

Effectiveness of Upper Extremity Multiple Angle Isometrics on Upper Extremity Pain and Hand Endurance Amongst Tabla Instrument Learners

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ABSTRACT

Introduction: Tabla is one of the most widely played Hindustani instruments. It requires sitting cross-legged for a long time and demands a lot of forceful upper extremity movements. This is shown to cause many playing-related musculoskeletal disorders amongst the tabla players. Young tabla players experience pain and fatigue while practicing in their initial stages. A proper strengthening protocol is hence needed to reduce the occurrence of such disorders.

Method: For this study 40 participants who play the tabla instrument from age group 15 to 21 were selected. Their pre and post interventional pain levels were calculated by the Numerical Pain Rating Scale (NPRS) and the endurance was calculated by the Strength-Decrement Index.

Results: The paired t test was done and it showed that there was a significant effect of the multiple angle isometrics on both pain as well as the endurance levels (p value <0.0001 for both the parameters).

Conclusion: The multiple angle isometric exercise protocol has a significant effect on pain and endurance of upper extremity amongst tabla instrument learners.

Keywords: [multiple angle isometric exercises, tabla players, upper extremity pain, upper extremity endurance, NPRS, strength decrement index]

INTRODUCTION

India has a rich and varied collection of classical music which is world renowned. One such widely played instrument is the percussion instrument called Tabla. This instrument forms the backbone of "Hindustani classical music" and is practiced by many.

Tabla is the most famous membranophone percussion instrument used in Indian Classical Music. Playing any percussion instrument requires coordinated and repetitive striking motion and forces which is a risk factor to development of playing related musculoskeletal pain. The prevalence

of tabla playing related musculoskeletal pain is 43% to 50% in tabla players.^[1]

Playing the tabla requires integrated movements of the entire upper limb from shoulder, elbow, wrist and fingers.^[1]

The player sits cross – legged on the floor and strikes both the drums with the fingers, occasionally raising the pitch of the left-hand drum by pressing the heel of the hand. Hand is the most important and key body part involved to create sound from any musical instrument, thus the upper extremity is more exposed to injuries due to over practice or performing for more years.^[2]

A proper conditioning program can be applied for effectively managing the

occurrence and controlling the severity of pain. Physiotherapy management should be considered in modifying instrument playing related pains. [3]

ISOMETRIC EXERCISES

Isometric exercise is a static form of exercise in which a muscle contracts and produces force without an appreciable change in the length of the muscle and without visible joint motion. [5] Functional demands often involve the need to hold a position against either a high level of resistance for a short period of time or a low level of resistance over a prolonged period. [5] Multiple – angle isometrics are a type of exercises in which resistance is applied at multiple joint positions within the available ROM [5]

The number of tabla playing-related musculoskeletal disorders is 43% to 50% in percussionists as a great deal of force is required to play a percussion instrument. [1][2]

There is little information available about the commonly occurring pain in the upper extremity of the Tabla players as well as how to increase the endurance of their hand to play the instrument comfortably and without pain for a comparatively longer duration. Hence, this study was conducted.

The effectiveness of upper extremity multiple angle isometric exercises on pain and hand endurance, before and after the 3-week protocol was calculated using the Numerical Pain Rating Scale (NPRS) and Strength Decrement Index respectively.

LITERATURE REVIEW

1. Punyaja Jani in the year 2018 studied the effect of conditioning physiotherapy exercises on tabla playing related wrist pain in young tabla learners. Half of the subjects were given an exercise protocol comprising and the other half underwent the normal table training protocol. VAS and PRWE were recorded for both the groups before the intervention. The study concludes that physiotherapy exercises are effective in reducing pain and disability in young tabla learners. [2]

2. W Mishra conducted a study in the year 2013 on “Playing-related musculoskeletal disorders among Indian tabla players”. The present study was undertaken to investigate the prevalence of discomforts among professional table players. Eighty-five professional tabla players voluntarily participated in the study. The Nordic Musculoskeletal Questionnaire (NMQ) and visual analogue scale (VAS) were administered to all the participants. Demographic details, music-related activities, and symptoms of discomfort were also recorded. It was found that prone anatomical areas were the low back, shoulder, neck, wrist, upper back, and knees. [1]

3. A Strength-Endurance Index for Power Grip by D. W. Jones ÆL. D. Robertson ÆS. F. Figon. (Published 12 February 2009) hand endurance is defined as the strength decrement index which is

$SDI = (IS - FS)/IS100.$

IS- initial strength (mean peak force in cycle 1-3)

FS- final strength (mean peak force in cycle 16-18)[4]

MATERIALS & METHODS

The experimental study was done for 3 weeks (alternate days). 40 participants were selected by the convenient sampling method from Tabla classes in and around Pune. The participants were between the age group of 15 to 21 years.

INCLUSION CRITERIA

1. Tabla players playing for at least more than 5 years.
2. Practicing tabla at least 3 times a week.
3. NPRS (upper extremity-right hand) > 5

EXCLUSION CRITERIA

1. Tabla players who are in any exercise regime
2. Recent spine or upper limb injuries (last 1 year)
3. Having shoulder weakness (MMT grade <3, shoulder girdle muscles)

4. Congenital deformities
5. Visual or auditory deficit
6. Materials used were the Numerical pain Rating Scale, a hand dynamometer and a smiley ball.

