# Effect of Six Weeks Training Program on Pain and Functional Ability of Archery Players with Mild Impingement of Shoulder

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***Abstract*- BACKGROUND: Archery requires the ability to shoot an arrow at a given target with accuracy. Accurate arrow shooting at a predetermined target is necessary for archery.**
**OBJECTIVE: To find the effect of six weeks training program in improving the pain. To find the effect of six weeks training program in improving the functional ability.**
**METHODS: A total of 30 participants were derived as a sample. Random sampling was done. Participants received the home exercise treatment for six weeks. Age, weight and height were calculated before starting the treatment. Shoulder Pain And Disability Index (SPADI) was used to measure pain before, during and after treatment.**
**RESULTS: Distribution of study participants according to age group with their weight, revealed that the mean weight of 17-19 years age group was 60.43kgs with 9.29 and 60.96kgs with 9.11kgs variation for 20-22 years of age group. The result shows that SPADI percentage compared by pre and post invention with their mean values. The average value in pre intervention was 54.35 with 20.60 standard deviation, the mean value at post intervention was found to be 19.86 with 12.22 SD. Independent t-test was used for comparison and the calculated value was obtained as 8.59 and the result was significant at 0.01 level of significance.**
**CONCLUSION: The present study concluded that effect of six weeks training program showed significant improvement on pain and functional ability of archery players with mild impingement of shoulder.**

***Keywords:*** **Archery players, SPADI, Shoulder impingement, Shoulder pain.**

## I. INTRODUCTION

Archery is an individual and non-contact, static sports that requires archer to possess muscular strength, upper body endurance, coordination, attention, concentration and high levels of stability with proper precision and focus. Archery requires the ability to shoot an arrow at a given target with accuracy. Accurate arrow shooting at a predetermined target is necessary for archery. The following shooting distances are permitted per the International Archery Federation regulations: Men's sizes are 90 m, 70 m, 50 m, and 30 m; women's sizes are 70 m, 60 m, 50 m, and 30 m. Competitors must execute 144 shots in a single day, which calls for a particularly reliable action. In archery, the shot is frequently described as having three phases [1]. The stance, the arming phase, during which the archer pushes the bow and pulls the bow string, and the sighting phase, which involves the final stretching of the bow while targeting. The arming phase consists of dynamic work of the shoulder joint and the sighting phase almost isometrically loads the shoulder girdle. The shoulder joint maintains internal rotation, flexion, and horizontal extension for a brief period of time during the sighting phase. Shoulder soreness results from performing target practice movements repeatedly. Consequently, it was observed that right shoulder soreness in archery players constituted an occupational hazard. Archery involves shooting arrows at a target from set distances. The repetitive movement of drawing and releasing the bow can put asymmetric forces on the structure of shoulder girdle and which act as the causative mechanism for archery related shoulder injuries. Repetitive concentric and eccentric contraction of the muscles of shoulder girdle and upper back during draw and stance may cause fatigue and tendinitis of the surrounding muscles [2]. Impingement syndrome is the most frequently reported cause of shoulder pain in athletes who participate in overhead sports during the archery competition, an archer shoots the whole day and drawing the bowstring weighing about 14-22 kg. An archer shoots totally 144 arrows except for the test shots. So, an archer pulls an average of 20 kg during

every single shot and totally 144x20=2880 kg [3]. The most crucial motion in archery, according to coaches, is "back tension." The major and minor rhomboids are two large, deep muscles in the back that are mostly utilized to tense the back. They draw or retract the shoulder blades forward toward the spine. The levator scapulae, a deep muscle that pulls the shoulder blades back, assists the rhomboids in their work. The top, middle, and lower components make comprise the broad superficial muscle group known as the trapezius. Depending on the angle of the pressure on the muscle fibers, the fibers of these sections work as ropes to draw the shoulder blade upward, inward, or downward. The main back muscles required for tension are the rhomboids, levator scapulae, and trapezius, which, when used properly, hold the bow back at full draw. The largest back muscle is called the latissimus dorsi. The primary purposes are to rotate the arm inward, drag the arm to the side, and extend the arm rearward. The "lats" help the posterior deltoid extend the drawing arm backward and rotate it inward during the drawing process [4].

