Original Article
ISSN (Online): 2582-7472

ShodhKosh: Journal of Visual and Performing Arts
January-June 2022 3(1), 341–348

INDIAN MRIDANGAM ARTIST AND ASSOCIATED MUSCULOSKELETAL DISORDERS

Dr. Vijaya Krishnan [1], Dr. Sarada Sridhar [2]

[1] Assistant Professors, Department of Musculoskeletal Physiotherapy, MGM College of Physiotherapy, Navi Mumbai, Maharashtra, India
[2] BPTh, MGM College of Physiotherapy, Navi Mumbai, Maharashtra, India

Received 03 April 2022
Accepted 05 May 2022
Published 23 May 2022

Corresponding Author
Dr. Vijaya Krishnan,
victoryv2@yahoo.co.in

DOI
10.29121/shodhkosh.v3.i1.2022.113

Funding: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

ABSTRACT

Background: Percussion artists are prone to develop musculoskeletal injuries. Mridangam is one of the most popular accompaniments in an Indian Carnatic Music recital. Thus, the aim of the study is to explore the prevalence of musculoskeletal disorders amongst Mridangam artists.
Methodology: This was a descriptive cross-sectional study. Mridangam artists from various music school participated in the study over the period of 6 months. Self-made questionnaire was administered to artists comprising of demographic data, practice habits, and information about instrument usage. Using a video camera, the posture was recorded and analyzed. The recorded video was evaluated for risk factors.
Results: This study revealed a 40% prevalence of playing related musculoskeletal affection among the Mridangam artists. Low back region was the most affected followed by knee and shoulder.
Conclusion: The assessment of hazards revealed that the artists have medium exposure level of risk factors. Mridangam a form of percussion instrument has minimal detrimental effects on the artists must be promoted more. Title: Indian Mridangam Artist and Musculoskeletal Disorders.

Keywords: Carnatic Music, Mridangam, Percussion Instrument, Musculoskeletal Disorder, Pain, Posture

1. INTRODUCTION

From centuries, India has been identified as a culturally enriched country identified by the various diverse religions and communities co existing together. Indian traditions are an amalgamation of explicit dialect, dance, music, religions, cuisine, engineering etc developed through the millennia giving a unique identity to its society formed with multiple ethnicity and cultures all under one domain. Kuriakose et al. (2015)

Music or “Sangeet” is one of many the gifts to mankind, noblest and universal irrespective of the manmade boundaries and creed. It shapes the civilization of man.

Pitch, Rhythm, Delivery dynamics (Vocal and/or Instrumental), Timbre and Texture, Genres etc are the basic elements of Music that positions sound to produce a masterpiece. It is one of the Art Form or "Kala" inclusive of either or both –Vocal Singing (Geetam) and Instruments (Vaadyam). Zaza et al. (1998), Clift and Caminc (2016), Kulke (2004)

Hornbostel-Sachs System classifies musical instruments into four divisions Clift and Caminc (2016) comprising of String Instruments/Chordophones, Wind Instruments/Aerophones, Drums/ Membranophones and Non-Drum Percussion Instruments/ Idiophones. Hornbostel and Sachs (1992)

