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Rehabilitation of Rotator Cuff Acute & Chronic injury in Throwing Sports athletes (Cricket & Baseball) through Theraband & Hydrotherapy Exercises plus Treatment & Diagnosis Evaluation

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ABSTRACT

Aim of the Study: The present research aimed at the rehabilitation of rotator cuff injury (RC) in national and university level athletes of cricket and baseball who belonged to the five different cities of Punjab (Lahore, Multan, Gujranwala, Faisalabad & Sialkot) having confirmed Acute and Chronic injury along with treatment and diagnosis evaluation.

Methodology: The data was collected from 5 major cities of Punjab and a total of (N=100) athletes were taken as a sample size and a diagnosis based on physical assessment tests used to identify the level of the injury. Similarly, another group of Control injured subjects (N=20) selected for further comparison. Pre and post-test data were taken to compare the values before and after the execution of rehabilitation plan. The rehab plan integrated several theraband & hydro exercises were executed for 6 weeks. A survey questionnaire was also spread to get the feedback before and after the sessions of athletes. The principle of Specificity, Progression, over loading, Rest & Restoration along with Rest, Ice, Compression & Elevation (R.I.C.E) is used (As per obligatory). The reliability calculated through Cronbach's Alpha and its value was 0.86.

Findings: The statistical analysis completed with the help of SPSS-26, paired sample t-test utilized and results showed statistically significant values. The conditioning plan was satisfactory and all the athletes returned to their sport after the completion of the rehabilitation and recovery program.

Conclusion: rotator cuff injury can be prevented at initial levels if it is diagnosed properly and a suitable rehab plan can boost up the recovery process. The proper technical guidelines and awareness can also enhance the performance of the muscle and can prevent the reoccurrence of the injury in the athletes.

Keywords: Rotator Cuff, Rehabilitation, Treatment and Trauma, Theraband & Hydrotherapy.

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Introduction

The importance of the organized sports has been grown up in popularity for the last few decades, resulting in an increase in the number of overuse injuries among children and adolescents. The injuries have an important impact on playing career and limited to the athlete's ability to participants in pressure sport. The rotator cuff is one of the commonest injuries among injuries of sports which generated pain and dysfunction in throwing athletes to different levels of competitions of all sports. It is also a primary dynamic stabilizer of the glenohumeral joint which is placed under significant stress during contact sports. The rotator cuff injury has been diagnostically confirmed and physical activity becomes altered (activities of daily living or work/athletic tasks), therapeutic exercise which might be beneficial for attempting to restore the lost function as long as all contributing factors have been considered (Millett *et al.* 2006).

Shoulder difficulties are known to be affect 26% of wheelchair athletes, 36% of high-level water polo players, 50% of elderly tennis players, 60% of swimmers, and perhaps much more among high-level baseball pitchers. Following a direct impact injury to the shoulder, rotator cuff-related to shoulder discomfort and dysfunction which have also been described (Blevins, 1997). Throwing sports, notably baseball, have increased the occurrence of such injuries in skeletally immature players, with long-term impairments and deformities are possible. The causes of rotator cuff tears in young athletes have been linked to overuse and repetition of overhead movements. Abduction coupled with external rotation is thought to press on the rotator cuff, notably the supraspinatus, causing articular-sided fraying and eventually rotator cuff tears. Even asymptomatic throwing athletes have been reported to experience impingement (Weiss *et al.,* 2013). A prospective epidemiologic study among college-level baseball players, which sought to establish an injury pattern in collegiate-level baseball players, reported that the overall incidence of any related complaints or injuries was 19%. Fifty-eight percent of the injuries occurred in the upper extremity, with shoulder injuries among the most prevalent. Because of the mechanics of pitching, there was a higher incidence of shoulder injuries among pitchers which was resulted in 69% of the total injuries.

There is no such evidence of rotator cuff injuries in overhead injuries but cadaveric, radiographic and arthroscopic research had clear proof of that. Shaffer and Huttman (2014) observed in twenty rotator cuff injured have a problem in throwing shoulder as compared with non throwing one which is forty percent of their subjects (Connor *et al.,* 2019). Shaffer and Huttman (2014) cited in his research while they worked on a group of young athletes that articular tears found to be (91%) of partial tears, especially the rupture muscles, the true incidence of that among the shoulders injured was probably overlooked. Rehabilitation is one of the major factor to come back to replay condition. A rehabilitation plan of sports injuries required extra care, highly structured exercise and sports specifically approach which prepared both athlete and the injured tissue as per requirement of psychological and physical demands at highest level of competition (Kibler *et al*., 2006; Gill *et al.,* 2021).

Significance of Study

The study focuses on the proper rehabilitation plan for rotator cuff injury with efficient (Cricket & Baseball) through proper technique along with treatment and diagnosis; by using theraband & hydro exercises to help the athletes to recover rapidly, effectively, efficiently and economically from the rotator cuff injury.