The pathologic contact between the glenoid edge and the side of the rotator cuff that confronts the shoulder's articular surfaces is referred to as internal impingement. This condition frequently manifests in young, competitive overhead athletes. Asymptomatic shoulders have been reported to have contact between the glenoid and the rotator cuff without any signs of a pathologic change. Although under extremely high loading conditions, the shoulder of an overhead athlete normally performs repetitive motions at the limits of the functional arc of motion. These diseases have been proven to cause osseous and soft tissue adaptations over time. Sports performance is altered by shoulder impingement syndrome. Sports involving overhead arm motions sometimes include athletes experiencing shoulder impingement symptoms. Although their origin is thought to be complex, they are linked to a wide variety of underlying mechanisms and traumas. Overuse is one of the major contributors to the onset of symptoms. The diagnosis is typically made after the athlete has ceased practicing because to worsening pain levels and functional restrictions Therefore, resistance training exercises over the full range of motion with considerable load are an inappropriate treatment strategy at that moment.

In the rehabilitation process of shoulder impingement, exercises focusing on selective activation of weaker muscle parts with minimal activity in the hyperactive ones are an important component. Hyperactivity of the upper trapezius (UT) with reduced middle trapezius (MT) and lower trapezius (LT) muscle activation in addition to insufficient serratus anterior (SA) muscle function has been related to decreased amounts of scapular upward rotation, external rotation, and posterior tilt in patients. Recent study selected 4 exercises to rehabilitate the scapular muscle balance based on low UT/MT and UT/LT ratios in healthy subjects [5]:

(1) Side-lying forward flexion,
(2) Side-lying external rotation,
(3) Prone horizontal abduction with external rotation, and
(4) Prone extension in neutral position

## II. METHODOLOGY

*A. STUDY DESIGN*: Experimental study designed approved by the institutional Review Board of Gurugram University.

*B. PARTICIPANTS AND RANDOMIZATION:* A total of 30 participants were derived as a sample. Random sampling was done. Study was done at Vidyasagar Sports Academy, Takshila School Archery Club, Faridabad, Haryana. The study was conducted from 17 August 2022 to 10 October 2022. This study includes archery athletes, both males and females, who were lies in the age group of 17 to 25 years. Athletes who were suffering from shoulder impingement symptoms for at least 3 months. Participants must be practicing archery for at least a period of one year. Participants must have at least 2 of the following 5 criteria in addition to a history of shoulder pain that is positive Neer sign [6], positive Hawkins's sign [7], positive Jobe's sign [8], pain with Apprehension and positive relocation. In our study excludes subjects who were less than 17 years and more than 25 years of age group. Participants who were other than archery profession. Participates if they had any history of dislocation, shoulder surgery, current symptoms related to the cervical spine or any other documented structural injuries to the shoulder complex. Outcome measure was Shoulder Pain and Disability Index (SPADI) [9].

*C. EXERCISE PROGRAM:* The subjects were tested before and after a 6-week daily home exercise program. In our study, a 6-week training period was

used because the most significant improvement was expected in this time period.

Before starting the program, the athletes were thoroughly instructed in the 4 exercises by physical therapist. Three sets of 10 repetitions for each exercise will be prescribed, with 1-minute rest between sets. Initial exercise weights were determined and based on gender and body weight but will be further individualized by 10 repetition maximum (RM) testing. To minimize repetitive overload, the order of the exercises was altered in every week.

| EXERCISE | DESCRIPTION |
|---|---|
| PRONE EXTENSION | The subject is prone with the shoulders resting in 90 of forward flexion. From this position, the subject performs bilateral extension to a neutral position with the shoulder in neutral rotation. |
| FORWARD FLEXION INSIDE LYING | The subject is in a side-lying position, with the shoulder in neutral. The subject performs 90 of unilateral forward flexion in a sagittal plane. |
| EXTERNAL ROTATION INSIDE LYING | The subject is side lying with the shoulder in neutral position and the elbow flexed 90. From this position, the subject performs 90 of external rotation of the shoulder with a towel between the elbow and trunk to avoid Compensatory movements. |
| PRONE HORIZONTAL ABDUCTION WITH EXTERNAL ROTATION | The subject is prone with the shoulders resting in 90 of forward flexion. From this position, the subject performs bilateral horizontal abduction to a horizontal position, with an additional external rotation of the shoulder at the end of the movement. |

*D. DATA COLLECTION PROCEDURE:* Academy was selected for the sample collection. Then the subjects were explained about the purpose of study. Then they were evaluated according to the inclusion and exclusion criteria. Informed Consent form was obtained. Demographic details of the subjects were asked which included their name, age, address, date, practicing year and etc. Participants were randomly selected for the study. Pre and post testing were performed in the same setting with the same standardized examination protocol, assessment method and testing equipment. Initial data was collected on the day of exercise will be provided. Shoulder Pain and Disability Index (SPADI) score will be individually obtained.

*E. DATA ANALYSIS*: The data were collected and entered in Microsoft excel sheet and were analysed using statistical package for social science (SPSS) version 28. The mean and standard deviation of age, height and weight were calculated and hence comparison was taken out. Analysis was performed for SPADI. Mean and standard deviation of all the dependent variables of participants were calculated.

