International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Study of the Effect of Rotator Cuff Strengthening Exercises on Power, Endurance, Speed, Stability and the Coordination of Limb Movement in Badminton Players (Experimental Study)

Dr. Shalini singh chouhan[1], Ms. Shakshi Nikumb[2], Ms. Soumya Trivedi[3], Ms Hrishika Bhatiya[4], Ms Anushka rasoniya[5], Mr. Yash jat[6], Mr. Sultan Singh[7], Mr. Rohit Basani[8]

[1]Tutor, Renaissance University, School of Paramedical Sciences
[2,3,4,5,6,7,8]Student, Renaissance University, School of Paramedical Sciences

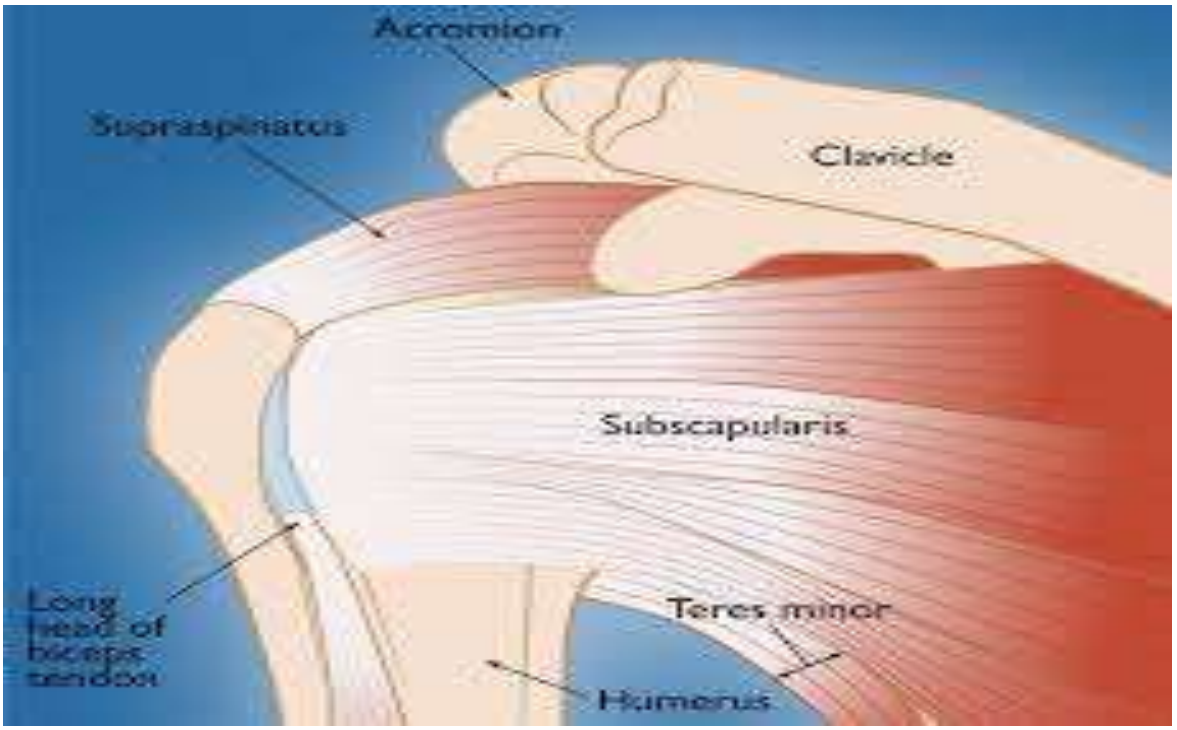
Abstract
Background: A standard Study of the effect of Rotator cuff strengthening exercises on power, endurance, speed and stability and the coordination of limb movement in badminton players (Experimental study) in young badminton players.
Aims: The aim of this study was rotator cuff strengthening exercise on speed and the coordination of limb movement in badminton players.
Setting: The research was conducted in various badminton clubs, encompassing a diverse population of young players aged 18- 25 years. The badminton clubs were selected to represent different analog and exercise protocol to ensure a comprehensive analysis.
Design: Study will be quasi experimental. It is an experimental type of study, based on pre and post measurements. In this type of study take pre data by using data scale and then start exercise protocol to develop the strengthen the player and then again taking post data, and analyzed the result.

Keywords: Badminton player, Rotator cuff, strengthening, Exercise, Scapular stabilization, Shoulder Pain,

1. INTRODUCTION:

The rotator cuff is a collection of muscles and tendons that surround the shoulder joint and retain the head of the upper arm bone firmly in the shoulder's shallow socket. The Rotator Cuff (RC) refers to a set of four different muscles and tendons that provide strength and stability to the shoulder complex while in motion. They are also known as the SITS muscle, which stands for supraspinatus, infraspinatus, teres minor, and subscapularis. The muscles originate in the scapula and attach to the head of the humerus, producing a cuff around the glenohumeral (GH) joint. A rotator cuff injury may create a dull discomfort in the shoulder that intensifies at night. Rotator cuff strengthening exercises are often given in shoulder rehabilitation programs; however there is no consensus on the most beneficial exercise type and dosage parameters. The primary goal of shoulder rehabilitation is often to strengthen the rotator cuff and restore

normal glenohumeral kinematics.



