Dry Needling for Subacromial Impingement: Effects on Shoulder Function and Joint Mobility

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ABSTRACT

Background: The narrowing of the subacromial space, which is the space right below the acromion process and above the shoulder joint, is known as subacromial impingement syndrome. Subacromial impingement syndrome (SAIS) describes the irritation and inflammation of the rotator cuff tendons as they go through the subacromial region, which causes pain, weakness, and a reduction in the shoulder's range of motion. In the general population, shoulder pain (SP) is the third most prevalent musculoskeletal disease.

Aim:This study aims to compare the dry needling for subacromial impingement effects on shoulder function and joint mobility

Materials and method: A total of 20 subjects were selected and divided into two groups. Dry-needling technique group (n=10) and conventional physiotherapy with strengthening exercises group (n=10).SPADI scale and gonimeter was used to evaluate the functional activity and range of motion . Both intervention were given for 2 weeks, 5 session per week

Results: The values were analyzed using the paired and unpaired t-tests.In both groups, the pre- and post-test results were analyzed using Goniometer and SPADI SCALE. With a p value of less than 0.0001, it was discovered that the dry-needling group's mean value was more significant than that of traditional physiotherapy.

Conclusion: This study indicates that conventional physiotherapy and a dry needling technique group are useful interventions for treating subacromial impingement syndrome. The study's findings indicate that, when it comes to functional activity and range of motion, dry needling is a more effective treatment method for subacromial impingement syndrome subjects than conventional physiotherapy.

KEYWORDS: subacromial impingement syndrome, Dry-needling technique, strengthening exercises, conventional Physiotherapy, SPADI scale.

INTRODUCTION

The term "subacromial impingement syndrome" (SAIS) describes the irritation and inflammation of the rotator cuff tendons as they go through the subacromial region, which causes pain, weakness, and a reduction in the shoulder's range of motion.[1] Subacromial impingement syndrome (SAIS), which is in fact the most common cause of shoulder pain. Between 44% and 65% of all complaints of shoulder pain are attributed to SAIS. Acromion impingement due to rotator cuff impingement is more likely when these variables decrease the subacromial space.[2,3]

Acromio-humeral space also known as subacromial space, Subacromial/subdeltoid bursa, superior capsule of the glenohumeral joint, rotator cuff and long head of biceps tendons are all located within the subacromial area.The area becomes narrower when the greater tuberosity approaches the acromion during arm elevation.The narrowing of the subacromial space, which is the space right below the acromion process and above the shoulder joint, is known as subacromial impingement syndrome.[4,5]

The scapula and humerus's connection Is altered by limited thoracic motion, which reduces the strength of the shoulder complex. Moreover, it results in a restricted glenohumeral joint range of motion (ROM), which is a pathological cause of SIS .The rotator cuff muscles are supraspinatus, infraspinatus, teres minor, subscapularis.The subscapularis fossa, an anterior part of the scapula, is the predicted source of the subscapularis.The has been extensive description of the subscapularis muscle's insertion. The lesser tuberosity is where the majority of the subscapularis inserts.[6,7]

The supraspinatus, which is located in the supraspinous fossa of the scapula, above the scapular spine, is the most superiorly positioned rotator cuff muscle. Its tendon extends laterally, crossing the humerus' head, passing under the acromion process, and integrating into the glenohumeral joint capsule before joining the larger tuberosity of the humerus' superior aspect. The infraspinous fossa of the scapula is mostly occupied by the thick, triangular infraspinatus muscle. The glenohumeral joint, which supports shoulder joint stability and motion, is formed in part by these muscles. Although the shoulder joint is one of the most flexible in the body, these muscles enables it to be stable.[8,9]

The rotator cuff's conjoint tendon "experiencees micro trauma and compression when it travels beneath the coracoacromial arch, which is a common chronic repeated mechanical process involved in the pathophysiology of subacromial impingement. As the arm is turned or abducted, the subacromial space becomes more compressed, changing in length. The supraspinatus is most in touch with the anterior inferior space of the acromion at 90 degrees of abduction and 45 degrees of internal rotation.[10] There are two major mechanical hypotheses that are put out for the space narrowing observed in SAIS.There are primary and secondary types of subacromial impingement syndrome. Primary impingement occurs when structural defects cause the subacromial space to mechanically decrease. Secondary impingement results in soft tissues becoming trapped because of an irregular shift in the centre of rotation during elevation. It results from a functional disturbance of the centering of the humeral head, such as a muscular imbalance.[11,12]