Figure 1

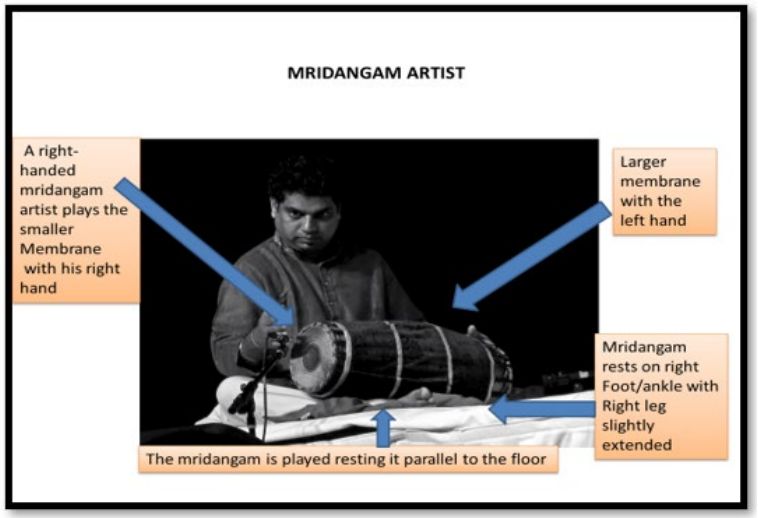

Figure 1 Position of Mridangam artist

Mridangam is one such membranophone percussion instrument used in Indian classical Carnatic music. This two-sided drum made of hollowed jackfruit wood, connected together using high tension leather straps as depicted in Figure 1, resonates when struck. Different bass and treble sounds are produced due to alteration in the diameter of the two ends of the drum. The high pitch sounds are emitted from the smaller side and the wider side produces low pitched sound. The mridangam stays horizontal parallel to the floor while playing. There are various strokes played by mridangam artists like The, Dhi, Thom and Nam. The advanced strokes are Gumukki, Full Chapu, Ara Chapu and Dheem. Raman (1935) The various strokes used are illustrated in Figure 2.

Figure 2

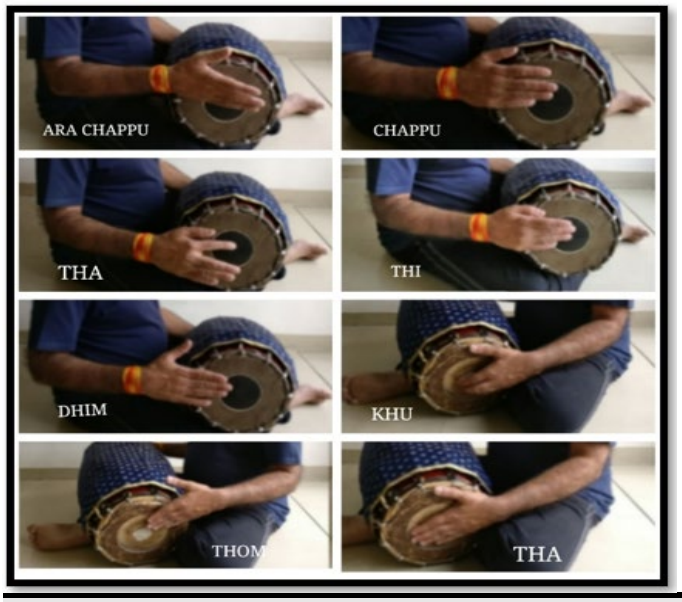

Figure 2 Strokes Used by Mridangam artist

The risk of developing health problems among musicians are higher owing to the increased physical and mental stressors at work. Leaver et al. (2011) in their study concluded that the health risks differ based on the type of instrument played. Various injuries can be sustained due to the vibrations produced. It was found by Stanhope (2016) that musicians undergo subtle injuries which go unnoticed many a times making early detection extremely difficult.

Playing Related Musculoskeletal Dysfunction (PMRD) is defined as pain, chronic in nature, debilitating and interfering with the Artist's ability to play the instrument. There is prevalence of PRMD in all type of instrumental players, however studies have indicated that percussionists are at a greater risk for PRMD. Sandell et al. (2009), Mishra et al. (2013), Gohil et al. (2016), Kok et al. (2018), Papandreou and Vervainioti (2010) There are a very few published studies done on percussion artists in India especially on Mridangam artists. Very limited data is available on Mridangam players and the associated musculoskeletal conditions. Therefore, our study aimed to understand the prevalence of musculoskeletal disorders and risk factor associated with playing mridangam.

