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Assessment of risk for upper limb musculoskeletal injuries in amateur Tabla players: A Cross sectional study

Research Article

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Abstract

The force and effort required to play a percussion instrument can cause musculoskeletal issues in percussionists (PRMDs). India's most popular percussion instrument is the tabla. The aim of the study was to assess the risk of upper limb musculoskeletal disorders among table players. Method: This cross-sectional study was conducted on seventy-six amateur table players, who were between the age group of 18 to 25 years. The posture of amateur table players and the risk of musculoskeletal injury among them was assessed by using Rapid Upper Limb Assessment (RULA) scale. Result: Assessment of posture while playing tabla by using RULA scale shows that 25.39 % players were at a low risk of musculoskeletal injury, 71.42% players were at a medium risk of musculoskeletal injury and 3.17% were at high risk of musculoskeletal injury. The majority of musculoskeletal pains were in the shoulder and wrist joint. Conclusion: The study shows that the tabla players are at a risk of musculoskeletal injuries and early preventive measures should be implemented to prevent long term complications of wrong posture while playing tabla.

Key Words: Tabla players, Musculoskeletal injuries, RULA Scale, Risk assessment.

Introduction

The Tabla is a percussion instrument with a membranophone that originated in the Indian subcontinent (1).

It consists of two single-headed, small drums with barrel shapes that are somewhat varied in size and shape; *daya,* also known as *dahina*, denotes the right and *baya*, also known as *bahina*, denotes the left (2). Both of the drums are covered in a black substance known as "*syahi*" and are constructed of animal leather (3).

During tabla playing, the musician uses their pressure of hand heels to change the pitch and tone colour of each drum.

The procedure for playing tabla is complex and for creating different varieties of sounds and rhythm, it requires extensive use of the fingers and palms in various configurations.

The tabla player sits with knees folded and back unsupported with the neck slightly bent, shoulders flexed, elbow extended with repetitive wrist and finger movement. Repeated hand movements like wrist flexion- extension, ulnar and radial deviation, striking of fingers and ulnar border leads to various disorders (4).

Tabla players can suffer from a variety of injuries that cause pain, weakened, tingling, and numbness. The prevalence of upper limb musculoskeletal injuries among players ranges from 43 percent to 50 percent, according to prior studies (5).

The coordinated and repetitive striking actions and forces required to play a percussion instrument might result in musculoskeletal issues (6).

Due to their posture when playing the tabla and the repeated movements of their upper limbs, they also have musculoskeletal issues. According to studies, professional tabla players might develop musculoskeletal conditions such tenosynovitis, carpal tunnel syndrome, de Quervain's syndrome, overuse syndrome, cumulative traumatic disease, and overuse syndrome etc (7).

Finding the risk factors for musculoskeletal disorders among table players is crucial due to the increased occurrence of musculoskeletal injuries and work-related illnesses among musicians (8). The aim of the present study was to assess the risk of musculoskeletal injuries among the amateur table players so that early identification of risk factors is possible and preventive strategies can be implemented.

Materials & Methods

This was cross sectional study on the assessment of risk of musculoskeletal injuries among amateur table players. A study was conducted between August 2020 to March 2021. The study was approved by the

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Institutional Ethical Committee of Chaitanya Medical Foundations College of physiotherapy Chinchwad Pune with approval number BPT/CMF/202021. Seventy-six amateur tabla players were included in the study.

Inclusion criteria

- Amateur tabla players who were practicing tabla for last 1 year
- Both male and female tabla players
- Age group between 18 to 25 years

Exclusion criteria

- Post-traumatic musculoskeletal injury
- Fracture to the upper limb in past 6 months
- Those who are involved in any exercise program
- Those who are playing any sport

The written consent was obtained from all the participants. The demographic data from all the participants were obtained such as gender, age, height ,weight, BMI work experience and work hours per day.

The RULA (Rapid Upper Limb Assessment) method was used to examine the ergonomic sitting posture of the subjects and the positioning of the upper limb while playing tabla .

McAtamney and Corlett (1993) have devised this method for the ergonomic evaluation of workplaces where upper limb disorders related to work are reported (9). RULA investigates the repetition of movements, static muscle work, and force as risk factors for MSD. The neck, upper arm, lower arm and wrist were evaluated for risk of musculoskeletal injury.

