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Research Paper

Effect of Pragmatic Posterior Capsular Stretch and Proprioceptive Neuromuscular Facilitation Stretch on Shoulder Range of Motion in Badminton Player

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ABSTRACT
Background and objectives: *Posterior Shoulder tightness is major problem in general working population. Posterior shoulder tightness (PST) is common physical impairments in overhead sports. It is more in athletes especially in players throwing places extremely high stress on shoulder specifically on the anatomical stabilization that keeps the shoulder stable. In throwing athletes these stresses are very high and repeated many times and to a wide range of overuse injuries. Although throwing injuries in the shoulder most commonly occur in badminton players. Some evidence-based studies proved that pragmatic posterior capsular stretch and pnf stretch are effective in improving the posterior shoulder tightness among badminton players. But there is no comparative study of these two protocols. Hence the purpose of this study is to compare the effect og pragmatic posterior capsular stretch and PNF stretch in improving the posterior shoulder tightness among badminton players.*
Methods: *Quasi Experimental study design, a total of 60 subjects pragmatic selection criteria for the study and were divided into 2 groups, 30 members in group A (PRAGMATIC), 30 members in group B (PNF STRETCH). Both groups performed intervention as 4 days for week, 30 minutes per session up to 4 weeks. The outcomes were Goniometer and NPRS*
Results: *Paired T test was used to access the statistical significance between pre & post test scores. Statistical analysis of the data revealed that there is no difference between both pragmatic and PNF stretch'*
Conclusion: *In this study, 4 weeks of showed that pragmatic and PNF stretch both approaches are significant in improving posterior shoulder tightness among volley ball players.*
Key words: *Posterior shoulder tightness, pragmatic, NPRS, Goniometer, PNF stretch, badminton players.*

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I. INTRODUCTION

Badminton is one of the most widely-played sports in the world. Badminton is a sport that requires a lot of overhead shoulder motion. Abduction, internal and external rotation of the shoulder joint during shots, lobbing, stroking and smashing were the cause of the injury. The overhead throwing athlete is an extremely challenging patient in sports medicine due to the high forces, repetitive nature, and extreme ranges of motion observed during the throwing motion. Research and clinical observations have shown that posterior shoulder tightness results in various kinematic alterations, such as decreased shoulder internal rotation, horizontal adduction, abduction, and flexion and increased external rotation. These alterations have been linked empirically to bony and soft tissue adaptations that result from the large rotational and distractive forces acting on the GH joint during the throwing motion[1].

Posterior Shoulder tightness is major problem in general working population. Posterior shoulder tightness (PST) are common physical impairments in overhead sports. It is more in athletes especially in players

throwing places extremely high stress on shoulder specifically on the anatomical stabilization that keeps the shoulder stable. In throwing athletes these stresses are very high and repeated many times and to a wide range of overuse injuries. Although throwing injuries in the shoulder most commonly occur in baseball pitchers, they can be seen in any athlete who participants in sports that requires repetitive overhand motions, such as badminton[2].

Badminton is a complex displace with high technical, tactical, and athletic demands on the players, because of this there is a need for the players to specialize early in certain tasks in the game, such as smashing and shots is the way in which the shoulder moves over the head and smash the shuttle with force the shoulder externally rotated and flexed and elbow slightly flexion.

Overhead athletes, like badminton players, can demonstrate altered glenohumeral joint mobility and flexibility in the dominant hand resulting in significantly less internal rotation and greater external rotation of the shoulder, classified as glenohumeral internal rotation deficit [GRID]. It has been suggested that posterior shoulder tightness is a common in overhead throwing athletes. The incidence of shoulder pain in the general population has been reported to be as high as 27% and as many as 74% of the patients who were seen for shoulder Posterior shoulder tightness is identified by measuring horizontal humeral 3 adduction, although another clinical measure that is commonly used is the bilateral measurement of glenohumeral internal rotation (IR) range of motion[3]. It is important to note, however that the measurement of glenohumeral IR range of motion specifically aims to identify glenohumeral IR range of motion deficits (GIRD). Although GIRD is believed to be a leading contributor to posterior shoulder tightness. (25-27) Anatomical GRID has been described as a loss of less than 18 to 200 deficit of glenohumeral Internal rotation with symmetrical total rotation motion of the uninvolved shoulder within 50 . Pathological Grid had been identified as a loss of glenohumeral internal rotation> 18-200 . Nonthrowing shoulder has been compared with the throwing shoulder corresponding to loss of the total rotation > 50 has observed. who are having shoulder problems there is decline in the external rotation strength with grid. Some authors suggest that repetitive stress to posterior structures in the follow through phase in throwing movements could lead to inflammation, scar formation and subsequent tightness in posterior tissues.

