violinists (Descriptive study)</td>
<td>Showed that 7 violinists were found to have nerve conduction studies values suggestive of early median neuropathy at or distal to the wrist.</td>
</tr>
<tr>
<td>Zaza et al. (1998)</td>
<td>The meaning of playing-related musculoskeletal disorders to classical musicians (Case study design)</td>
<td>They showed that participants defined PRMDs as pain and other symptoms which are chronic and beyond their control.</td>
</tr>
<tr>
<td>Fry (1987)</td>
<td>Prevalence of overuse (injury) syndrome in Australian music schools (Survey study)</td>
<td>Showed that in 116 students there was presence of overuse injury syndrome. Students playing keyboard, woodwind and strings were more effected as compared to brass players.</td>
</tr>
</tbody>
</table>

Discussion
Enormous physical demands involved in profession of music can plague musicians with repetitive stress injuries. Musicians are vulnerable to various types of health problems due to high physical and psychological demands of their profession[1]. Music instruments may cause upper limb injuries and hand disorders. Pianists, guitarists and violinists hands are most frequently affected. Most commonly guitarists are susceptible to overuse injuries and tendinitis that may coexist with compression nerve syndromes because of their non-functional and positioning of upper extremities during long-term practice performance [10]. Various neuromusculoskeletal problems and soft tissue injuries such as tendinitis, overuse syndrome, focal dystonia and deQuervain tenosynovitis have been reported to occur in musicians [3,15,21]. Literature review suggests musicians sustains various neuromusculoskeletal problems during their career which have been attributed to poor posture, long hours of practice, excessive force, static loading of instruments [6, 21, 22]. A common finding in studies was that playing...
related disorders were more evident in pianists, guitarists and string players [23,24]. Ackermann concluded that PRMDs are a common complaint in professional orchestral musicians, which hamper with the musicians’ capability to perform to their full potential, and disorders last for many weeks [17]. Bruno et al concluded that Musculoskeletal disorders (MSDs) to be common problem among adult classical piano students, they are more frequently affected by disabling (MSDs) and found that prevalence of disabling musculoskeletal disorders for neck (29.3%), thoracic spine (21.3%) and upper limbs (20.0 to 30.4%) and no difference was found in prevalence rate of disorders in females [11]. Allsop and Ackland concluded that Playing Related Musculoskeletal Disorders (PRMDs) are associated with particular playing techniques and postures (misuse), frequency and duration of practice, which may be related to level of playing (overuse) as well as age, sex and occupation and reported that PRMDs are higher in professional musicians (71.9%) in comparison with 38.1% of non–professional musicians [12].

PRMDs do not have one or more simple causes but are product of many interacting factors. Kennedy et al conducted a study on 24 university guitarists to determine the presence of median and ulnar neuropathies in them and found that 6 guitarists had positive finding for special test (phalen’s and tinel’s sign) of median and ulnar nerves and out of these only 4 guitarists showed electrodiagnostic changes suggesting median neuropathy at or distal to wrist [15]. In another study by Gohl et al on university pianists (n=19) found that 16% (n=3) of pianists had evidence of median neuropathy at or distal to wrist when evaluated by nerve conduction studies and F-wave [16].

**Conclusion**

Literature review of present study reveals that musicians are susceptible to various types of injuries patterns due to their repetitive physical demands. There is need to generate awareness amongst musicians about types of injuries they are predisposed to so that appropriate preventive measures could be taken to preclude these injuries.

**Conflict of interest:** none

**Reference**