Objectives of the Study

- Educate the athletes & coaches about the importance of rehabilitation for athletes suffering from rotator cuff injury.
- To strengthen the weak muscles through rehabilitation exercises and regain strength.
- To return to play after complete recovery through theraband & hydro exercises.

Research Question

- Does rehabilitation have an important technique in the recovery of the throwing muscle injury Rotator Cuff injury?
- The implemented Theraband & Equatic exercises rehab plan is helpful & effective for the athlete.

Research Hypothesis

- Rehabilitation with Theraband & Equatic exercises plays a vital role in the recovery of athletes suffering from a rotator cuff injury (RC).

The following Figure 1 shows the anatomy of the rotator cuff muscles

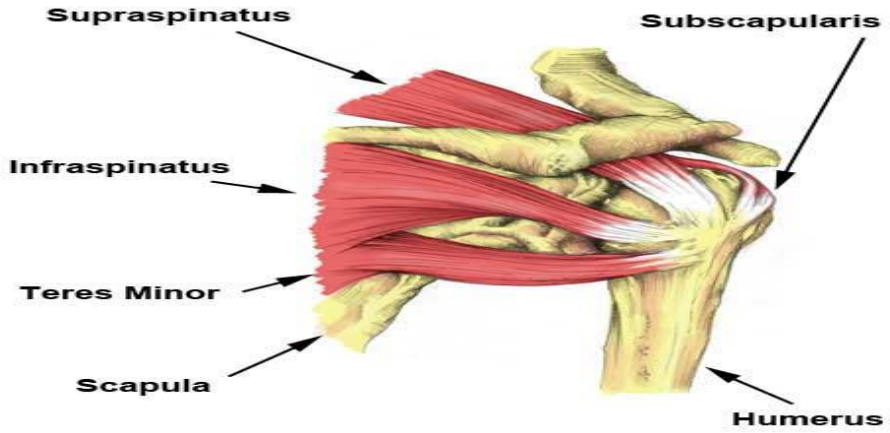

Figure:1 (Anatomy of the rotator cuff muscles)

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Assessment of Rotator Cuff Injury

In examining the athlete with shoulder complaints, comprehensive medical history and nature of the symptoms is required. In addition to specific inquiries concerning shoulder symptomatology, it's crucial to ask the athlete about cervical spine symptoms and injuries that could lead to referred shoulder discomfort, particularly in older athletes. In overhead athletes, rotator cuff disease commonly presents as pain during the throwing motion. Internal impingement and anterior instability have been linked to pain during the early stages of acceleration. The location of discomfort may be useful in determining the injury's location. Anterior pain from a subscapularis injury, anterolateral superior discomfort from supraspinatus pathology and posterior pain from an infraspinatus injury are all possibilities. Internal impingement may be the cause of posterior-superior pain during overhead activities. Athletes with modest anterior instability and subsequent cuff disease may experience signs of instability like the arm becoming dead or a sensation of subluxation. They will usually complain of a general loss of pitching or throwing speed, power, or endurance. Athletes who have a total rotator cuff injury frequently experience pain during rest and at night. With increasing overhead activity, those with rotator cuff tendonitis experience pain. Early internal impingement throwers frequently complain of stiffness and a prolonged warm-up time (Blevins, 1997). Furthermore, says when the rotator cuff is injured as a result of a direct hit to the shoulder, the chronic injury with not properly treated or installed rehabilitation, the symptoms are usually severe pain and weakness. Because the supraspinatus is the most usually implicated muscle, discomfort and weakness are most noticeable when performing overhead movements (Blevins, 1997; Shaffer and Huttman, 2014). Athletes nearly usually remember a specific event that triggered their symptoms as they complain of discomfort and dysfunction that limits their ability to return to sport with on rare occasions, daily activities. Prior to their contact injury, athletes under the age of 40 years often have no history of

shoulder difficulties; however those over 40 years may have had some chronic symptoms due to impingement and cuff tendonitis. Although the rotator cuffs disease after an acute glenohumeral anterior dislocation is uncommon in young athletes. The chance of a cuff tear after a dislocation rises with age, becoming particularly high in people over the age of 40 (Blevins, 1997).

Treatment

The athlete's initially causes, level of disability, relevant action to injury, duration of the recovery timing, R.I.C.E principle, Isometric, isotonic & iso-kinetic exercises for rehabilitation and associated diagnoses all have contribute an important role in treatment along with categorization of incomplete Cuff injuries which resulted in chronic as per not treated properly. Additionally, the medicines prescribed by the doctors have a great importance in recovery and regaining strength. Any management strategy must take into account the results of past investigations, treatments, and the retort to old history output (Shaffer and Huttman, 2014; Gill *et al.,* 2019; Gill *et al.,* 2021).