The Neer test (NT) Is commonly used to detect subacromial Impingement syndrome (SAIS), which is characterised by pain that is felt through an arc of elevation as the shoulder abducts. Using the Hawkinse-Kennedy clinical exam, which involves positioning the shoulder joint to increase contact between the head of the humerus and the acromion and compress the tissues that run through the subacromial region, subacromial impingement usually detected.[13,14]

The technique known as "dry needling" Is a highly skilled intervention for the treatment of neuromusculoskeletal discomfort and movement limitations. It involves inserting a fine filiform needle into the skin to stimulate the connective tissues, muscles, and underlying myofascial trigger detected.[15]For impingement ultrasound is a frequently employed electrotherapeutic method. Physiotherapists frequently employ therapeutic ultrasonography as a modality. Thermal effects and non-thermal effects are the two possible benefits of therapeutic ultrasonography. Thermal effects contribute to the reduction of pain, whereas non-thermal effects strengthen the inflammatory response's ability to repair cells. The reduced range of motion brought on by SIS can be regained with the help of pain reduction and tissue restoration.[16]

MATERIALS AND METHODS:

The research was intended to be a comparative analysis including twenty people who were 35 to 50 years old and had been diagnosed with subacromial impingement syndrome. The subjects were male and female. The approach of convenient sampling was used to choose the participants. The primary resources used in the study were a goniometer for assessment, dry-needling supplies, and ultrasound equipment. In terms of the selection criteria, the inclusion criteria included participants who tested positive on the Neer and Hawkins Kennedy tests, had a limited range of motion between 60 and 120 degrees, and experienced subacromial pain within the designated age range. On the other hand, exclusion criteria included anyone who had ever had adhesive capsulitis, rotator cuff tears, shoulder tendonitis, or shoulder surgery. Twenty subjects with subacromial impingement were divided into two groups each group (10 each group). One group (n=10) received dry-needling technique and remaining group (n=10) received conventional physiotherapy with strengthening exercises.

PROCEDURE

Dry-needling Group

The groups were treated with a dry needling that weighted 0.25 grams and measured 25mm. An acupuncture needle was never used more than once. The therapist cleaned the area where the needle was inserted with an alcohol swab and wore surgical gloves the entrie time. The latent MTP was located by pincher palpation.

Dry needling for supraspinatus: The patient is usually positioned either sitting or lying on their side for the dry needling treatment that targets the supraspinatus muscle. The supraspinatus muscle can be easily accessed because to this location. The therapist carefully takes tiny, sterilized needles into particular muscle sites. Trigger points, or sites of muscle tension, are found by palpation and anatomical understanding. After inserting the needle, the therapist may gently move it in order to target trigger points and relieve muscle tension, such as by twisting or moving it like a piston.

Dry-needling for infraspinatus: The patient's stance is modified for dry needling that targets the infraspinatus muscle in order to allow simple access to this particular muscle. The patient may lie on their side or move into a prone position, depending on their needs and the parameters of the treatment. To reduce the possibility of infection, the therapist makes sure the skin and surrounding tissues are properly sterilized. Points within the infraspinatus muscle are targeted with a tiny, sterilized needle. Usually, the needle is carefully withdrawn after being left in place for a short while. This method helps to relieve tight muscles and assist in the general treatment of shoulder impingement syndrome.

CONTROL GROUP

Conventional physiotherapy group

Ultrasound parameters

For this technique, pulsed ultrasound will be used at a frequency of 1 MHz, an intensity of 1.5 W/cm², and for a duration of 10 minutes. For the patient to have their arm examined from shoulder to elbow, patients are required to sit comfortably in an armless chair facing the screen of the ultrasound equipment. In order to observe the structures within the shoulder joint, the examiner places themselves on the side of the shoulder that is being scanned and uses a high-frequency ultrasound device.The examiner gently presses against the patient's skin to enable the probe to move smoothly and transmit sound waves effectively, resulting in excellent imaging. Additionally, the examiner were looking the patient to make slight movements in particular directions to assist.

STRENGTHENING EXERCISES

Wall press : Patients are instructed to keep their head down and their alignment straight from their glutes to their core. They take a deep breath and slowly raise their elbows, lowering their chest to the wall. They inhale as they approach the wall and then pause slightly before pushing back up to the starting position. Ten to twelve repetitions of this exercise are performed, with the emphasis being on keeping correct form and controlled breathing throughout.