There is growing body evidence that PST and can contribute to shoulder impingement symptoms. One cross-sectional study by tyleret found that the presence of positive subacromial impingement, signs positively correlated with PST and GIRD in general population. Moreover, the excessive posterior capsular tightness produced by repetitive functional positions of 90° shoulder abduction and ER ≥ IR makes the humeral head shift antero-superiorly compared with a normal shoulder in throwing movements are applied they are pragmatic posterior capsular stretch and proprioceptive neuromuscular stretch. pragmatic posterior capsular stretch helps is increasing shoulder range of motion. Pragmatic capsular stretch can help to release and relax muscles, and promote the body' s own healing mechanisms. Pragmatic stretch is unique in its application as the client provides the initial 4 effort while the practitioner facilities the process. The primary force originates from the contraction of soft tissue, which is then utilized to assist and correct the presenting musculoskeletal dysfunction. Pragmatic stretch is generally classified as a direct technique as opposed to indirect because the muscular effort is form a controlled position in a specific direction against a distant counter force. One of the main uses of this method is to normalize joint range, rather than increase flexibility, and techniques can be used on any joints with restricted range of motion (ROM) Identified during the passive assessment[4].

PNF stretch is an exercise that improves the range of motion and internal rotation in the shoulders. It targets the infraspinatus and the teres minor muscles, which are found in the rotator cuff. These muscles provide stability in your shoulders. PNF stretch may help to improve movement in your shoulders, allowing you to complete daily or athletic activities with more ease. It can also help you develop the flexibility and stability you need to prevent injury

The mechanism of indirect shoulder injuries is under debate in the literature. Asymptomatic changes in the thoracic spine and shoulder girdle are considered the precursors of specific diagnoses such as subacromial impingements. One of the most prominent changes reported in this regard is scapular dyskinesis. The opinion of the researchers[5].

In this condition shoulder pathology is gradually drifting towards posterior capsular tightness asa major culprit in relation to scapular dyskinesis and subsequent pathology. It is theorised that glenohumeral internal rotation deficit is a result of posterior capsular tightness, and scapular dyskinesis is its manifestation. It is observed that the repetitive overload during the deceleration phase of throwing leads to the hypertrophy of the posterior capsule, which forces the greater tuberosity of the humerus to translate superiorly—a useful observation that explains the mechanism of subacromial impingement. Therefore, a lax capsule is necessary for the optimum function of the shoulder.

Aim of the study
To compare the Effect of pragmatic posterior capsular stretch and proprioceptive neuromuscular facilitation stretch on shoulder range of motion in badminton player

OBJECTIVES OF THE STUDY
To evaluate the Effect of pragmatic posterior capsular stretch on Posterior Shoulder Tightness among badminton players.
To evaluate the Effect of proprioceptive neuromuscular facilitation stretch on Posterior Shoulder Tightness among badminton players.
To compare the effectiveness of pragmatic posterior capsular stretch versus proprioceptive neuro muscular facilitation stretch on decreasing Shoulder Tightness among badminton Players.

HYPOTHESIS

NULL HYPOTHESIS:-There is no significant difference between pragmatic posterior capsular stretch and proprioceptive neuromuscular facilitation stretch on shoulder range of motion in badminton player.
ALTERNATE HYPOTHESIS:- There is significant difference between pragmatic posterior capsular stretch and proprioceptive neuromuscular facilitation stretch on shoulder range of motion in badminton player.