The goal of this study was to examine if internal and external standard rotator cuff workouts utilizing a general exercise criteria have been recommended in the therapeutic environment for enhancing speed and coordination of limb movement in young badminton players.

Strengthening exercises

The purpose of strengthening exercises is to improve the strength of particular muscles or muscle groups. Strengthening exercises push the muscles to their limit until they get fatigued; this force and overload of the muscles promotes muscle growth. Increasing the strength of weak muscles increases the risk of injury to the surrounding joints and soft tissues.

Benefits of Strengthening Exercise

- Muscle strength has improved.
- Reduce energy consumption since muscles are more productive.
- Lower chance of getting hurt
- Enhance performance
- Boost the effectiveness of your movements.
- Postpone the start of arthritic diseases.

Strengthening exercises scheduled include

- Resistance training
- Training in opposition to the water's resistance
- Using a resistance band while working out
- Weightlifting exercises
- Exercising with your own body weight as the load.

2. SUBJECT AND METHOD

2.1 Participation:

Total 40 students participated in the research. Out of which 16 were males and 24 were females, between the age group of 18-25 years. Consent was taken before performing research. Players with History of previous surgeries or fracture at the elbow joint, hyper mobile joint, Use of steroid injection during last 3 months, Dysfunction in the shoulder, neck and thoracic region, Neurological deficit, generalized arthritis are excluded.

2.2 Study design and research setting:

Study will be quasi experimental. It is an experimental type of study, based on pre and post measurements, including physical activity levels, and physical health among badminton player. Additionally, Exercise protocol will be conducted to explore the physical influencing of well being and identify potential interventions.

2.3 Instrumentation and study tool:

The tool used for the data collection of this study was a closed kinetic chain upper extremity stability test (ckcuest), Plate tapping test. The test was validated and reliable it in motion for the data collection. It was a multi visit study where participants had to examine out by test containing few task about their level of fitness for game as well as day to day life,

All participants are screened for eligibility by checking if they fit in the inclusion criteria. Eligible participants were asked to fill out the consent form to provide consent for taking part in this study voluntarily. They were asked to fill out the questionnaire providing a complete description containing the description of the study, consent form. Data were collected by the method of convenience sampling. By the end of the study, all the responses were recorded

2.4 METHOD

- Plate Tapping Test

1. Purpose of the test:
   To evaluate the speed and coordination of limb movements.
2. Equipment required:

- Table (height adjustable),
- Yellow disk (20 cm diameter),
- Rectangle disk (30 x 20 cm),
- Stop watch.

3. Pre-test:

Explain the test procedure to the subject. Obtain informed consent. Complete a form and record basic information such as age, height, weight, and sex. More details about the pre-test procedure can be found here.

4. Procedure:

If possible, the table height should be adjusted so that the subject can stand comfortably in front of the disks. Two yellow disks are placed on the table with their centers 60 cm apart. The rectangle is placed the same distance between both panes. The non-preferred hand is placed on top of the rectangle. Participants were asked to move their preferred hand back and forth across the discs over the center hand as quickly as possible, repeating this action 25 times (50 times).

- Closed Kinetic Chain Upper Extremity Stability Test

1.1.1. Materials:

- Place strips of athletic tape (1.5 inches wide) parallel to each other (36 inches apart) on the floor.
- Yoga mate

1.1.2. Methods

1.1.2.1. Subjects

The Institutional Review Board at the A.T. Still University of Arizona Health Sciences, Mesa Campus determined this study to be safe for human subjects. Informed consent was obtained from each subject prior to data collection. The initial sample consisted of 78 male collegiate baseball players between the ages of 18 and 22 who reported no recent shoulder, elbow, or wrist injuries. Participants were recruited from two community colleges in Arizona and one NCAA Division III college in California. Participants were excluded if they did not meet the age range, had upper extremity surgery within the past year, did not have full clearance from their team physician to participate in training or competition, or had pain or fatigue in the upper extremity due to recent activity.

1.1.2.2. Data Collection Procedure

Participants completed a screening questionnaire to ensure they had no recent surgeries or injuries to the shoulder, elbow, or wrist. Each participant was then assigned an identification number. Each participant's weight was measured in pounds and converted to metric units and recorded. Height was measured using a standard 10-foot tape measure in inches, converted to meters and recorded. Each player's position was also recorded. Each subject was then given brief instructions on how to conduct the test. Two strips of athletic tape, 1.5 inches wide, were placed parallel to each other, 36 inches (91.4 cm) apart on a tile floor and measured with a standard tape measure. The starting position for the test was to assume a push-up position while grasping each section of the band with one hand. Subjects were instructed to reach across their body with one hand from the starting position and touch the tape underneath their other hand. After touching the tape, the hand should be returned to the starting position. Subjects should perform the same movement with the other hand. A touch was counted each time a hand reached across the subject's body and touched the tape. The total duration of the experiment was 15 seconds. Each subject completed a warm-up trial and then completed the actual test three times with a 45-s rest period between trials, and the average of the three runs was used for data analysis.