Wall angles: During the wall angles exercise, patients should keep their elbows and wrists in contact with the wall while standing with their backs to the wall and maintaining a 90-degree bend in their arms. They take this pose and gently move their arms up the wall before returning to the starting position. This exercise is done ten to twelve times to highlight controlled movement and maintaining touch with the wall throughout the workout.

Scapular squeeze: The patient is instructed to start in a standing or seated position with their core engaged and shoulders relaxed. Then bend their elbows to 90 degree and rest their forearms by their sides, palms facing inward. Then pinch their shoulder blades together without shrugging your shoulders. Imagine trying to squeeze a pencil between their shoulders

blades. Then hold the squeeze for 5 seconds, then slowly release and return to the starting position .Then instruct the patient to repeat for 10-12 times for 2-3 sets.

Outcome measures :

To measure each subject's range of pain, the SPADI scale and goniometer were used both before and after the two-week intervention. A goniometer and the Shoulder Pain and Disability Index (SPADI) were used to assist individuals to reduce the intensity of their pain. Over the duration of the treatment procedure, the patients' progress and adherence to the intervention was monitored in order to assess their level of progress.

RESULTS:

The values were analyzed using the paired and unpaired t-tests.In both groups, the pre- and post-test results were analyzed using Goniometer and SPADI SCALE. With a p value of less than 0.0001, it was discovered that the dry-needling group's mean value was more significant than that of traditional physiotherapy.

DISCUSSION:

The term "subacromial impingement syndrome" (SAIS) describes the irritation and inflammation of the rotator cuff tendons as they go through the subacromial region, which causes pain, weakness, and a reduction in the shoulder's range of motion.The aim of the study is to compare the effectiveness of dry needling on shoulder function and range of motion in individuals with subacromial impingement syndrome. The comparison is demonstrated with duration of two weeks. The results were measured using the numerical pain rating scale, shoulder pain and disability Index (SPADI) for pain and Goniometer is used to range of motion before and after the treatment.

According to Francisco Javier Lopez et.al., (2022) The aim of the systematic review was to investigate the possible effects of dry needling, either in alone or in combination with exercise therapy, on the level of pain and disability experienced by patients who have subacromial pain syndrome. Overall, the study's findings suggested that dry needling, whether used alone or in conjunction with other therapies, may not significantly reduce pain in the short- and mid-term (less than five weeks) when compared to other treatments like massage, stretching, exercise therapy, or a combination of modalities like hot packs and analgesic electrotherapy .

Muhammad Asim Arif et.al., (2022) The aim of the research was to assess the effects of dry needling on shoulder range of motion, pain limit, and infraspinatus muscle function in individuals with subacromial shoulder pain.. After three to four days of treatment, it was discovered that dry needling had a positive impact on shoulder joint range of motion and pain reduction. Shoulder impingement syndrome is one of the neuromuscular pain disorders that have been treated using dry needling, a procedure that includes the insertion of tiny needles into muscle trigger sites.

Blanco diaz.et.al.,(2022) This study aims to evaluate how effectively dry needling (DN) and conventional physiotherapy cooperate to support in the pain relief of patients suffering from subacromial syndrome (SAS).DN has been shown in several studies to be as effective as applying a placebo to minimize pain in four weeks for various pathologies, particularly those involving the upper limb .

LIMITATIONS

In this particular study, the follow-up period may be rather short.

Subacromial impingement syndrome patients functional activity and range of motion would be studied in greater detail with a longer-term follow-up to learn more about the therapies sustainability.

RECOMMENDATIONS

To increase statistical power and result reliability, increased sample sizes should be used in future study.

Longer treatment periods should be used to conclude further research.

There are age categories in which to study.

Future research on subacromial pain syndrome should concentrate on particular occupational groups and use standardized intervention techniques.

CONCLUSION:

This study indicates that conventional physiotherapy and a dry needling technique group are useful interventions for treating subacromial impingement syndrome. The study's findings indicate that, when it comes to functional activity and range of motion, dry needling is a more effective treatment method for subacromial impingement syndrome subjects than conventional physiotherapy.

DECLARATION

- **Conflict of interest:** The authors declare no conflict of interest.
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- Material : The authors have no financial or proprietary interest in any material discussed in this article.