## III. RESULTS

Table no.1. Distribution of study participants according to age group with their weight

| Age-Group | Mean Weight | Standard Deviation (SD) |
|---|---|---|
| 17-19 | 60.43 | 9.29 |
| 20-22 | 60.96 | 9.11 |

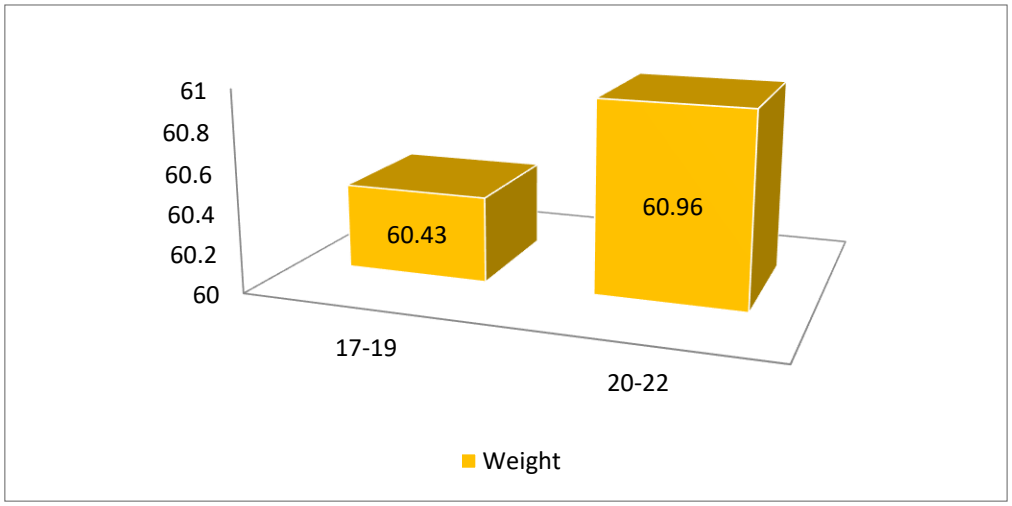
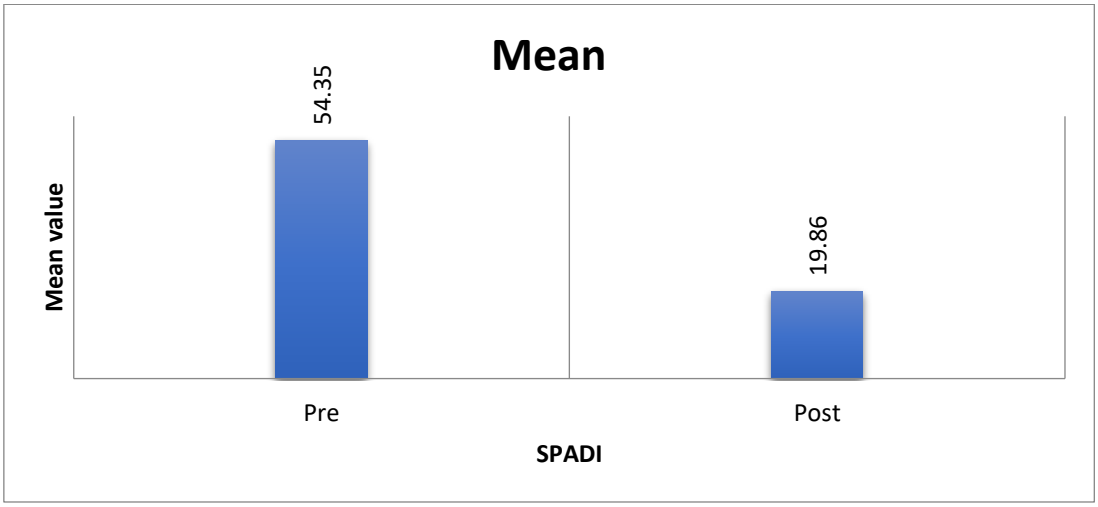


Table no.1and figure1.1 distribution of study participants according to age group with their weight, revealed that the mean weight of 17-19 years age group was 60.43kgs with 9.29 and 60.96kgs with 9.11kgs variation for 2022 years of age group.