II. METHODOLOGY

The study was proposed to compare the Effectiveness of pragmatic posterior capsular stretch and PNF stretch on posterior shoulder tightness among badminton players.
SUBJECTS: Subjects are recruited from KIMS college of physiotherapy and KIMS dental college, study done in KIMS Medical college campus, Amalapuram.

METHOD OF DATA COLLECTION:A total number of 60 patients both men of age between 18 - 25 years suffering with shoulder tightness in badminton players and who are willing to participate in the study were included as per the study criteria and they were divided into two groups respectively after obtaining the consent form the patients. These 60 subjects were allocated into two group by convenience sampling.

GROUPS	NO OF SUBJECTS	TRETMENT
GROUP – A	30	PRAGMATIC STRETCH
GROUP – B	30	PNF STRETCH

STUDY DESIGN: Comparative study

STUDY SAMPLE: Convenient Sampling

TREATMENT DURATION: 4 weeks, 4days a week, 30min a day.

STUDY DURATION: The study was conducted during the period between December 2021 to December 2022.

OUTCOME MEASURES:
GONIOMETER and NUMERICAL RATING SCALE

Goniometer was the most frequently used outcome measure applied in the studies. Numerical rating scales used for pain assessment.

INCLUSION CRITERIA
10 degrees dominant and non-dominant

- Subacute shoulder pain.
- Asymmetric in shoulder internal rotation measured with above 90.
- Age group 18 to 25.
- Males are included

- Badminton players.

EXCLUSION CRITERIA:

- Recent shoulder injuries on dominant side in previous 6 months.
- Peripheral nerve injuries.
- Any trauma cases.
- Fractures.
- history of previous surgery.
- Psychological impaired

III. PROCEDURE

Pragmatic posterior capsular stretch: PPCS was the only intervention used during the study. The subject is positioned in side-lying as shown in figure 1. Label 1 shows the position of the thumb and fingers. The therapist stabilises the scapula in protraction through one hand and uses his/her other hand for longitudinal traction (label 2), medial rotation (Label 3) and extension (label 4) simultaneously. The semi - flexed elbow provides the necessary leverage, and the manoeuvre is performed in a way to mimic the active RUBTB. The stretch is maintained for 30 s combined with at least three deep breaths, and each breath is held in deep inspiration for around 8-10. The stretch is maintained for 30 s combined with at least three deep breaths, and each breath is held in deep inspiration for around 8–10 s. Duration: 10-15minutes

DOSAGE:- 4 days per week adequate rest intervals for 4 weeks.

PNF STRETCH:- PNF STRETCH Subject should lie in supine with the dominant shoulder abducted to 90◦, and the elbow flexed to 90◦ with the shoulder externally rotated as far as possible. This PNF stretching protocol utilizes the contract-relax technique in which the subject's shoulder was stretched to end range for 5 seconds, contracted against the researcher for 5 seconds, and stretched to end range again for 20 seconds. The PNF stretches was conducted 3 times with 20 second of rest period in between each stretch. Post- test measurements of shoulder internal rotation were done immediately following the stretching sessions.
The PNF stretches was conducted 3 times with 20 second of rest period in between each stretch.
Duration : 15 minutes
DOSAGE:- 4 days per week adequate rest intervals for 4 weeks.

IV. RESULTS

Statistical analysis was done using statistical software SPSS 20.0 version for this purpose the data was entered into Microsoft excel-2007 spread sheet, tabulated and subjected into statistical analysis.

Descriptive statistical data was presented in the form of mean (+/-) standard deviation, percentage (%) and also graphical representation. 60 subjects completed the entire study protocol of 4 weeks in the training session of group A and group B

To observe the treatment impact before and after the treatment in the groups, the analysis was carried out using statistical tests, for the outcome measures – Goniometer (shoulder joint) and NPRS Within the group differences were checked with paired student-T test and between the group's differences are checked using unpaired student-T test.

