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## The effect of conditioning physiotherapy exercises on tabla playing related wrist pain in young tabla learners: a randomized controlled trial

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### Abstract

**Background and Objectives:** Tabla is the most famous membranophone percussion instrument used in Indian Classical Music. Musical instrument players, unlike other occupations, commence their careers at early ages. Playing percussion instrument requires coordinated and repetitive striking motion and forces which is a risk factor to development of playing related musculoskeletal pain. 1 Few initial weeks of training includes perfecting the common tabla strokes on individual drums followed by tuning both the drum beats and eventually forming the -“Kaida” which is a particular and disciplined manner in which the beats are tuned and played. Left (/non dominant) wrist is a commonly reported location for playing related pain. 3 Conditioning refers to augmentation of the energy capacity of a muscle through an exercise program. 2 Active range of motion exercises, strengthening and stretching exercises are important elements of conditioning program designed to promote pain relief as well as reduce the risk of injuries. A conditioning program for musicians can be applied at early stages of training for effectively managing instrument playing related pain, especially in reducing its frequency and severity. Physical therapy exercises should be considered in modifying performance-related factors that have been reported. 4 This study is determined to study the effects of conditioning physiotherapy exercises on tabla playing related wrist pain in young tabla learners.

**Study Design:** Randomized Controlled Trial

**Setting:** Instrumental Music Institutes In and Around Pune.

**Outcome Measures:** Visual Analogue Scale (VAS), Patient Rated Wrist Evaluation Scale (PRWE)

**Method:** 50 Subjects were selected for the study based on the inclusion and exclusion criteria, in the sequence of enrolment of the subject, even numbered i.e. half the subjects were categorized as group ‘A’-the experimental group. The other half, odd numbered subjects were categorized as group ‘B’- the control group a pre intervention VAS and PRWE scoring was recorded for both groups. An exercise protocol was administered among the group a subjects prior to routine practice session. This was continued before training for a period of 1 month. Subjective assessment of pain and function post training after 1 month was taken from both groups.

**Result:** There is a significant difference in VAS and PRWE in both, the experimental and control group. However, significance is very strong in the experimental group. The study concludes that physiotherapy exercises are effective in reducing pain and disability in young tabla learners.

**Keywords:** Tabla, Percussion Instrument, Conditioning Exercises, Kaida, Patient Rated Wrist Evaluation Scale

### 1. Introduction

Tabla is the most famous membranophone percussion instrument used in Indian Classical Music. Playing percussion instrument requires coordinated and repetitive striking motion and forces which is a risk factor to development of playing related musculoskeletal pain [1].

The tabla is comprised of two sealed membranophones with animal skin heads: the smaller wooden shelled *Dayan* (played with right hand and tuned to higher pitch) and larger, metal shelled *Bayan* (played with left/non dominant hand) [1]. Playing of the tabla requires movement of the entire upper limbs from shoulder to finger tips

Some basic strokes with the dayan on the right side and the bayan on the left side are:

- Ta: (on dayan) striking sharply with the index finger against the rim while simultaneously applying gentle pressure to the edge of the syahi with the ring finger to suppress the fundamental vibration mode.

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- Ghe or ga: (on bayan) holding wrist down and arching the fingers over the syahi; the middle and ring-fingers then strike the maidan (resonant).
- Thin: (on dayan) placing the last two fingers of the right hand lightly against the syahi and striking on the border between the syahi and the maidan (resonant).
- Dha: combination of Na and Ghe.
- Dhin: combination of Tin and Ghe.
- Ka or kath: (on bayan) striking with the flat palm and fingers (non resonant).
- Na: (on dayan) striking the edge of the syahi with the last two fingers of the right hand.
- Te: (on dayan) striking the center of the syahi with the middle finger (non resonant).
- Tu Tun:(on dayan) striking the center of the syahi with the index finger to excite the fundamental vibration mode (resonant).
- Dhere dhere (on dayan) striking of syahi with palm.

Few initial weeks of the above described training includes perfecting these strokes followed by tuning both the drum beats and eventually forming the “Kaida” which is a particular and disciplined manner in which the beats are tuned and played.

The left/ non dominant wrist was observed to be commonly reported location for pain in young tabla learners as the strokes on the *Bayan* are performed using the wrist. Whereas, on right/dominant side, strokes are performed using the fingers.

Conditioning refers to augmentation of the energy capacity of a muscle through an exercise program.

Active range of motion exercises, strengthening and stretching exercises are important elements of conditioning program designed to promote pain relief as well as reduce the risk of injuries.

A conditioning program for musicians can be applied for effectively managing playing related pain, especially in reducing its frequency and severity. Physical therapy exercises should be considered in modifying performance-related factors that have been reported [4].