2. METHODOLOGY

This is a cross sectional questionnaire-based survey. This study was conducted with approval from the Institutional Research Committee. With a purposive sampling of 50 participants, Mridangam professionals were screened across 7 renowned music teaching academies in Mumbai and Navi Mumbai regions. The study included Mridangam artists in the age group of 25 to 45 years who have completed formal training for more than 7 continuous years and have played professionally for a year or more. Recreational artists and players having recent injuries, any other musculoskeletal or neurological disorders were excluded from the study. The type and idea behind the study were explained to the participants and written informed consent was obtained from the artists prior study commencement.

2.1. OUTCOME MEASURES

Playing related Musculoskeletal Dysfunction Self-made questionnaire: was designed which consisted of information domains such as demographic data, instrument specifics, mridangam practice and playing habits etc. this descriptive questionnaire was evaluated for face and content validity by 3 experts from the field of physiotherapy and 3 veteran mridangam artists. These doyens were familiar with the construct that the questionnaire was designed to measure.

Kinovea Software: Charmant (2004) is an organized tool with the foremost goal of reviewing human kinesis. With the help of a simple camera, it allows to record, observe, analyse, and measure motion. The software allows converting Videos to slow motion frames so that each human movement can be scrutinized and interpreted in detail. In our study, Kinovea was used to record and explore each individual for his posture while playing the mridangam strokes. A video camera (1080x2280 pixels) placed on a tripod which was 35cms tall was used to examine the "Ara-chappu and Thom" strokes which are commonly used by artists. The posture (both Anterior and Lateral views) of left and right side of the artist were recorded and uploaded to the software for further investigation. This is demonstrated in Figure 3.

Figure 3

Figure 3 Postural assessment done using Kinovea

The Assessment of Repetitive Tasks (ART) tool is designed to help assess the risks of tasks that require repetitive movement of the upper limbs. The ART tool uses a numerical score and a traffic light approach to indicate the level of risk. These factors are grouped into four stages to evaluate neck, shoulder/arm, back, wrist and hand - Frequency and repetition of movements, Force, Awkward postures, and Additional factors (recovery, duration, breaks, workspace environment etc.) Each field is scored as "0- Infrequent Movements, 3- Frequent Movements and 6- Very Frequent Movements" for both left and right side of the human body separately. The factors are entered on a flow chart to evaluate and grade the degree of risk. The score ranges are grouped to indicated proposed exposure risk as low, medium, and high colour coded as green, yellow, and red respectively. Ferreira et al. (2009), Graves et al. (2004)

The data thus collected was entered in Excel and analysed using SPSS version 24. Descriptive analysis was then, and further Spearman correlation was performed

to assess the relation between musculoskeletal dysfunction and the associated risk factors.

3. RESULTS

Table 1

Table 1 Player Profile	
Features	
Age (yrs.) Mean ± SD	35.92 ±10.95
Body Mass Index Mean ± SD	25.08±2.23
Occupation: n (%)	
Light work	29 (58%)
Medium work	17 (34%)
Heavy work	4 (8%)
Weight of instrument: n (%)	
10 kg	23 (46%)
12 kg	16 (32%)
>12	11(22%)
Method of carrying: n (%)	
Carrying by hand	13 (26%)
Carrying by shoulder	37 (74%)
Type of instrument used: n (%)	
Kutchi	10(20%)
Kappi	17 (34%)
Both	23(46%)
Average hours playing per day	2.12 ±.96
Average no of days playing per week	4.70±1.59
Average no of months playing per year	10.36±2.64

Table 2

Table 2: Prevalence of Pain		
Period and point prevalence	**N**	**Percentage**
Past 12 months	20/50	40%
Last 7 days	16/20	80%
Current Pain	20-Aug	40%

Inference: This table demonstrates that out of 50 participants only 20 had pain in the past year. Out of these 20, only 8 artists have pain currently.