Goniometer and NPRS assessment of the shoulder joint has shown differences in theirpre-test and post-test values .But on comparing the means of both groups there was no difference, as both the interventions has improved the posterior shoulder tightness.

V. DISCUSSION

My study included 60 subjects allotted into 2 groups, 30 in each group respectively. In this study we approached the subjects with two techniques are pragmatic stretch and PNF and it carried out for 4weeks which is followed by follow-up. Pre and post intervention data was collected with two scales one is range of motion and second scale is for pain. Goniometer and numerical rating scale the primary and secondary outcomes of my study. There is no significant difference among both groups pragmatic and PNF stretch (p-value 0.0479) hence my study

accepted null hypothesis.

PNF is effective in improving the range of motion. Two aspects to PNF are their ability to relax an overactive muscle and their ability to enhance stretch of a shortened muscle or its associated fascia when connective tissue or viscoelastic changes have occurred. Two fundamental neurophysiological principles account for the neuromuscular inhibition that occurs during application of these techniques. The first is post contraction inhibition [also known as post isometric relaxation, or PIR], which states that after a muscle is contracted, it is automatically in a relaxed state for a brief, latent, period. The second is reciprocal inhibition (RI) which states that when one muscle is contracted, its antagonist is automatically inhibited.

Chaitow et al stated that normal blood circulation is restored by PNF as it is an active muscular relaxation method cleanses the nociceptive stimulants from the area of pain which relieves pain. Active muscle contraction has shown the changes in neuro physiological effects including pain inhibition which promotes the muscle stretching further.

In Post isometric relaxation, a strong muscle contraction against equal counterforce triggers the Golgi tendon organ. The afferent nerve impulse from the GTO enters the dorsal root of the spinal cord and meets with an inhibitory motor neuron. This stops the discharge of the efferent motor neurons impulse and therefore prevents further contraction, the muscle tone decreases, which in turn results in the agonist relaxing and lengthening. PNF stretch can improve joint mobility, even when the muscle is relaxing initially. A relaxation period follows the muscle contraction, which then helps to achieve the new Range of motion. By the following mechanism thus the range of motion increases in posterior shoulder tightness among the badminton players.

The underlying mechanism for the pragmatic stretches and its action on the muscle is increasing the range of motion because of the viscoelasticity behavior of the muscle followed by short term changes in muscle extensibility. pragmatic stretching mechanism has positive implication or range of motion which may involve neurological molecular and biomechanical changes stretching causes gush of viscoelasticity and decline in the stiffness of muscular and connective tissues therefore it leads to improvement in muscle extensibility. while during pragmatic stretch Golgi tendon organ assumes that tension is resulting from the stretch of the muscle tendon unit, may result in muscle elongation by assisting impulses from primary afferent of muscle spindle and may also contribute muscle relaxation by inhibiting tension in the contractile units of the muscle being stretched.

Due to the inhibitory effects of Golgi tendon organs, there will be reduction in of the pain which followed by static stretching. There by reduction in the motor neuronal discharges they will cause relaxation of the musculotendinous unit by resetting its resting length and Pacinian corpuscles modification. This mechanism of reflexes will allow relaxation in musculotendons unit tension and leads to drop down of the pain perception. By the application on the PNF technique and pragmatic stretch there is increase in the range of motion and decrease in the pain perception which had been proved significantly by the statistical result.

After these two interventions which is given to posterior stiffness of shoulder tightness of players. Statistical reports states that there is a significant difference with in the groups for pre and post interventions data and while comparing the both groups it states that there is no significant difference between the group Aand group B. Hence this study accepts null hypothesis.

VI. CONCLUSION

The study concluded that there is a significant difference with in the groups for pre and post interventions data and while comparing the both groups it states that there is no significant difference between the group A and group B. In the present study we are accepting the null hypothesis that both pragmatic and PNF stretch are equally effective on range of motion and pain among badminton players.

LIMITATIONS OF THE STUDY

Limitations of the study includes very less studies were done and further studies are required to asses in which there is no control group. This study was not blinded and further follow up is needed for this study.