## 2. Aim

The main aim of the study is to determine the effect of conditioning physiotherapy exercises on tabla playing related wrist pain in young table learners.

## 3. Objectives

- To observe the effect of physiotherapy conditioning exercises on tabla playing related wrist pain in children
- To observe the effect of tabla “Kaida” on tabla playing related wrist pain in children

## 4. Hypothesis

- Null hypothesis ( $H_0$ )-Conditioning physiotherapy exercises will show no effect on tabla playing related wrist pain in young tabla learners.
- Alternate hypothesis ( $H_1$ )-Conditioning physiotherapy exercises will show effect on playing related wrist pain in young tabla learners.

## 5. Review of Litreature

- Sonia Ranelli *et al.* conducted a study in the year 2012 on

“Playing-related Musculoskeletal Problems in Children Learning Instrumental Music: The Association between Problem Location and Gender, Age, and Music Exposure Factors”.

Results: Sixty-seven percent of students reported PRMP symptoms at some point, 56% reported them within the last month, and 30% reported an inability to play as usual within the last month. The right (24%) and left (23%) hand/elbow and neck (16%) were the most commonly reported PRMP locations. Odds ratios for the risk of PRMP in different locations varied by instrument played.

Conclusions: The high prevalence and location of PRMP are important issues for child and adolescent instrumentalists. Gender, age, and music exposure are associated with PRMP risk and need to be addressed to ensure musicians' personal well-being and musical longevity.

- W Mishra *et al.* 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 tabla 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.

- Chan *et al.* conducted an ABG award winning study in the year 2014 on

“Effect of a Musicians' Exercise Intervention on Performance-Related Musculoskeletal Disorders”.

The purpose was to evaluate the effect of purpose-designed exercise program on performance-related musculoskeletal disorders (PMRDs) and associated risk factors in a sample of professional orchestral musicians. Conclusion: of the study was that A tailored exercise program for musicians was effective at managing PMRDs especially in reducing the frequency and severity of PRMDs. Physical therapy exercises should be considered in modifying performance-related factors that have been reported to be predictors of PRMDs.

- C. Zaza, V. T. Farewell conducted a study in Sept 1997 on

“Musicians' playing-related musculoskeletal disorders: An examination of risk factors”

Conclusion -This study suggests that females and string players were at a higher PRMD risk. A number of other individual characteristics were also important determinants of the development of a PRMD. Warming up before and taking breaks during practice sessions protected the subject from a PRMD. Given the high proportion of musicians who experience PRMDs, prevention programs are warranted.

- Irina Foxman, Barbara Burgel conducted a study in July 2006 on

“Musician Health and Safety- Preventing Playing-Related Musculoskeletal Disorders” Summarizing that Musicians are exposed to high risk musculoskeletal activities such as repetition, hours of

exposure awkward postures when playing instruments. These activities may result in PMRDs  
 Conclusion-Student occupational health nurse practitioners in this pilot project performed outreach and comprehensive screening and treatment for a small group of musicians diagnosed as having PMRDs. Tendon and nerve gliding exercises were a key component of the treatment plan.

**7. Criteria**

Inclusion criteria	Exclusion criteria
Beginner tabla learners with wrist pain on non-dominant side	Not more than 3 months training Experience
Age-7-12 years	History of recent trauma
Alternate days or daily training	Sports involving non dominant wrist
Sole instrument being learnt	
Both male and female	
30min-1 hr training duration	

**8. Materials Used**

- Consent form.
- Visual Analog Scale
- PRWE questionnaire
- Pen
- Paper
- Colorful sponge balls
- Mats

**9. Outcome Measures**

Visual Analog Scale (ICC = 0.97) [15-18]  
 Patient Rated Wrist Evaluation Scale (ICC=0.90)

**10. Procedure**

- Study began with presentation of synopsis to the ethical committee and clearance was obtained.
- Various music instrumental institutes in and around Pune were visited.

**6. Methodology**

- Sample size: 50
- Study design: Randomized Controlled Trial
- Sampling method: Simple Random Sampling.
- Study population: Young Tabla Learners
- Study setting: Instrumental Music Institutes in and Pune.
- Study duration: 6 months.

- Subjects were selected for the study based on the inclusion and exclusion criteria. Consent was taken from the subjects’ parent/guardian. Procedure was explained to them.
- In the sequence of enrolment of the subject, even numbered i. e. half the subjects were categorized as group ‘A’-the experimental group. The other half, odd numbered subjects were categorized as group ‘B’- the control group.
- A pre intervention VAS and PRWE scoring was recorded for both groups.
- An exercise protocol was administered among the group a subjects prior to routine practice session. This was continued before training for a period of 1 month.
- Subjective assessment of pain and function post training after 1 month was taken from both groups.