Non Operative

According to Shaffer and Huttman (2014) mostly the management of rotator cuff injury is non operative. This is because the high incidence of rotator cuffs injury in sports especially in throwing events. The previous used management techniques are not guarantee for successful execution recovery and replay as well. The primary defended against cuff throwing athletes to stop playing and get rest as soon as possible, try non-steroidal anti-inflammatory medicines (NSAM) and go through a physical therapy programmed. Stretching with the arm mobilization is used to treat posterior capsular contractures (Tallat, Arshad, & Gill, 2018). To create strength in shoulder joint, core muscles (abdomen), and thoracic muscles are used to reinstate normal scapulothoracic and trunk rotation mechanics as reduce pain, regain rotator cuff strength and recital functional improve. A gradual short distance throw or movement activity planned with a game specific and postural specific spotlight aids in the restoration of good mechanics, food supplementation along with use of subacromial corticosteroid injections occasionally (Gill et al., 2022). The length of non-operative treatment also depends on the causes, the depth of the disease, and the athlete's circumstances. While three months is an acceptable time frame for a complete programmed, some rehab plans take long time to recover, particularly for athletes who have a full rupture. A comprehensive literature, non-treatment therapy of partial tears regarded as reasonably beneficial for a large number of over head throwers (Shaffer and Huttman, 2014).

Methodology

100 male athletes belonged to five major cities of Punjab (Lahore, Multan, Gujranwala, Faisalabad & Sialkot) were part of this study. The study was cross sectional studies in which qualitative and quantitative approach along with selective sampling with deductive approach utilized and a total of 20 subjects each from all cities. The athletes belonged to cricket and baseball sports only as most cases are seen in these activities. The age range was identified from 18-40 years respectively. Another group of Control injured RC with N=20 selected for further comparison. All the players were either novice with acute or chronic symptoms RC injury, as they not properly treated results in chronic. Principal of specificity, overloading, rest & restoration and progression implemented right through the research. The activity of all research is shown in flow chart as Fig.1.