- The starting position for the test is in a push-up position with one hand placed over each tape.
- From the starting position, the patient is instructed to reach one hand across their body to touch the tape underneath their other hand.
- After touching the tape line, the hand is returned to the original starting position.
- The subject then performs the same movement with their other hand.
- Each time a hand reaches over the patient's body to touch the tape; it is counted as a touch.
- The total duration of a trial is 15 seconds.
- Each subject performs one warm-up trial, and then performs the actual test three times with a 45 second rest period between trials.
- The average of the three trials is used for the test result.

Method

1. Subject assumes push-up position (male) or modified push-up position (female).
2. Subject must move hands back and forth from each line as often as possible within 15 seconds. Rows are spaced 3 feet apart.

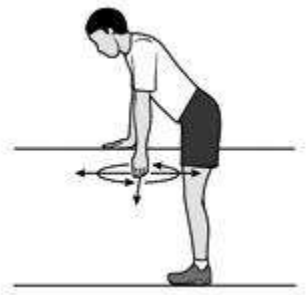
3. Count the number of lines you touch with both hands.
4. Start with a sub-maximal warm-up. Do 3 repetitions and calculate the average.
5. Normalize the values using the following formula:

- Value = average number of lines touched / height (inches)
- Determine strength using the following formula (68% of body weight = torso, head, arms):
- Force = 68% weight x average number of lines touched / 15

Exercise Record
Pendulum
Muscles used:

- Deltoid,
- Supraspinatus,
- Infraspinatus,
- Subscapularis

Equipment needed:
None
Reps:
2 sets of 10
Days per week:
5-6



Step-by-step instructions
Lie forward with one hand on a counter or table. Let the other arm hang freely at your side. Gently swing your arm back and forth. Repeat the exercise by moving your arm from side to side, and then repeat the exercise again while moving in a circular motion. Repeat the entire sequence with the other arm.
Tip:
Don't round your back or straighten your knees.
Crossed Arm Stretch
Main Muscles Worked:

- Posterior Deltoids
- You should feel a stretch in the back of your shoulder

Equipment Needed:
None
Reps:
4 on each side

Days per week:
5-6

Step-by-step Instructions

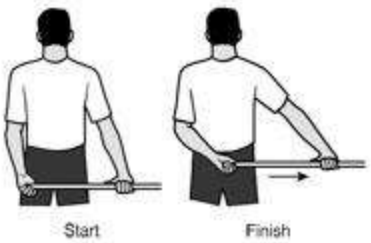
- Relax your shoulders and pull one arm as far in front of your chest as possible, supporting your upper arm.
- Hold the stretch for 30 seconds, and then relax for 30 seconds.
- Repeat the exercise with the other arm.

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

Passive internal rotation
Main muscles used:

- Supraspinatus
- You should feel a stretch in the front of your shoulder.

Equipment needed:
Light stick e.g. B. Folding ruler (wooden ruler)
Reps:
4 on each side
Days per week:
5-6



Step-by-step instructions

- Hold the stick behind your back with one hand and lightly grip the other end of the stick with the other hand.
- Pull the stick horizontally as shown, passively stretching your shoulder until you can pull without feeling pain.
- Hold the position for 30 seconds, and then relax for 30 seconds.
- Repeat the same exercise on the other side.

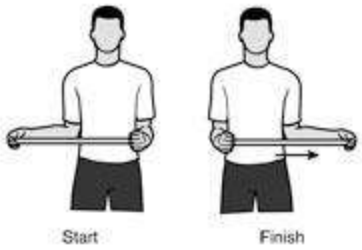
Tip:

Do not lean forward or turn to the side when pulling the stick.

Passive external rotation
Main muscles used:

- infraspinatus,
- teres minor
- You should feel a stretch in the back of your shoulder.

Equipment needed:
Light stick, e.g. B. Folding ruler (wooden ruler)
Reps:
4 on each side
Days per week:
5-6



Step-by-step instructions

- Grab the stick with one hand and the other end of the stick with the other hand.
- Hold the elbow of your extended shoulder next to your body and squeeze the stick horizontally as shown until you can pull it without feeling pain.
- Hold the position for 30 seconds, then relax for 30 seconds.
- Repeat on the other side.

Tip:
Keep your hips facing forward and avoid twisting.
Sleeper Stretch
Main muscles used:

- Infraspinatus,
- Teres minor
- You should feel a stretch on the outside of your upper back behind your shoulder.

Equipment needed:
None
Repetitions:
4 repetitions, 3 times daily
Days of the week:
Daily

Step-by-step instructions

- Lie on a hard, flat surface with your affected shoulder down and your arm bent as shown. If necessary, you can place your head on a pillow for more comfort.
- Use your unaffected arm to press down on the other arm.
- Stop pressing when you feel a stretch behind your affected shoulder.
- Hold this position for 30 seconds, then relax your arms for 30 seconds.

Tip:

Don't bend or squeeze your wrists.

Standing Row

Main Muscles Worked:

- Middle and Lower Trapezius
- You should feel this exercise in the back of your shoulders and upper back.