RULA (Rapid Upper Limb Assessment) is a simple methods for the assessment of risk of musculoskeletal injury in occupational posture. RULA makes it possible to determine the priority level of intervention and the necessary actions by obtaining a numerical index that quantifies the risk to which the worker is exposed during the specified job activity.

The RULA method is recommended for the detection of upper limb, neck, and back postural problems in connection to muscular activity and external loads placed on the body. According to the Worldwide Ergonomics Association (IEA) and World Health Organization, RULA is included as one of the methods for the prevention of work-related musculoskeletal disorders (WMSDs) and is referenced in the international standard for occupational risk assessment (WHO) (10).

In this study the tabla player was asked to play a tabla and photos of the tabla players were clicked in various angles. Photos were taken with the hand in the resting position on tabla to measure the angle of trunk and with help of goniometer, the angle of shoulder, elbow, wrist and neck was measured. (figure 1,2, 3, and 4).

Figure 1: Measurement of shoulder angle while playing tabla

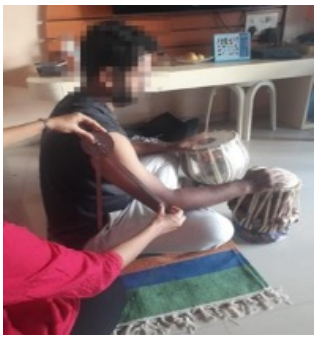

Figure 2: Measurement of elbow angle while playing tabla

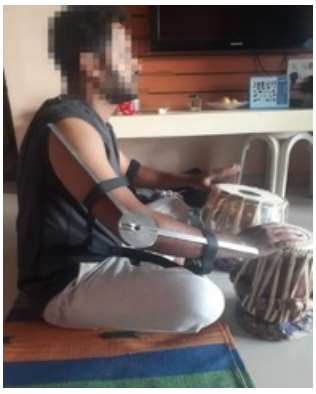

Figure 3: Measurement of wrist angle while tabla playing

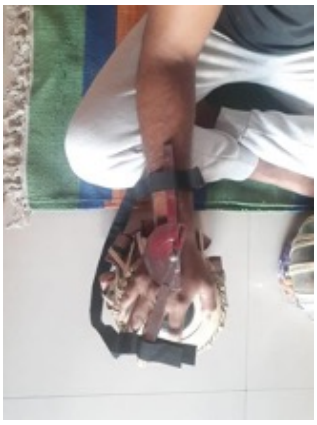

Figure 4: Measurement of neck angle while tabla playing

The clicked photographs were open with Kinova software which helped to measure the trunk angle. Kinovea is a valid and reliable method to perform motion and postural analysis (12). Once all the required angle was obtained, it was filled in RULA scale.

In RULA method (9), the body is divided into two groups, A and B: group A includes arm, forearm and wrist component and group B includes the neck, the trunk and the feet component. In this method the score is assigned to each segment depending on the posture adopted and two separated scores are obtained (Scores A and B) through the use of numerical tables or spreadsheets. These scores represent the degree of postural load on the musculoskeletal system which is determined by the combination of the posture of whole body.

The scores for muscle use and force are then added to Scores A and B to provide two additional scores (Scores C and D), which can then be combined to get the ultimate result, also known as the Grand Score, using a third table or spreadsheet.

The final REBA score ranges from 1 to 7. According to RULA scale, the scoring of action level and level of risk is as follows:

- Action level 1: Low risk level. A score of 1 or 2 indicates that posture is acceptable if it is not maintained or repeated for long periods.

- Action level 2: Medium risk level. A score of 3 or 4 indicates that further investigation is needed and changes may be required.
- Action level 3: High risk level. A score of 5 or 6 indicates that investigation and changes are required soon.
- Action level 4: Very high risk level. A score of 7 indicates that investigation and changes are required immediately.

The reliability of Rapid Upper Limb Assessment (RULA) Scale is (r=0.92) for assessing the risk of musculoskeletal injuries (13). The video was recorded while playing tabla for assessment of repetition of movement for 30mins.

Data collection

The participants were evaluated for risk of musculoskeletal injury during tabla playing by using RULA scale. Baseline characteristics including mean and standard deviation (SD) were described.

Statistical analysis and Results

Eighty tabla players were screened and 4 subjects failed to satisfy the inclusion criteria. Seventy six subjects remained and were included in the study.

Out of 76 participants who participated in the study, 68 participants were male and 8 participants were female. The mean and standard deviation for age group in the study was 21.63 ± 2.16 years. The mean and standard deviation for duration of practicing tabla players was 3.95 ± 1.22 years and frequency of tabla player per week was 20.93 ± 1.75.