Protocol to be followed (Group A)-The Experimental Group all exercises are performed in erect sitting posture on mat prior to tabla training.

Exercise	Reps	Hold
A. Place arms on thigh with wrist at its edge, then wrists up and down.	10	
B. “Wave” by keeping arms in front with fingertips extended upward. Move wrists outward, toward your pinkie side, then inward, toward your thumbs.	10	
C. With a fist, Rotate both wrists inwards and outwards	10 each	
D. Holding arm straight in front of your body, moving palm up and gently applying pressure with the other hand. Repeat with the other hand.	3 each	15 second
E. Holding arm straight in front of your body, moving down up and gently applying pressure with the other hand. Repeat with the other hand.	3 each	15 second
F. Spread fingers on both hands out as far as you (comfortably) can, then squeeze into a smiley sponge ball then spread out.	10	5 second

**Kaida Training**

**“Kaida” Teental**

Dha dha te te  
 Dha dha tu na  
 Ta ta te te  
 Dha dha dhin na

**Palta 1**

Dha dha tete tete tete  
 Dha dha tete dha dha tun na  
 Tata tete tete teye  
 Dha dha tete dha dha dhin na

**Palta 2**

Dha dha tete dha dha tete  
 Dha dha tete dha dha tun na  
 Tata tete tata tete  
 Dha dha tete dha dha dhin na

**Palta 3**

Dha dha tete dha te te dha  
 Dha dha tete dha dha tun na  
 Tata tete tate te dha  
 Dha dha tete dha dha dhin na

Starting slow and rhythmically, each theme is played for 5-10 times over duration of 5 minutes each  
 Kaida theme introduced slowly at half or quarter of the eventual speed progressively increasing at the desired speed.

**Group B-The control group**

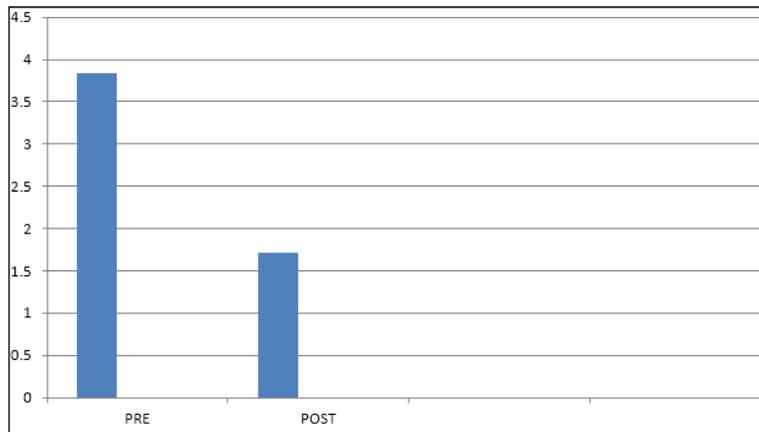
Goes ahead directly with the Kaida training in the above

mentioned manner.

**11. Statistical Analysis**

- **Graph 1 and Table 1**

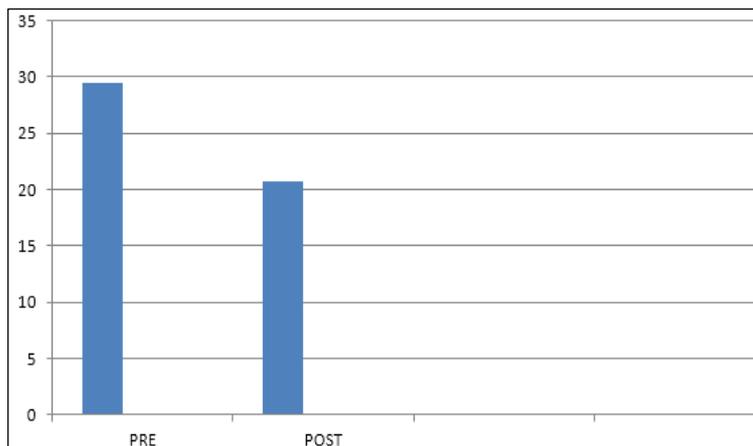
**Effect of Conditioning Physiotherapy Exercise on Vas in Group A**



Group a	Mean± sd	T value	P value	Significance
Pre value	29.44±1.91	45.58	<0.001	Highly significant
Post value	20.7±1.51			