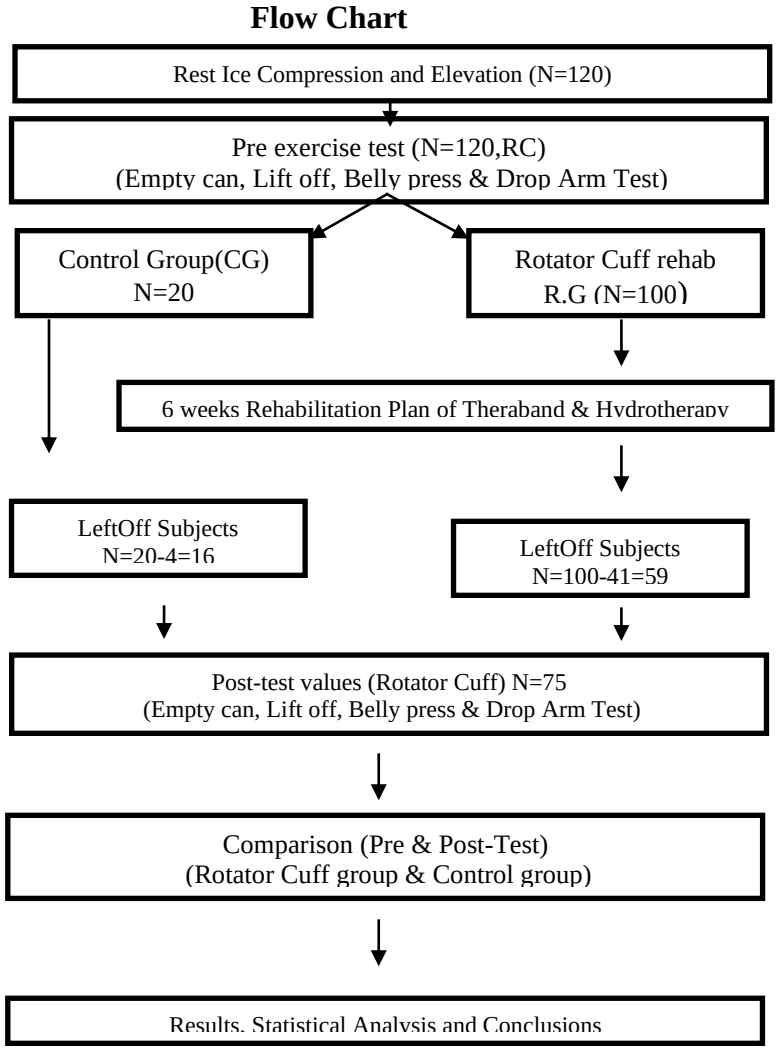


Fig. 1 Shows the Flow Chart of RC

Subjects Selection

Diagnosis of the Injury

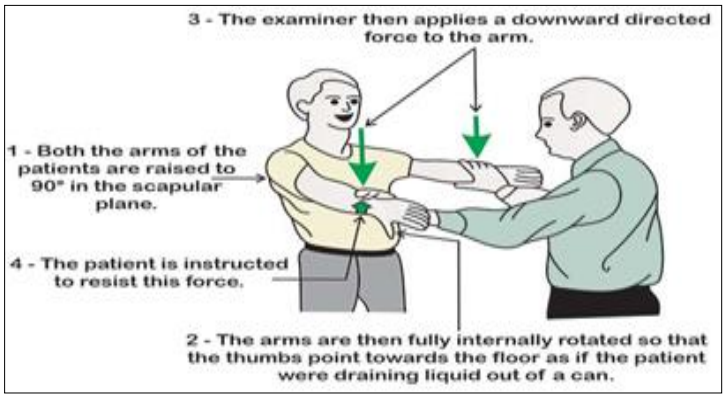
The diagnosis was done by conducting a physical assessment on the shoulder of the athletes. A number of tests were performed to detect the severity of pain and immobilization of the rotator cuff muscles at pre test procedure. The tests used by the researcher have high validity and reliability and it have been used in numerous researches done in the past. Some of the tests used by the different researcher are:

Jobe Test (Empty Can Test)

The supraspinatus test has also a second name as "**Jobe test"**. The test should be executed in the plane of scapula which is 30°. The arm is placed at 90° (abduction) and 30° (Horizontal, abduction) in the plane of scapula as the thumb position in downward direction to execute medial rotation of the shoulder. The Asser pushes the arm in downward direction to put pressure as a result the athlete while asking to resist the pressure. If it resulted in pain and no strength in muscles so it's an indication of a optimistic test. N=15 athletes tested positive by doing the empty can test. There was minor to major pain and this varied from athlete to athlete (Longo et al., 2011).

- Both arms of athlete are raised to 90° in the plane of scapula

- both the arms are positioned in such a way so that thumb should be pointed towards floor as if the athlete were draining liquid out of a can.
- The examiner than applies a downward direction power to the arm
- The athlete asked to oppose the power.



Drop-Arm Test (Supraspinatus)

The famous researcher Codman described this test. The athlete is asked to raise the arm with maximum elevation and gradually come down in movement in same arch direction. The condition should be considered as positive as if the athlete dropped the arm quickly and having pain, a total of N=18 athletes showed signs of pain and discomfort. Athlete unable to lower arm further with control

Drop- Arm Test (Rotator Cuff Test)

Abduction arm gradually lower

May be able to lower arm slowly to 90°(deltoid function)

Arm will then drop to side if rotator cuffs tests

Positive Test

Patient unable to lower arm further with control

If able to hold at 90° pressure on waist on waist will cause arm to fall

Lift-off Test (Subscapularis)

Gerber and Krushell1 in 1991 introduced this test and executed in that way to place the effected arm on the back (right behind the mid lumber region) and said the athlete to internally rotate the arm in raised (lift) position in posterior back off of the back or if the athlete performs the lifting position by extending the elbow or the shoulder. The position was executed on athletes & N=15 showed signs of soreness and affected ROM (range of motion) of the shoulder (Longo et al., 2011).

Belly Press Test

In 1996 a researcher Gerber executed the arm test at the side and the elbow flexed to straight 90°, by having the athlete to press the palm towards his belly by internally rotating the shoulder. The test is optimistic as:

(1) The athlete feels a pain or weakness as compared with other shoulder

(2) The athlete pushes the hand in the opposite direction of the abdomen in the direction of shoulder extension, showed that unable to apply power reverse to the abdomen by dynamic internal rotation formed by the subscapularis. The test was conducted on the athletes and N=13 had problems when doing internal rotation with pain and inability to rotate the arm properly indicating weakness in the rotator cuff muscle (Longo et al., 2011).

Belly Press Test

For: Subcsapularis Integrity

- Posture: Patient seated with arm 45° & full internal rotation
- Test: Resist further internal rotation
- Positive Weakness present

Treatment of Rotator Cuff (RC) injuries

The injured athletes who suffered from different complications of the rotator cuff muscle have been given a proper care along with special protocol of rehabilitation plan executed and it was observed preciously that safety and prevention from further deterioration of the affected area. The athletes who have been suffered the immobilization issues were given proper rehabilitation plan of isometric and isotonic strength exercise, range of motion exercises (flexibility exercises), mobilizing exercises along with theraband exercises. The athletes who had a pain or discomfort in the shoulder treated with the Rest, Icing, compression and Elevation (R.I.C.E) principle as per required by researcher, trainer, coaches and doctors (Collin *et al., 2015;* Edwards *et al.,* 2016; Rosa & Robert 2022; Reinholz *et al.,* 2023).