PROCEDURE

The pain assessment after playing the Tabla of each participant was taken before the start of the intervention. The initial hand endurance was calculated by taking the hand strength of each participant with the help of a hand dynamometer before the start of the intervention. The participants then underwent isometric exercise training 3 times a week for 3 weeks. In the first week all the exercises were done for 5 repetitions with the hold of 6 seconds. In the second week 7 repetitions were done with 8 second hold, followed by 10 repetitions and 10 second hold in the third week.

At the end of 3 weeks the participants were re assessed. Their pain levels were recorded with the help of NPRS. Hand endurance was calculated after taking the final grip strength with the help of a hand dynamometer.

Hand endurance was calculated by Strength decrement index = $(IS - FS) / IS \times 100$

Where, IS-initial strength (mean peak force in cycle 1-3)

FS- final strength (mean peak force in cycles 16-18) [4]

The exercises were:

1. Floor push-ups - the elbows will be flexed at functional angle for playing the tabla
2. Wall push-ups
3. Isometric shoulder lateral rotation-elbow flexed at 90° and hand placed close to the body. Attempt to push the hand outward on the wall/door.
4. Isometric shoulder medial rotation-elbow flexed at 90° and hand placed close to the body. Attempt to push the hand inward on the wall/door.
5. Isometric shoulder flexion-elbow flexed at 90° and hand placed close to the body. Attempt to push the hand behind on the wall/door.

6. Isometric shoulder extension-elbow flexed at 90° and hand placed close to the body. Make a fist and then push the hand in front as if pushing the wall/door.
7. Squeezing a smiley ball
8. Push the two palms into each other-namaste pose
9. Hook the fingers of both hands together, resist pulling the hands apart
10. Isometric wrist extension- make a fist with palm facing down. Move the wrist in a slight upward direction and resist with the opposite hand.
11. Isometric wrist flexion-make a fist with palm facing up. Move the wrist in a slight upward direction and resist with the opposite hand.
12. Isometric radial deviation-make a fist with thumb pointing up. Move the wrist in a slight upward direction and resist with the opposite hand.

STATISTICAL ANALYSIS

Total of 40 candidates aged 15-21 years, volunteered to participate in the study and completed the 3 weeks of program. Paired t test was done to find the statistical significance of the pre and post interventional values of pain and endurance respectively.

RESULT

40 candidates participated in the study. Paired t test was done. The results obtained for upper limb isometric exercises to decrease pain and increase endurance were found to be significant with p value <0.0001 and t value 21.7779 for pain and p value <0.0001 and t value 19.5712 for endurance.

Table no 1: PAIN SCORE IN TABLA PLAYERS

PAIN: NPRS	Pre interventional mean score ±SD	Post interventional mean score ±SD	T value	P value	Results
	7.00±1.01	2.40±1.35	21.7779	<0.0001	Extremely significant

Table no 2: ENDURANCE SCORE IN TABLA PLAYERS

ENDURANCE: strength decrement index	Pre interventional mean score +SD	Post interventional mean score + SD	T value	P value	Results
	0.0008240+0.00 1004	0.003887+ 0.001005	19.5712	<0.0001	Extremely significant

DISCUSSION

This study was aimed to find the effectiveness of upper extremity isometric exercises on upper extremity pain and hand endurance in Tabla players.

40 tabla players in the age group of 15-21, in and around Pune city voluntarily participated in this study.

W Mishra conducted a study in the year 2013 on “Playing-related musculoskeletal disorders among Indian tabla players”. The study was undertaken to investigate the prevalence of discomforts among professional table players. Demographic details, music-related activities, and symptoms of discomfort were also recorded. It was found that prone anatomical areas were the low back, shoulder, neck, wrist, upper back, and knees.^[1]

Punyaja Jani in the year 2018 studied the effect of conditioning physiotherapy exercises on tabla playing related wrist pain in young tabla learners. Half of the subjects were given an exercise protocol comprising and the other half underwent the normal table training protocol. VAS and PRWE was recorded for both the groups before the intervention. The study concluded that physiotherapy exercises are effective in reducing pain and disability in young tabla learners.^[2]

This study showed us the significant effectiveness of isometric exercises on pain and endurance in tabla players. Exercise is considered an important component of effective chronic pain management and it is well-established that long-term exercise

training provides pain relief. In healthy, pain-free populations, a single bout of aerobic or resistance exercise typically leads to exercise-induced hypoalgesia (EIH), a generalized reduction in pain and pain sensitivity that occurs during exercise and for some time afterward.^[6]

Maxwell L.Howell, Ray Kimoto and W.R.Morford in a study conducted in 2013 found that muscular endurance showed significant changes due to isometric exercises in 11 subjects over a period of 8 weeks.^[7]

Isometric exercises produce a muscle contraction and generate force without causing any change in the muscle length. This leads to strengthening of that muscle in the specific position. Thus, helping the player to perform at any specific intensity over a longer duration of period.^[5]

CONCLUSION

From the above study it can be concluded that there is significant effect of multiple angle isometric exercises on pain and endurance of upper extremity in Tabla instrument learners.

LIMITATIONS

1. Female candidates were not included in the study
2. The effect of this protocol on long duration performance-based pain was not checked

FUTURE SCOPE

1. A similar study can be done only on the female population.
2. A comparative study to find out the effect on males and females can be done.
3. A study can be undertaken according to the specific needs of long duration performance-based players.
4. Adolescent age groups are seen to play the instrument on a more regular basis hence a study can be undertaken which is entirely focused on them.

Declaration by Authors

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