**Graph 2 and Table 2**

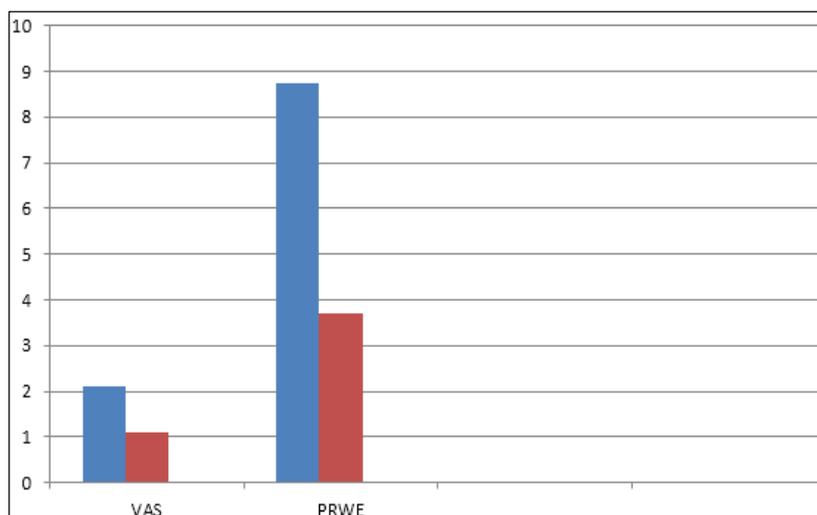
**Effect of Physiotherapy Exercises and Tabla Kaida on Prwe**



Group a	Mean± sd	T value	P value	Significance
Pre value	29.44±1.91	45.58	<0.001	Highly significant
Post Value	20.7±1.51			

**Graph 3**

**Effect on Vas and Prwe in Group A and Group B**



## 12. Result

- Within Group A when comparing the Mean value of pain the pre-treatment ( $2.832 \pm 0.733$ ) and post treatment ( $1.716 \pm 0.395$ ) results showed highly significant difference ( $p < 0.001$ ,  $t = 21.35$ ) by paired t test. Also, the mean value of PRWE pre-treatment ( $29.44 \pm 1.91$ ) and post treatment ( $20.7 \pm 1.510$ ) results showed highly significant difference ( $p < 0.001$ ,  $t = 45.58$ ) by paired t test.
- Within Group B when comparing the Mean value of pain the pre-treatment ( $6.783 \pm 0.935$ ) and post treatment ( $2.588 \pm 0.642$ ) results showed significant difference ( $p < 0.001$ ,  $t = 10.48$ ) by paired t test. Also, the mean value of PRWE pre-treatment ( $29.4 \pm 5.72$ ) and post treatment ( $25.68 \pm 3.34$ ) results showed significant difference ( $p < 0.005$ ,  $t = 33.90$ ) by paired t test.
- There is a highly significant difference in VAS in both, the experimental and control groups. Also, there is a significant difference in PRWE scores in both groups. However, significance is very strong in the experimental group.

## 13. Conclusion

The study concludes that physiotherapy exercises are effective in reducing pain and disability in young tabla learners.

Also, practicing tabla “kaida” has shown a significant difference in pain and related difficulties. However the effect is marginally high in the experimental group that performed physiotherapy exercise.

## 14. Limitations and future scope

- Limitations
  1. No specific “kaida” training done universally
  2. Time period for beginning of “kaida” training varies individually
  3. Assessment measures subjective
  4. Other pathologies of wrist not assessed
- Future Scope
  1. Number of interventional exercises can be added
  2. Assessment and addressal of pain in associated, larger areas of body on same group
  3. Training hand function based on beats

## 15. Discussion

- The study was done with the aim to determine the effect of conditioning physiotherapy exercises on tabla playing related wrist pain in young table learners.
- Initially a thorough study about the revolutionary playing arts and subject of interest was done. After keeping in mind all aspects of the study, a synopsis was created it was put forth for clearance from the ethical committee.
- Musical institutes in and around Pune were visited and the training process including the “Kaida” training was better understood after starting to work on the project.
- Pre-treatment VAS and PRWE scale outcomes were recorded. A designed physiotherapy training program was given to the subjects of the experimental for around 4times a week for duration of a total of 4 weeks. The control group went ahead with their conventional “kaida” training. Post intervention values of the VAS and PRWE scales were then taken and conclusions

drawn. Paired t test within the group and an unpaired t test in between the groups was done.

A tailored conditioning program helps in maintaining the muscle tissue length, increased blood flow and extensibility thus improving the effectiveness and reduced spraining, straining and stiffness of the soft tissues. Also, consideration of all elements of conditioning-frequency, intensity, type and time is taken.

Also, the conventional “kaida” training followed by the players had a significant effect in the reduction of pain and other functions which can be explained by use of repetitions of the specific movements involved in the beats. However, the high incidence of playing related injuries and pain have still been reported making it call for novel interventional studies to improve the above mentioned status of players.

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