Equipment Needed:

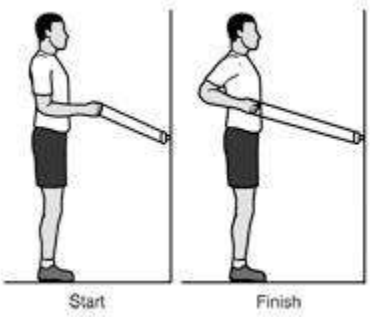
- Use an elastic stretch band with a comfortable resistance.
- Once the exercise becomes easy, increase to 3 sets of 12 repetitions.
- If you have access to a fitness center, you can also use a weight machine to perform this exercise.
- A fitness assistant at the gym will teach you how to use the equipment safely.

Reps:

3 sets of 8

Days per week:

3



Step-by-step instructions

- Make a 3-foot loop with an elastic band and tie both ends together.
- Attach the loop to a doorknob or other sturdy object.
- Bend your elbows and place the band at your side as shown in the starting position.
- Bring your arms close to your sides and slowly pull your elbows straight back.
- Slowly return to starting position and repeat the exercise.

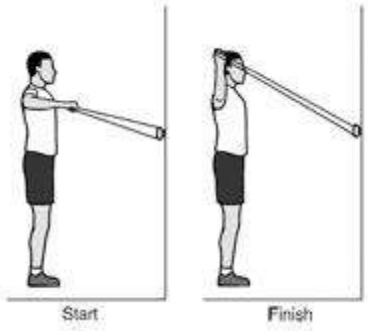
Tip:
As you retract your shoulder blades, pull them together.
External rotation with arms abducted 90°
Primary muscles worked:

- Infraspinatus
- Teres minor
- You should feel this exercise behind your shoulders and in your upper back.

Equipment needed:

- Use an elastic stretch band with comfortable resistance.
- As the exercise becomes easier, increase to 3 sets of 12 repetitions.
- If you have access to a fitness center, you can also perform this exercise on a weight machine.
- A fitness assistant at your gym will teach you how to use the equipment safely.

Reps:
3 sets of 8 repetitions
Days per week:
3



Step-by-step instructions

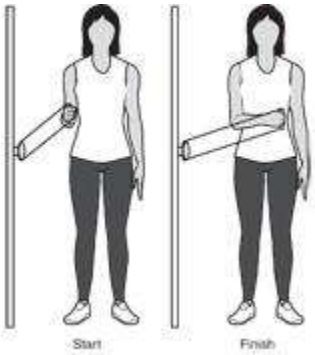
- Make a 3-foot loop of rubber and tie the ends together.
- Attach the loop to a doorknob or other sturdy object.
- Hold the band at shoulder height with your elbows bent 90 degrees, as shown in the starting position.
- Keeping your shoulders and elbows level, slowly raise your hands until they are in line with your head.
- Slowly return to the starting position and repeat the exercise.

Tip:
Make sure your elbows are in line with your shoulders.
8. Internal rotation
Main muscles used:

- Pectorals,
- Subscapularis
- You should feel this exercise in your chest and shoulders

Equipment needed:
Use an elastic stretch band with a comfortable resistance. As the exercise becomes easier, increase to 3 sets of 12 repetitions. If you have access to a fitness center, you can also perform this exercise on a weight machine. The fitness assistant at your gym will teach you how to use the equipment safely.

Reps:
3 sets of 8 repetitions
Days per week:
3



Step-by-step instructions

- Make a 3-foot loop with a rubber band and tie the ends together.
- Attach the loop to a doorknob or other sturdy object.
- Bend your elbows and place the band at your side as shown in the starting position.
- Bring your elbows close to your sides and move your arms across your body.
- Slowly return to starting position and repeat the exercise.

TIP:
Keep your elbows pressed against your sides.

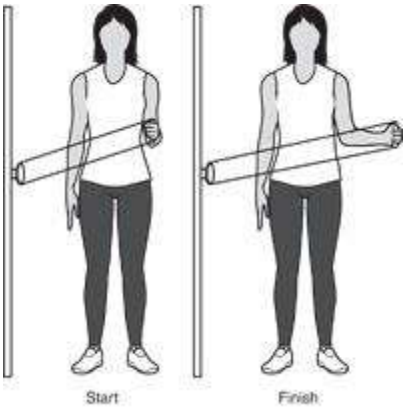
9. External Rotation
Main Muscles Used:

- Infraspinatus,
- Teres Minor,
- Posterior Deltoid
- You should feel a stretch in the back of your shoulders and upper back

Equipment Needed:

- Use an elastic stretch band with a comfortable resistance.
- Once the exercise becomes easy, increase to 3 sets of 12 repetitions.
- If you have access to a fitness center, you can also perform this exercise on a weight machine.
- The gym's fitness assistant will teach you how to use the equipment safely.

Reps:
3 sets of 8
Days per week:
3



Step-by-step instructions

- Make a 3-foot loop with the rubber band and tie both ends.
- Attach the loop to a doorknob or other sturdy object.
- Bend your elbows and place the band at your side as shown in the starting position.
- Slowly rotate your arms outward, keeping your elbows close to your sides.
- Slowly return to starting position and repeat the exercise.

Tip:

Squeeze your shoulder blades together as you pull your elbows back.