Table no.2.Comparison of SPADI values according to pre and post interventions

| SPADI | Mean | Std. Deviation | t-value | p-value |
|---|---|---|---|---|
| Pre | 54.35 | 20.60 | 8.59 | 0.001* |
| Post | 19.86 | 12.22 | | |

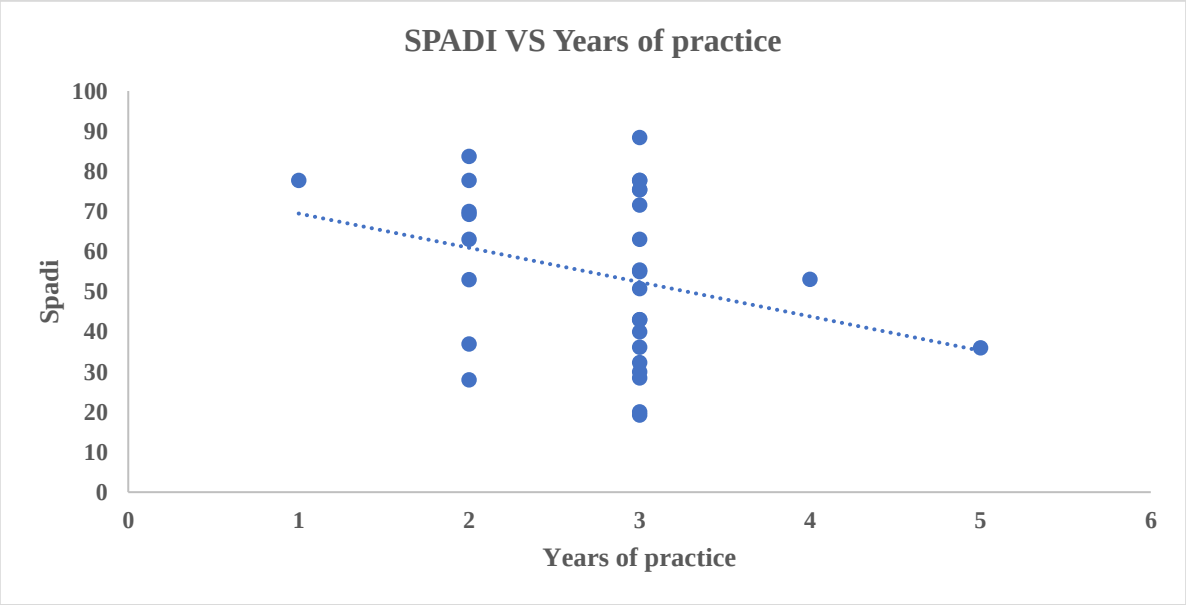
**= Significant at 0.01 level of significance*.




In this present study, table no.2 and figure2.1, shows that the SPADI percentage compared by pre and post invention with their mean values. The average value in pre intervention was 54.35 with 20.60 standard deviation, the mean value at post intervention was found to be 19.86 with 12.22 SD. Independent t-test was used for comparison and the calculated value was obtained as 8.59 and the result was significant at 0.01 level of significance.

Table no.3. Correlation of SPADI value with year of practice

| Correlation | Mean | Std. Deviation | r-value | p-value |
|---|---|---|---|---|
| SPADI | 54.35 | 20.60 | -0.302 | 0.105 |
| Year Of Practice | 2.75 | 0.75 | | |



In our study, table no. 3 and figure3.1 depicts that, the correlation between SPADI percentage at pre intervention with year of practice. Pearson's correlation coefficient test was applied and the value -0.302 represents the negative correlation between them, i.e., both the variables are inversely proportional to each other and the result was not significant at 0.05 level of significance.

## VI. DISCUSSION

The most important findings, according to SPADI scores, the exercise program was able to produce modifications or improvements in pain and functional abilities. The individuals in the study showed decrease in their pain levels and increase in their functional ability after performing the six weeks training program. Some studies conducted in the past on the effects of exercise in the treatment of shoulder impingement have been found to have statistically or clinically meaningful impact on pain relief or improved function in many overhead athletes but no study was done particularly on archery players.

To interpret the results of our study in relation to earlier research on this subject, it is difficult to compare them to the findings of other studies because different studies examined the effects of various exercises in various study populations, under various training modalities, and with various outcome measures.

H. Surendra Sharma et al., 2015 [4] conducted a study on effectiveness of six weeks training on static strength of archery players. It concluded that the studies that were included looked at overhead athletes as a result. The majority of studies discovered that how overhead athletes improve their pain but very less literature is present particularly for archery players. However, several outcomes were not statistically significant, and there was heterogeneity in others.

## V. LIMITATION OF THE STUDY

This study did not see for immediate and delayed retention.

## VI. FUTURE SCOPE OF THE STUDY

1. Study can be done on a wider Sample.
2. Different subjects and age groups can be studied.

## VII. CONCLUSION

The present study concluded that effect of six weeks training program showed significant improvement on pain and functional ability of archery players with mild impingement of shoulder.

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