Table 3

Table 3 Summary of Pain Characteristics	
Region	**Percentage**
Shoulder	20%
Wrist	10%
Finger	5%
Neck	10%

Lower Back	25%
Knee	20%
Calf	5%
Ankle	5%

Inference: The lower back region (25%) is the most affected followed by Knee (20%) and Shoulder (20%).

Table 4

Table 4 Risk factor assessment	
ART TOOL	
Total Score (Mean ± S.D)	12.91 ± 1.95
Low exposure n (%)	7(14%)
Medium exposure n (%)	43(86%)
High exposure n (%)	0

Inference: Maximum artists are at a medium risk level for developing Playing related Musculoskeletal dysfunction

4. DISCUSSION

Indian Classical Music has evolved exponentially in the past decade. Its ever-increasing popularity among the western world has opened doors for many budding artists to venture out to discover the international platforms and fusion music. Percussion instruments have been found to enhance the experience of music. They ensure maintenance of a constant tempo and regular rhythm throughout the performance. Mridangam is one of the major percussion accompaniments to traditional Carnatic Music. The health problems of these artists remain relatively under recognized and under studied, even though the field of performing arts medicine is advancing. The journey of this study was conducted to understand the prevalence of playing related musculoskeletal disorders among Mridangam artists of India.

The Table 1 highlights the demographic details of the Mridangam players participating in the study while Table 2 demonstrates the pain profile of the artists. In this study 40% prevalence of Playing Related Musculoskeletal Disorders was found. Table 3 shows the region wise distribution of pain. Among the 20 individuals who experienced pain, the maximum pain was reported in lower back followed by shoulders and knee.

Playing-related musculoskeletal disorders are triggered due to many factors related to the instruments, the musicians, and their interactions. Few of the extrinsic factors include musician technique, playing environment etc. Sandel et al in their study also concluded that PRMD's are major concern for all percussionists and there's an acute need to examine both physical and psychological causes for the same.8It was observed in our study that while playing mridangam, the artist sits with folded knees in a crossed sitting posture with the neck bent slightly at an angle of 10–15°. The upper arm remains in a position between 20° and 40° of flexion with shoulders raised, and the elbow at around 100° maintaining the wrist in flexion for 3 hours either while playing in a concert or teaching. They maintain a stooped posture throughout. This causes an increase in the load on the low back as well as the shoulder muscles. Static load, defined as extended muscle contraction, joint

stress and strain of soft tissue and surrounding bone. occurs when the upper extremity is held in a comparatively fixed position. However, movement related force on the muscles, joints, and supporting structures is Dynamic load. Both these loads need to be optimally balanced with more movements and less stationary forces to associated structures while playing. In the absence of this crucial balance pain is presented as a symptom. The resulting knee pain can be explained due to prolonged cross-legged sitting. This position requires greater range of motion at the knee joint for a long duration making it vulnerable to musculoskeletal discomfort and pain.

Like any other musical instrument, playing mridangam also places a demand on the musculoskeletal system. Table 4 illustrates the risk level associated with playing mridangam. According to our findings, these artists are at a medium exposure to the various risk factors identified. Different instruments pose variable risks for PMRDs. Lori in their study have highlighted these risk factors ranging from muscle/tendon injuries to neuromuscular and joint affections. Gooding (2018) Compared to the various percussion instruments, Mridangam appears to be a safer option with respect to PRMDs. Preventive strategies when initiated, these artists will be able to perform better without any hazards of injuring themselves. As the majority of problems reported were low back, shoulder and knees, approaches such as postural correction, warmups, breaks during practice sessions can improve the player performance. Also, efforts can be made to modify the instrument with respect to weight and size which can reduce the load on the shoulders when the Mridangam is carried around. Along with these adequate steps, nutrition and health promoting behaviours need to be endorsed to further enhance performance.

The limitations of this study were the small sample size and the availability of very few female artists. This art form is not very popular and is limited to few regions in India. Many of the budding artists do not complete their training and quit before reaching the professional level. Mridangam playing being associated with medium risk factors, should be promoted, and practiced throughout the country.