10. Elbow Flexion

Muscles worked:

- Biceps,
- Brachialis
- this exercise should be felt in the front of your upper arms

Equipment needed:

- Start with a weight that allows you to do 3 sets of 8 repetitions, and work your way up to 3 sets of 12 repetitions.
- Once the exercise becomes easy, increase the weight by 1 pound at a time, up to a maximum of 10-15 pounds.
- After each increase in weight, start again with 3 sets of 8 repetitions.

Reps:

3 sets of 8

Days per week:

3

Step-by-step instructions

- Stand upright with your weight evenly distributed between your feet. Slowly raise your weight toward your shoulders, keeping your elbows close to your sides as shown.
- Hold the position for 2 seconds.
- Slowly return to starting position and repeat the exercise.

Tip:

Don't rush through the exercise or swing your arms around.

11. Elbow Extension

Muscles worked:

- Triceps
- You should feel this exercise on the back of your upper arm.

Equipment needed:

- Start with a weight that allows you to do 3 sets of 8 repetitions, and work your way up to 3 sets of 12 repetitions.
- Once the exercise becomes easy, increase the weight by 1 pound at a time up to a maximum of 10 pounds.
- After each increase in weight, resume with 3 sets of 8 repetitions.

Reps:

3 sets of 8 repetitions

Days per week:

3

Step-by-step instructions

- Stand upright with your weight evenly distributed on both feet.
- Raise your arms and bend your elbows, placing your weight behind your head. Place your other hand on your upper arm to support your arm.
- Slowly straighten your elbows and raise the weight over your head.
- Hold that position for 2 seconds.Slowly lower your arms behind your head and repeat the exercise.

Tip:

Keep your abs tight and don't arch your back.

12. Strengthen your trapezius muscles

Muscles worked:

- Middle and posterior deltoids,
- supraspinatus, middle trapezius

- You should feel this exercise in the back of your shoulders and upper back
  Equipment needed:
- Start with a light weight that you can do 3-4 sets of 20 repetitions without feeling pain.
- Once the exercise becomes easy, increase the weight by 2-3 pounds, but do fewer repetitions.
- With each increase in weight, increase to 3 sets of 15 repetitions with a maximum weight of about 5-7 pounds.

Reps:
3 sets of 20
Days per week:
3-5

Step-by-step instructions

- Place your knees on a bench or chair and lean forward so that your hands can reach the bench and support your weight.
- Place your other hand at your side, palm facing your body.
- Slowly raise your arm and rotate your hand to thumbs-up position, stopping when your hand is at shoulder height and your arm is parallel to the floor.
- Slowly lower your arm back to the starting position and count of 5.
  Tip:

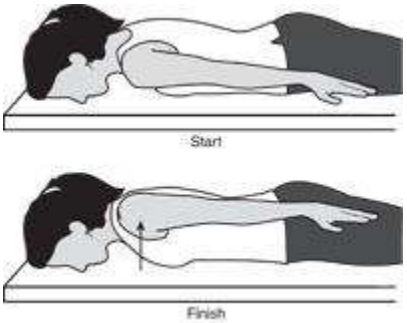
Use a weight that makes the last rep hard but not painful.

13. Scapular Adjustment

Muscles worked:

- Middle trapezius,
- Serratus
- You should feel this exercise in your upper back and shoulder blades.
  Equipment needed:

None
Reps:
10 Days per week:



3 Step-by-step instructions

- Lie face down with your arms at your sides.
- If necessary, place a pillow under your forehead for comfort. Slowly draw your shoulder blades together and lower they as far down as you can.
- Release this position about halfway and hold for 10 seconds.
- Relax and repeat this exercise 10 times.

Tip:

Don't tense your neck.

14. Scapular Extension

Muscles worked:

- Middle trapezius,
- Serratus
- You should feel this exercise in your upper back, near your shoulder blades

Equipment needed:

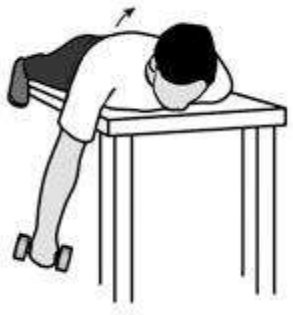
- Start with a weight that allows you to do 2 sets of 8-10 repetitions, and work your way up to 3 sets of 15 repetitions.
- Once the exercise becomes easy, increase the weight by 1 pound increments up to a maximum of 5 pounds.
- Each time you increase the weight, start again with 2 sets of 8-10 repetitions.

Reps:

2 sets of 10 repetitions

Days per week:

3



Step-by-step instructions

- Lie face down on a table
- Slowly return to starting position and repeat the exercise, Or bed with your injured arm hanging at your side.
- Keeping your elbows straight, slowly lift the weight by pressing your shoulder blades as far away from each other as possible.

Tip:

Don't bring your shoulders close to your ears.

15. Horizontal Abduction While Bending Forward

Primary muscles worked:

- Middle and lower trapezius,
- Infraspinatus,
- Teres minor,
- Posterior deltoid
- You should feel this exercise in the back of your shoulders and upper back.