Table 1: *Physical Assessment Tests for RTCuff Injury (Checklist)*

Test	+ve	-ve	Remarks
Subscapularis			
1. Lift-off test	15	7	Pain with affected ROM (range of motion) of the shoulder
2. Passive lift-off test	-----	5	----------
3. Belly-press test	13	4	Unable to rotate the arm internally.
4. Belly-off sign	-----	3	----------
5. Bear Hug	-----	6	----------
Infraspinatus and Teres Minor			----------
6. External rotation lag sign at 0°	-----	3	----------
7. External rotation lag sign at 90°	-----	4	----------
Supraspinatus			
8. Jobe's test (empty can test)	15	5	Minor to major pain detected in the shoulder
9. Drop arm test	18	6	Extreme pain and discomfort
Other			
10. Neer's sign	-----	----	----------
11. Hawkin's sign	-----	----	----------
12. Speed's test	-----	----	----------

Rehabilitation Training Plan

Rehabilitation is one of the major factors to come back to replay condition. A rehabilitation plan of sports injuries required extra care, highly structured exercise and sports specifically approach which prepared both athlete and the injured tissue as per requirement of psychological and physical demands at highest level of competition (Gill et al., 2019: Gill et al., 2021; Gill et al., 2022; Zhang et al., 2022). The target rehabilitation plan was executed as mentioned in the table 2 below:-

Table 2: *Showed 8 weeks rehabilitation training plan for rotator cuff injury.*

Week	**1**	**2**	**3**	**4 Unload week**	**5**	**6**	**7**	**8 Unload week**
No of Days	1-2 Days	2-3 Days	3-4 Days	1-2 Days	2-3 Days	3-4 Days	4-5 Days	3-4 Days

Target Muscles: The muscle groups targeted which supported the shoulder joints in this conditioning program include:

(a) Teres (minor & major) (b) Supraspinatus (c) Infraspinatus (d) Subscapularis

Table 3: *Rehab Exercises (Isometric, Isotonic & theraband)*

Pendulum in water	Passive Internal & external Rotation (front movement) with & without theraband
Alphabets in water	Passive internal & external Rotation (back movement) with & without theraband
Short circles in water	Standing rows with and without theraband
Clockwise & anti clockwise	Abduction and medial rotation exercises with or without theraband
Forward & backward movement of arms in water	External rotation 90° with and without theraband
Side lift of arms inwards and outwards inn water	External rotation Arm abduction with and without theraband
Extended arms in 90° and make circles clockwise & anti-clockwise	Side lift hand through theraband up and down
Inwards and ourwards movement of extended arms in water	Side lift arm diagonally up and down with theraband

Note: After completion of every exercise there should be 30 sec rest.

Length of the Treatment Program

This rotator cuff conditioning program was continued for 8 weeks under the proper supervision of the qualified rehab specialist and support staff as available in five major cities of Punjab (Lahore, Multan, Faisalabad Gujranwala and Sialkot). After the recovery phase, these protocols utilized as a maintenance plan for further recurrence and increase life span of rotator cuff muscles. 3 to 5 days a week exercise conditioning program was done regularly by the athletes using different methods of shoulder stretching, exercises that would strengthen the shoulder and the use of rubber bands for mobilization of the muscles (Ellenbecker and Cools 2010; Gill *et al.*, 2021). The non-surgical rehabilitation treatment is showed in table 4:-

1. Pendulum in water

Prime movers Movements (muscles): Deltoids, supraspinatus, infraspinatus, subscapularis

Sets/Reps: 2 X 8 Reps
Weekly workout: 4 to 5 days

Step-by-step directions

- Put yourself as a lean forward and place your hand on a support and your other arm hand freely at your plane.
- Slowly sway your limb to and fore position. Do it again exercise movement as your arm movement side –to-side and redo it in a round movement.
- Do it again this all-exercise plan cycle with other arm as well.

Tip: Don't bend your back (round position) & your knees should be flexed.

Note: 30 sec rest in every exercise before performing

2. Crossover Arm Stretch (In water without theraband)

Prime movers Movements (muscles): Posterior deltoid
You should feel this stretch at the back of your shoulder

Sets/Reps: 4 reps (each side)
Weekly workout : 5 to 6 days

Step-by-step directions

- Put your shoulder in relax position & pull your arm in crossway direction, pull your elbow with straight arm as far as you can while holding your arm.
- The exercise should be done as hold for 30 sec
- Do it again and redo with the other arm as well.

Tip: Don't pull or put pressure your elbow.

Note: 30 sec rest in every exercise before performing

3. Passive Internal Rotation (Theraband & in water without theraband)

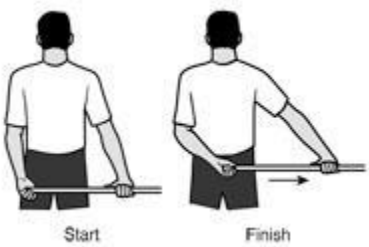
Prime movers Movements (muscles): Subscapularis
There should be a feel of anterior shoulder muscle stretch

Tools : Stick of length 2 feet

Sets/Reps: 4 reps (each side)
Weekly workout : 5 to 6 days

Step-by-step directions

- Put your hand on a stick on the back with your one hand and slowly grasp the next end to the other hand.
- Place the stick in horizontal direction in such a way as



your shoulder is feeling stretch at the point of stretch there should be no pain

- The position should hold for 30 sec.
- Do it again and do it on other side as well

Tip: Don't bend yourself or in a twist side position.