5. CONCLUSION

The percussion art of playing the Mridangam involves minimal effects on the musculoskeletal system. With proper posture and awareness about ergonomic positions, this kala/ art form should be promoted.

CONFLICT OF INTERESTS

None.

ACKNOWLEDGMENTS

None.

REFERENCES

Charmant, J. (2004). Kinovea : A microscope for your videos.

Clift, S. Caminc, P.M. (2016). Oxford textbook of creative arts, health and wellbeing: International perspectives on practise, policy and research. 151-162. https://doi.org/10.1093/med/9780199688074.003.0019

Ferreira, J, Gray M, Hunter L, Birtles M, Riley D. (2009). Development of an assessment tool for repetitive tasks of the upper limbs (ART).

Gohil, K, Sheth, M, Vyas, N. (2016). Prevalence of playing related musculoskeletal disorders in musicians. International journal of Therapeutic Applications.32 :100-3 https://doi.org/10.20530/IJTA_32_100-103

Gooding, L.F. (2018). Occupational health and well-being: hazards, treatment options, and prevention strategies for music therapists. Music perspectives. 36(2), 207-214. https://doi.org/10.1093/mtp/miw028

Graves, R. J., Way, K., Riley, D., Lawton, C., & Morris, L. (2004). Development of risk filter and risk assessment worksheets for HSE guidance--'Upper Limb Disorders in the Workplace' 2002. Applied ergonomics, 35(5), 475-484. https://doi.org/10.1016/j.apergo.2004.03.011

Hornbostel, E.M and Sachs, C. (1992). Classification of Musical Instruments. In Ethnomusicology : An Introduction, ed. Helen Myers. London : Macmillan, 444-461.

Kok, L.M, Groenewegen, K.A, Huisstede, B.M, Nelissen, RG, Rietveld, A.B, Haitjema, S. (2018). The high prevalence of playing-related musculoskeletal disorders (PRMDs) and its associated factors in amateur musicians playing in student orchestras : A cross-sectional study. 14-13. https://doi.org/10.1371/journal.pone.0191772

Kulke, H. (2004). A history of India. Rothermund, Dietmar (4th ed.). New York : Routledge. https://doi.org/10.4324/9780203391266

Kuriakose, J. Kumar, J.C. Sarala, P. Murthy, H.A. and Sivaraman, U.K. (2015). Akshara transcription of mrudangam strokes in carnatic music. 1-6. https://doi.org/10.1109/NCC.2015.7084906

Leaver, R. Harris, E.C. Palmer, K.T. (2011). Musculoskeletal pain in elite professional musicians from British symphony orchestras. 61(8). https://doi.org/10.1093/occmed/kqr129

Mishra, W. De, A. Gangopadhyay. S. Chandra, A.M. (2013). Playing-related musculoskeletal disorders among Indian tabla players. Medical problems of performing artists. 28(2), 107-1. https://doi.org/10.21091/mppa.2013.2019

Papandreou, M. Vervainioti, A. (2010). Work-related musculoskeletal disorders among percussionists in Greece: a pilot study. https://doi.org/10.21091/mppa.2010.3024

Raman, C.V. (1935). The Indian musical drums. 179-188. https://doi.org/10.1007/BF03035705

Sandell, M. Frykman, K. Chesky, A. Wiklund, F. (2009). Playing-related musculoskeletal disorders and stress-related health problems among percussionists. 175-180. https://doi.org/10.21091/mppa.2009.4035

Stanhope, J. (2016). Physical performance and musculoskeletal disorders : are musician and sportspeople on a level playing field? Perform. Enhancement Health. https://doi.org/10.1016/j.peh.2015.11.004

Zaza, C. Charles, C. Muszynski, A. (1998). The meaning of playing-related musculoskeletal disorders to classical musicians. Social science & medicine.47(12), 2013-2023. https://doi.org/10.1016/S0277-9536(98)00307-4