Equipment needed:

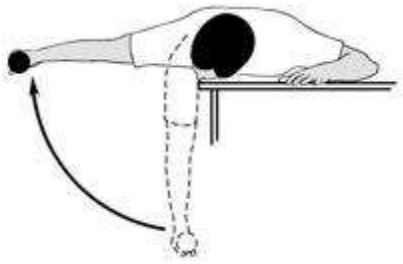
- Start with a weight that allows you to do 3 sets of 8 repetitions, and work your way up to 3 sets of 12 repetitions.
- Once the exercise becomes easy, increase the weight in 1 pound increments up to a maximum of 5 pounds.
- After each increase in weight, resume with 3 sets of 8 repetitions.

Reps:

3 sets of 8 repetitions

Days per week:

3



Step-by-step instructions

- Lie face down on a table or bed with your injured arm hanging at your side.
- Keeping your arm straight, slowly raise it to eye level.
- Slowly return to starting position and repeat the exercise.

Tip:

Control the movement as you lower the weight.

16. Internal and External Rotation

Major muscles used:

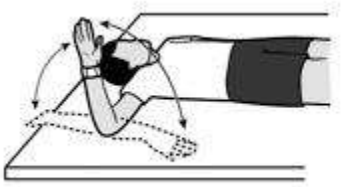
- Internal rotation –
- anterior deltoid,
- Pectorals,
- subscapularis,
- latissimus dorsi
- |External rotation –
- infraspinatus,
- Small round muscles,
- Posterior deltoid

This exercise should be felt in the front and back of your shoulders, chest, and upper back.

Equipment needed:

- Start with a light weight that you can perform 3-4 sets of 20 without pain.
- If the exercise is easier to perform, increase the weight by 2-3 pounds, but do fewer repetitions.
- With each increase in weight, increase to 3 sets of 15 repetitions, with a maximum weight of about 5-10 pounds.

Repetitions:
3-4 sets of 20
Days per week:
3-5



Step-by-step instructions –

- Lie on your back on a flat surface.
- Extend your arms straight from your shoulders and bend your elbows 90 degrees so that your fingers point up.
- With your elbows bent and on the floor, slowly move your arms in an arc as shown.
- If you feel pain at 90 degrees, lower your elbows to a 45 degree angle.

Tip:
Use a weight that makes the last repetition difficult but not painful.

17. External Rotation

Main Muscles Used:

- Infraspinatus,
- Teres Minor,
- Posterior Deltoid
- You should feel a stretch in the back of your shoulders and upper back

Equipment Needed:

- Start with a weight that you can do 2 sets of 8-10 repetitions (approximately 1-2 pounds) and work your way up to 3 sets of 5 repetitions.
- Once the exercise becomes easy, increase the weight by 1 pound increments up to a maximum of 5-10 pounds.
- Each time you increase the weight, start again with 2 sets of 8-10 repetitions.

Reps:
2 sets of 10 repetitions
Days per week:
3

Step-by-step Instructions

- Lie on your side on a firm, flat surface with your unaffected arm underneath and your head supported.
- Place your injured arm at your side with your elbow bent 90 degrees as shown.
- With your elbow at your side, slowly rotate your arm at your shoulder to raise the weight to a vertical position.
- Slowly lower the weight back to the starting position while counting of 5.

Tip:

Do not swing your body back while lifting the weight.

18. Internal rotation

Main muscles used:

- Subscapularis,
- Teres major
- You should feel a stretch in the front of your shoulder

Equipment needed:

- Start with a weight that you can do 2 sets of 8-10 repetitions (about 1-2 pounds) and increase to 3 sets of 5 repetitions.
- When the exercise becomes easy, increase the weight by 1 pound at a time up to a maximum of 5-10 pounds.
- Each time you increase the weight, start again with 2 sets of 8-10 repetitions.

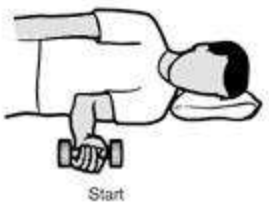
Reps:

2 sets of 10 repetitions

Days per week:

3

CKCUET			
		PRE-TEST	POST TEST
1.	Rohit	56	42
2.	Hanshika	50	49
3.	Mahendra	56	52
4.	Abhay	58	40
5.	Aniket	51	42
6.	Vijay	55	46
7.	Tanvi	56	46
8.	Chetan	51	52
9.	Rishi	62	35
10.	Harish	41	55
11.	Dipti	64	37
12.	Anishka	39	39
13.	Shiwangi	44	48
14.	mahak	54	45
15.	Mohan	63	42
16.	Savita	46	49
17.	Bhumika	55	51
18.	Sultan	59	44
19.	Swati	52	35
20.	Neha	45	39



Step-by-step instructions

Lie on a firm, flat surface on the side of the affected arm.Place a pillow or folded cloth under your head to keep your spine straight.

Place your injured arm at your side with your elbow bent at 90 degrees as shown.

Keeping your elbow bent and pressed against your body, slowly rotate your arm at your shoulder to raise the weight to a vertical position.

Slowly lower the weight to the starting position.

TIP:

Avoid rolling your body backwards while lifting the weight.