Note: 30 sec rest in every exercises before performing

4. Passive External Rotation (Theraband & in water without theraband)

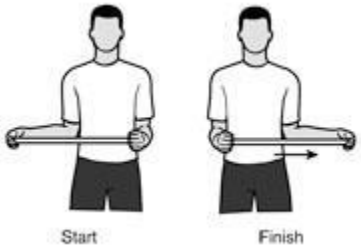
Prime movers Movements: Infraspinatus, teres minor
There should be a feel of posterior shoulder muscle stretch

Tools : Stick of length 2 feet

Sets/Reps: 4 reps (each side)
Weekly workout : 5 to 6 days

Step-by-step directions

- Hold the stick in you one hand and grab the other end of the stick with another hand
- Put your elbow on the side of your body and push the stick horizontally as shown in the figure feel the pull without pain.
- The position should hold for 30 sec.
- Do it again and do it on other side as well



Tip: Your hip should be in forward direction with no twist position

Note: 30 sec rest in every exercises before performing

5. Standing Row (Theraband & in water without theraband)

Prime movers Movements: Middle and lower trapezius
There should be stretch feel in the upper back and back of your shoulder

Tool: Theraband at your ease to do 3X12 exercise.

Sets/Reps: 3X8reps
Weekly: 3 days

Step-by-step directions

- Take a theraband and fixed it on a wall
- Stand parellal to the wall and pull the theraband as attached below to your waist height
- Your elbow should be within your body and pull your elbow in backward direction
- Return gradually to the start position and redo it

Tip: Press your shoulder both blades as you pull the theraband

Note: 30 sec rest in every exercises before performing

8. Internal Rotation (Theraband & in water without theraband)

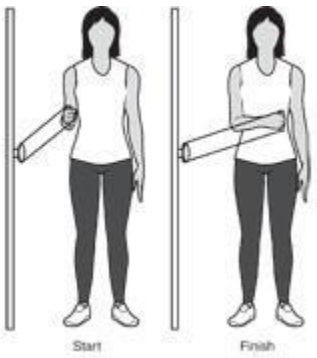
Prime movers Movements (muscles): Pectoralis, subscapularis

There should be a direct exercise stress on chest and shoulder.

Sets/Reps: 3X8reps
Weekly: 3 days

Step-by-step directions

- Take a theraband and fixed it on a wall
- Stand parellal to the wall and pull the theraband as attached below to your waist height
- Bend your elbow at 90 and move towards your waist position
- Put your elbow close to your side and bring your arm Keep your elbow crossways to your body.
- Gradually redo the exercise and come to the starting position & repeat



Tip: Put your elbow pressed into the side.

Note: 30 sec rest in every exercise before performing

9. External Rotation (Theraband & in water without theraband)

Prime movers Movements (muscles): Infraspinatus, teres minor, posterior deltoid

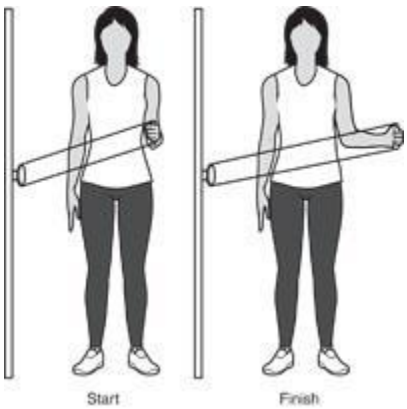
There should be feel stretch in the back of shoulder and upper back

There should be a direct exercise stress on chest and shoulder.
Tools: Theraband with ease resistance,

Sets/Reps: 3X8reps
Weekly: 3 days

Step-by-step directions

- Take a theraband and fixed it on a wall
- Pull the theraband in away direction as much as you can as shown in the figure
- Keep your elbow close to your side and slowly rotate in outward direction
- Gradually redo the exercise and come to the starting position & repeat



Tip: Press your shoulder both blades as you pull the theraband

Backwords

Note: 30 sec rest in every exercises before performing

Table 4. *Nonsurgical rehabilitation protocols for RTC in national or university level athletes*

Phase	Goals	Rehabilitation strategies
Acute	Reduce pain and inflammation	Activity modification
	Protection of RC	Physical modalities
	Painless full Range Of Motion	Medications
		PROM to AAROM to AROM in scapular plane
		Periscapular muscle strengthening
		Cross-training
		Cardiovascular exercises Core strengthening
Recovery	Normal RC strength	Advanced periscapular muscle strengthening Stretching (posterior capsule, pectoral muscles)
	Normal flexibility	
	Correct KC abnormalities	RC strengthening exercises: Isometrics to CKCE to OKCE to OKCME
Functional	Adequate KC function	Multi angle functional exercise
	Return to sports-specific activities	Plyometric exercises
		Eccentric exercises Return to practice (sports-specific exercises and drills)
Return to sports	Return to previous sport activity	Return to Throw/Swing/Serve program Injury Prevention Program

RC=Rotator Cuff, KC= kinetic chain; CKCE, Closed Kinetic Chain Exercises; OKCE, Open Kinetic Chain Exercises; OKCME, Open Kinetic Chain Multi-angle Exercises.