Demographic data of the amateur tabla players are listed in table 1.

Table 1: Baseline characteristics of sample

Variable	BMI Mean ±SD	Age Mean±SD	Practicing years Mean ±SD	Tabla playing hours/ week Mean ±SD
Men	23.03 ± 0.4	22.16 ± 2.19	4.11 ± 1.18	21.74 ± 1.9
Women	24.04 ± 0.5	21.10 ± 2.13	3.80 ± 1.25	20.13 ± 1.6
Average	23.53 ± 0.5	21.63 ± 2.16	3.95 ± 1.22	20.93 ± 1.75

Table 2: Prevalence of musculoskeletal injury in different parts of body in amateur tabla players

Region	Prevalence
Neck	52.3%
Shoulder	39.8%
Elbow	4%
Wrist	16.4%

Table 2 shows that the 52.3% tabla players had a neck pain,39.8% participants had shoulder pain,4 % participants had elbow pain and 16.4% participants had wrist pain.

Table 3: Risk of musculoskeletal injuries according to RULA Score and action required

RULA Score for assessment of MSD	Percentage risk assessment	Level of MSD risk	Action required
1 to 2	0%	Negligible risk	Posture is acceptable if it is not maintained or repeated for long periods
3 to 4	25.39%	Low risk	Further investigation is needed and changes may be required
5 to 6	71.42%	Medium risk	Investigation and changes are required soon
6	3.19%	Very high risk	Investigation and changes are required immediately

MSD: Musculoskeletal disorders
RULA: Rapid Upper Limb Assessment

The table 3 shows the scoring of RULA Scale in which 25.39% tabla players had a RULA score between 3 to 4 and these tabla players were at a low risk of MSD. These participants need further investigations and they need change in their working environment so that the risk of musculoskeletal injury cab be reduced. Another 71.42% participants were at a medium risk of MSD and they were having RULA score between 5 to 6 and these participants also require further investigations and need a change in posture and ergonomic environment soon to prevent injury and 3.19 were at a high risk of developing musculoskeletal injury and their RULA score was above 6. That means these tabla players require investigations and immediately require change in their working pattern.

Discussion

This study examined the risk of developing musculoskeletal disorders among tabla players. The result of this study shows that the tabla players are at a risk for developing musculoskeletal disorders and it can be prevented if identified earlier. In our study it is observed that the neck is most frequently affected site in tabla players. This is consistent with the finding of previous study done by Wricha Mishra. In her study she reported that playing-related musculoskeletal disorders (PRMD) are high among Indian tabla players.

This is due to prolonged sitting with shoulder flexed, elbow extended and neck flexed with repeated wrist movement which leads to increased risk of musculoskeletal disorders (5).The high risk of musculoskeletal disorder in tabla players may be related to repetitive movement, altered posture leading to muscle fatigue, pain, swelling, etc. The studies have proven that beginner tabla players should focus on their hands and wrists movements.

However, as a tabla musician develops more skill, their speed and volume grow, and they begin to use more of their shoulders and finally their back to

generate force and power.(14) Thus the tabla player with more years of experience and the more frequency of playing tabla per week increases the risk of musculoskeletal disorder as it leads to overuse of muscle leading to fatigue and pain. Regular aerobic and stretching exercises are a key factor in preventing damage and strengthening the musculoskeletal system in tabla players.

Study limitation

The study has several limitations. This study employed a relatively small sample size which is known to affect the validity and generalizability of the result. In this study the static posture of tabla players were assessed. So it is recommended to carry out further studies on dynamic posture. The size of right and left tabla varies. Also, the right side tabla striking is more than the left thus there may be more risk of developing MSD on the right side than the left side which is not analysed in present study.

Conclusions

From the study it is concluded that the tabla players are a risk of musculoskeletal disorders and most of participants were at a medium risk of MSD. Inappropriate and incorrect ergonomic postural habits while playing tabla can increases the risk of MSD in tabla players. So teaching proper ergonomic practices and regular stretching and strengthening exercises prior to tabla playing session can reduce the risk of musculoskeletal injury in tabla players.

Ethical clearance:

Ethical clearance was obtained from the institutional ethical committee of Chaitanya Medical Foundations College of Physiotherapy, Chinchwad, Pune.

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Conflict of interest: Nil

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