2.5 Results:

2.5.1. Descriptive Analysis:

Plate Tapping Test			
		PRE-TEST	POST TEST
1.	Neha	50	44
2.	Narmata	58	55
3.	Durga	54	50
4.	Komal	60	50
5.	Riya	54	42
6.	Muskan	45	40
7.	Vanshita	41	36
8.	Limanshi	39	32
9.	Dhwani	55	45
10.	Himanshi	44	40
11.	Mahesh	60	49
12.	Aditya	43	39
13.	Akshaya	54	48
14.	Mayor	59	50
15.	Yogi	49	42
16.	Krish	42	40
17.	Yash	50	44
18.	Anshuman	55	47
19.	Naresh	57	45
20.	Vishal	45	39

2.5.2. Demographic Variables:

1. Gender: Both Male and female bedminton player
2. Age : Age group of 18 year to 25 year

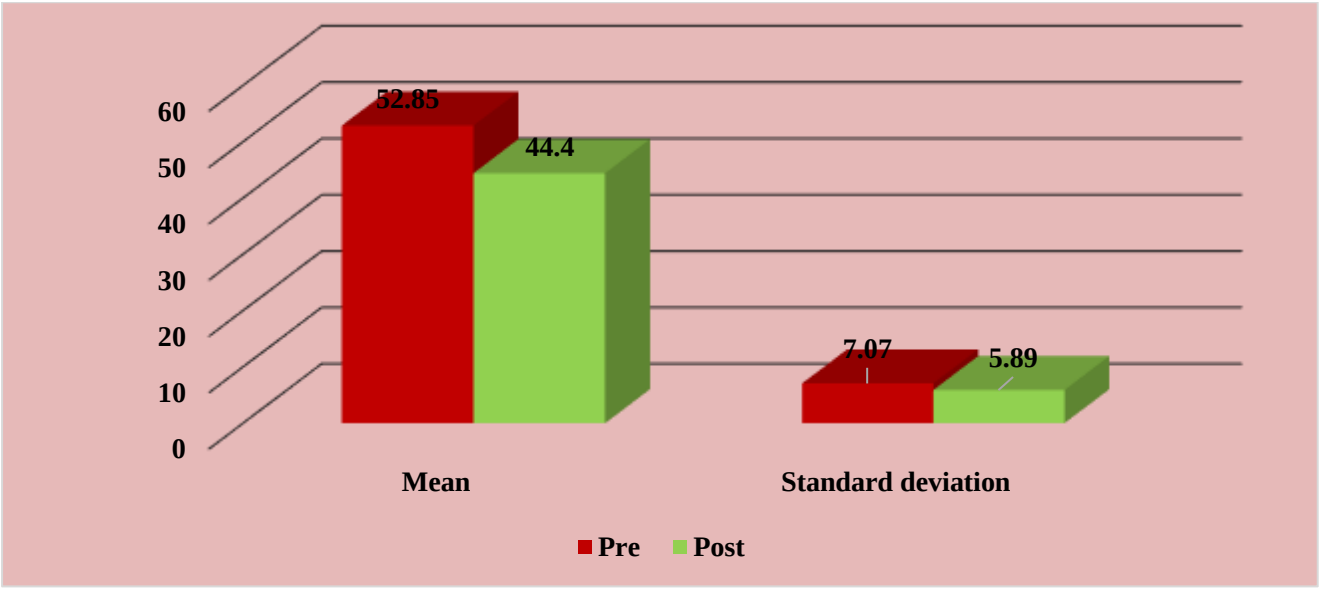
2.5.3. Inferential Analysis

Effect of rotator cuff strengthening exercises on speed and the coordination of limb movement in badminton players.

Condition	N	Mean	Standard deviation	t-value	p-value
Pre	20	52.85	7.07	3.56	<0.05
Post	20	44.4	5.89		

Above table show the result of "Effect of rotator cuff strengthening exercises on speed and the coordination of limb movement in badminton players." Mean value of Plate Tapping Test in pre and post condition of Rotator cuff strengthening exercises are 52.85 and 44.40. There is a significant difference between means. T-value is 3.56 which are significant at 0.05 because calculated t-value is

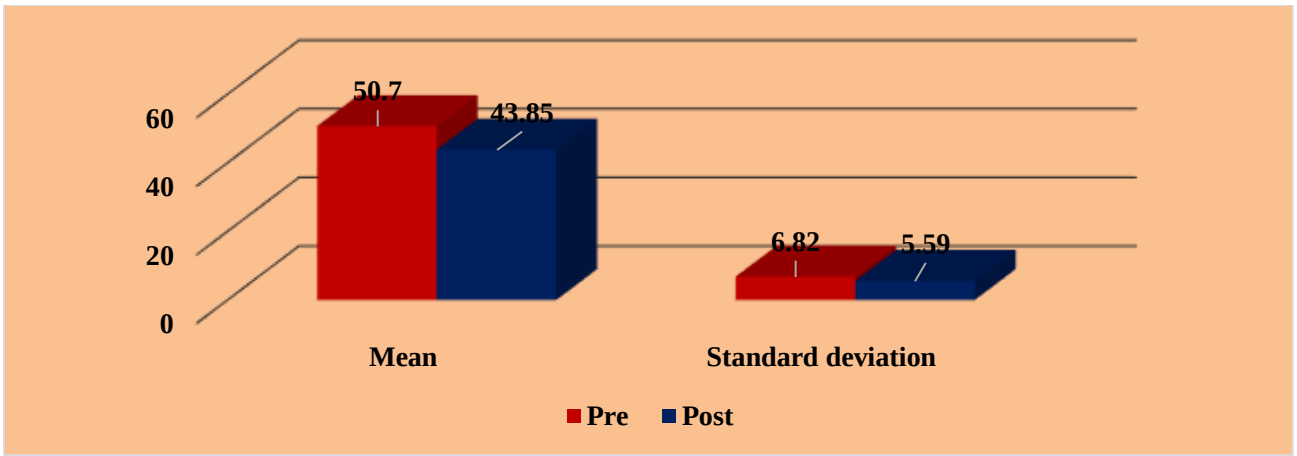
greater than minimum value at 0.05 and degree of freedom 19.
Therefore, we can say that there is a significant effect of Rotator cuff strengthening exercises on speed and the coordination of limb movement in badminton players.