Results

The results from the rehabilitation plan conducted on the (N=120) of different male athletes from the five major cities of Punjab ((Lahore, Multan, Gujranwala, Faisalabad & Sialkot). The plan executes for 6 weeks and the resulted showed significant through paired sample t-test analyzed by SPSS-26. Sialkot showed immense recovery after the completion of the rehab plan and 45 subjects left the study due to their personal reasons. The result of pre-tests indicated loss of function, mild to severe pain and joint mobility issues in the 4 muscles of the rotator cuff. After the complete treatment protocols including tharaband & hydro exercises, stretching drills and throwing mechanics, it was seen in the post-tests that there was an improvement in the overall functioning of the muscles, range of motion as well as reduced pain and discomfort in the post tests. It was observed that the training exercises were beneficial for the athletes recovering from a rotator cuff injury to a great extent.The following Table 2 shows results as assessed through paired sample t-test by Statistical Package for Social Science (SPSS).

Table 5: *Shows the analysis results*

Groups	N	t-value	p-value
Control Injures	N=16	----------	----------
Rotator Cuff (RC)	N=59	t= -7.9	***
			P=0.000

Pre & Post Test Evaluation

Empty CAN Test:

The empty can test was used to detect the severity of the pain which was seen as mild to severe in the (N=15) athletes when these athletes first appeared for a physical assessment. All of these athletes belonged to baseball and were pitchers. Similarly, mostly bowlers and long thrower of cricket were included. It was a pre-test diagnosis on the basis of which the researcher executed theraband and hydro exercises on the rotator cuff muscle. Various exercises were included along with rest and recovery protocols and after the completion of the rehab plan a post-test was conducted on which the athletes reported little or no pain in the supraspinatus muscle of the rotator cuff. These (N=15) athletes showed positive results and it was observed that they had no pain while doing pitching and it was evident that the rehab plan worked for these athletes and they seemed to enjoy the pitching once they went back to the sport after the injury.

Drop Arm test:

The drop arm test was used to detect the severity of the pain when the shoulder was elevated and then dropped abruptly. The pain was observed as mild to severe in the (N=18) athletes when these athletes first appeared for a physical assessment. (N=15) athletes were fast bowlers and (N=3) were batters who were habitual of fielding in the deep which affected their rotator cuff muscle. It was a pre-test diagnosis on the basis of which the researcher worked on the rotator cuff muscle (supraspinatus muscle). A number of exercises were included along with rest and recovery protocols and after the completion of the rehab plan a post-test was conducted on which the athletes reported little or no pain when they elevated their shoulder. The major focus was on gaining the strength, Range of Motion (ROM), mobilization and resistance of the rotator cuff muscle and especially for fast bowlers; therabands were consistently used as part of their rehab plan. These (N=8) athletes showed positive results and it was observed that they had no pain while doing bowling or throwing from the deep and it was evident that the rehab plan worked for these athletes as they returned back to their respective sports.

Lift Off Test:

The lift off test was used to diagnose the affected range of motion in the athletes along with discomfort when asked to move the arm posterior position. It was observed in the pre-test that (N=15) athletes who were all baseball pitchers had mild to severe affected range of motion and their subscapularis muscle of the rotator cuff was affected. The rehab protocols included a number of mobility exercises including shoulder mobility drills, increased range of motion, strength through therabands and controlled range of motion through rubber bands were aimed in the rehab plan of these athletes. There were positive results in the post-tests after the completion of the rehab plan and the players were able to use their arm more efficiently and effectively and there were an increase in the range of motion, regain strength and mobilization as well as pitching speed was improved once they returned to the sport.

Belly Press Test:

The belly press test was used to diagnose the pain when moving the arm internally. The pre-test was conducted on the athletes and (N=13) athletes reported pain and discomfort when moving the arm internally which indicated a clear weakness in the rotator cuff muscle. The rehabilitation strengthening exercises along with all schedule of the shoulder were used to develop the strength, range of motion and mobilization as most of these athletes were beginners. Strength was developed through easy mode to hard mode of the rubber bands as the players showed progress. The results of the post-tests showed improvement and return to the play effectively and efficiently.

Discussion

Rotator cuff injury can be prevented easily if at an early age proper techniques of throwing or bowling are taught. According to Browning & Desai (2004) overuse in the young athletes may have placed these patients at risk for their injuries with decreased stability and strength; in many studies same result had been achieved before and improved through rehab plan executed for 6 weeks. The throwing position of the shoulder plays a key role in the injury of these muscles. If the angle of delivery (Biomechanically) is correct and posture is stable, one can easily avoid this injury at an early stage. According to Sciascia & Karolich (2013) that most postural concerns can be addressed through the implementation of known stretching techniques and joint mobilizations similar results was observed before execution of rehab plan the result showed significant improvement resulted, which has been the absolute focus of this rehab plan. Rotator cuff tendonitis was the most frequent diagnosis (Blevins, 1997), as it has been observed that the beginners in the sport of baseball or cricket athletes (Club & School level) lack the knowledge of throwing mechanism and in the rehab plan it was addressed quite briefly on how to get the technique of right and how to overcome the injury of the rotator cuff muscles.

Kibler et al. (2003) says that the completion of rehabilitation of rotator cuff tendinopathy requires fulfillment of specific criteria regarding healing, range-of-motion, strength, and kinetic chain restoration as aligned in this study. Frequently the patient will then return to the same activity or sport that created the injurious stresses, howerer, it has been devise to maintenance exercise program to maximize the body's ability to withstand as per in previous frame of performing mode. The specific flexibility, strength, power, Range of motion (ROM) demands can then be matched with specific exercise programs. The present study was also based on developing a suitable rehab plan and implemented theraband & hydro exercises for the athletes as described in the recent studies. The effectiveness of rehabilitation in the treatment of rotator cuff tendinitis due to primary impingement is well documented in the literature. Most athletes with primary impingement without full thickness rotator cuff tears respond well to non-operative treatment directed toward strengthening the rotator cuff, decreasing inflammation and regaining range of motion (ROM). Rehabilitation will also be effective in the majority of athletes with cuff pathology due to primary tensile overload, instability and contact injury (Blevins, 1997). Millet et al. (2006), states that the keys to the prevention of overuse injuries include educating coaches, parents, and children alike of the potential hazards associated with premature sport specialization and by emphasizing the recreational value of sports the results are matched, the addition implemented plan of rehabilitation helped to recover it quickly and efficiently. Furthermore, as rotator cuff injuries and impingement are patterns of injuries that occur secondary to repetitive loading and chronic overuse, guidelines on pitching technique, pitch counts, and frequency of pitching in baseball, as well as early recognition of these injuries will help prevent their progression. By following a proper diagnosis and treatment plan one can recover swiftly from this issue and can return back to the sport. The use of therabands and hydro exercises even after the recovery must be encouraged as these provide strength and mobility to the working muscles. Therefore, a proper rehab plan and proper diagnosis is necessary at this level to stop this issue which is the major factor in affecting the performance of the athletes. As the properties of water, hydrostatic force helps to recover he rotator cuff injury in faster protocols. Additionally, the static force of water will put less pressure on joints muscles and ligaments and thus recover it in efficient mode. The theraband resistance exercises helped in regaining strength and thus combination of both will become an efficient and effective rehab plan for rotator cuff injury. These observations also clarify that a proper rehab plan plays a key role in the recovery of the athlete as it was a major objective of the study.

Conclusion

The result should significant and optimistic results as the test conducted resulted in no pain with Post-test execution the hydro-static force and mobilization played a vital role in recovering of the rotator cuff injury. All the diagnosis of the rotator cuff assessments helped to identify the injured athletes which is further resolved through rehabilitation. Rehabilitation is the best way to rotator cuff suffering athletes except for those with symptomatic full thickness rotator cuff tears for whom surgical repair is indicated.

The rotator cuff injury is seen as the most common injury especially in the sports that involve throwing like baseball and cricket. There are number of injuries due to lack of proper technique or overtraining of the particular muscle group due to lack of knowledge in the athletes of the national or university level in Pakistan. Hence, the rotator cuff injury can be prevented at initial levels if it is diagnosed properly and a suitable rehab plan can boost up the recovery process. The proper technical guidelines and awareness can also enhance the performance of the muscle and can prevent the reoccurrence of the injury in the athletes.

Future Recommendations

The research aimed on the early diagnosis of the injury and was followed by a proper rehab plan for each athlete who resulted in the complete recovery of the athletes and all of the set of objectives were met. Moreover, the researcher was able to create awareness among athlete as they are the new faces and can help their juniors to prevent this injury. The rotator cuff injury is a natural occurring phenomenon in the sports that involve throwing mechanisms. The future researches can be done on the rehabilitation in the other sports by following this rehab plan with additional and more modified exercises according to the sports. The diagnosis process can be done with the help of magnetic resonance imaging (MRI) if one has adequate resources and budget for more accurate diagnosis & for progression rehabilitation it should be more strength, power and gym training along with mobilization. The research can also be useful if it is done on the general population facing the shoulder issue and same rehab plan with less intense exercises can be applied. The rehab plan can be a stepping stone for the professional level athletes who aim to make a quick recovery following a rotator cuff injury.

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Conflict of Interest

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