Effect of rotator cuff strengthening exercises on strength, power, endurance, and stability of the upper extremities in badminton players.

Condition	N	Mean	Standard deviation	t- value	p-value
Pre	20	50.7	6.82	10.28	<0.05
Post	20	43.85	5.59		

Above table show the result of "Effect of rotator cuff strengthening exercises on strength, power, endurance, and stability of the upper extremities in badminton players". Mean value of Closed Kinetic Chain Upper Extremity Stability Test (CKCUET) in pre and post condition of Rotator cuff strengthening exercises are 50.70 and 43.85. There is a significant difference between means. T-value is 10.28 which are significant at 0.05 because calculated t-value is greater than minimum value at 0.05 and degree of freedom 19.
Therefore, we can say that there is a significant effect of Rotator cuff strengthening exercises on strength, power, endurance, and stability of the upper extremities in badminton players.



3. DISCUSSION:

The result of "Effect of rotator cuff strengthening exercises on strength, power, endurance, and stability of the upper extremities in badminton players". Mean value of Closed Kinetic Chain Upper Extremity Stability Test (CKCUET) in pre and post condition of Rotator cuff strengthening exercises are 50.70 and 43.85. there is a significant difference between means. T-value is 10.28 which is significant at 0.05 because calculated t-value is greater than minimum value at 0.05 and degree of freedom 19.

Therefore, we can say that there is a significant effect of Rotator cuff strengthening exercises on strength, power, endurance, and stability of the upper extremities in badminton players.

And on other hand

The result of "Effect of rotator cuff strengthening exercises on speed and the coordination of limb movement in badminton players." Mean value of Plate Tapping Test in pre and post condition of Rotator cuff strengthening exercises are 52.85 and 44.40. There is a significant difference between means. T-value is 3.56 which is significant at 0.05 because calculated t-value is greater than minimum value at 0.05 and degree of freedom 19.

Therefore, we can say that there is a significant effect of Rotator cuff strengthening exercises on speed and the coordination of limb movement in badminton players

4. CONCLUSION:

According to results we can conclude that there is a significant effect of Rotator cuff strengthening exercises on speed and the coordination of limb movement, strength, power, endurance, and stability of the upper extremities in badminton players. It means that Rotator cuff strengthening exercises is very effective for badminton players.

REFERENCES:

1. Ganderton C, Pizzari T. A systematic literature review of the resistance exercises that promote maximal muscle activity of the rotator cuff in normal shoulders. *Shoulder Elbow* 2013;
2. Vosloo M, Keough N, De Beer MA. The clinical anatomy of the insertion of the rotator cuff tendons. Eur J Orthop Surg Traumatol. 2017 Apr;27
3. Hippensteel KJ, Brophy R, Smith MV, Wright RW. A Comprehensive Review of Physical Examination Tests of the Cervical Spine, Scapula, and Rotator Cuff. J Am Acad Orthop Surg. 2019 Jun
4. Tashjian RZ. AAOS clinical practice guideline: optimizing the management of rotator cuff problems. J Am Acad Orthop Surg. 2011 Jun;
5. Gelber JD, Soloff L, Schickendantz MS. The Thrower's Shoulder. J Am Acad Orthop Surg. 2018 Mar
6. Javed O, Maldonado KA, Ashmyan R. StatPearls [Internet]. StatPearls Publishing; Treasure Island (FL): Jul 24, 2023. Anatomy, Shoulder and Upper Limb, Muscles.
7. Schmidt CC, Jarrett CD, Brown BT. Management of rotator cuff tears. J Hand Surg Am. 2015 Feb;
8. Borhannudin Abdullah, Qais Gasibat, , Gender-Specific Patterns of Muscle Imbalance in Elite Badminton Players: A Comprehensive Exploration. 2023 Aug 30
9. Borsa P.A., Laudner K.G., Sauers E.L. Mobility and stability adaptations in the shoulder of the overhead athlete: A theoretical and evidence-based perspective. *Sports Med.* 2008
10. . Guermont H., Mittelheisser G., Reboursière E., Gauthier A., Drigny J. Shoulder muscle imbalance

as a risk factor for shoulder injury in elite badminton players: A prospective study. *Phys. Ther. Sport.* 2023;61:149–155. doi: 10.1016/j.ptsp.2023.