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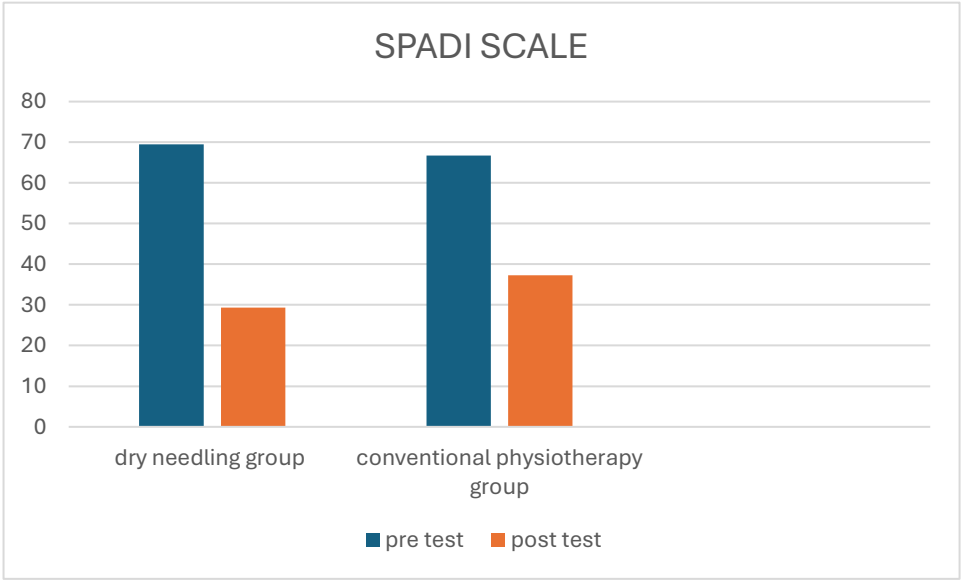
DATA ANALYSIS

Table 1: Pre and Post test values of dry needling group and conventional physiotherapy group by using SPADI SCALE



SPADI SCALE		MEAN	SD	T VALUE	P VALUE
DRY- NEEDLING GROUP	PRE- TEST	69.50	7.47	11.7159	<0.0001
	POST-TEST	29.30	5.56		
CONVENTIONAL PHYSIOTHERAPY GROUP	PRE-TEST	66.50	8.40	9.2972	
	POST- TEST	33.00	7.63		

Table 2: Pre and Post test value of dry-needling group and conventional physiotherapy group by using Goniometer (Shoulder flexion in degree)

SHOULDER FLEXION		MEAN	SD	T VALUE	P VALUE
DRY- NEEDLING GROUP	PRE- TEST	73.30	13.98	17.0346	<0.0001
	POST- TEST	147.50	14.77		
CONVENTIONAL PHYSIOTHERAPY GROUP	PRE- TEST	77.80	10.83	13.1975	
	POST- TEST	117.90	10.68		

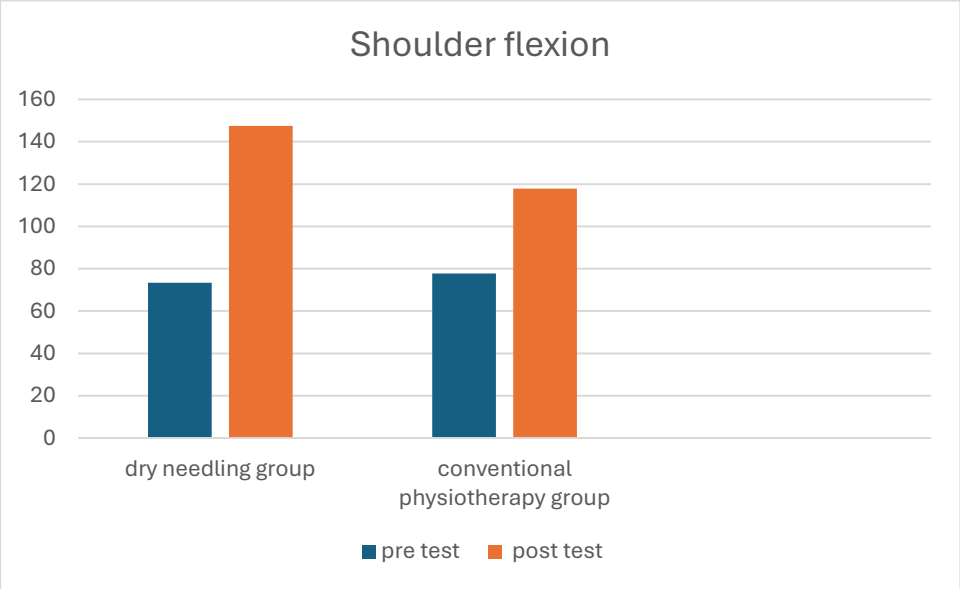
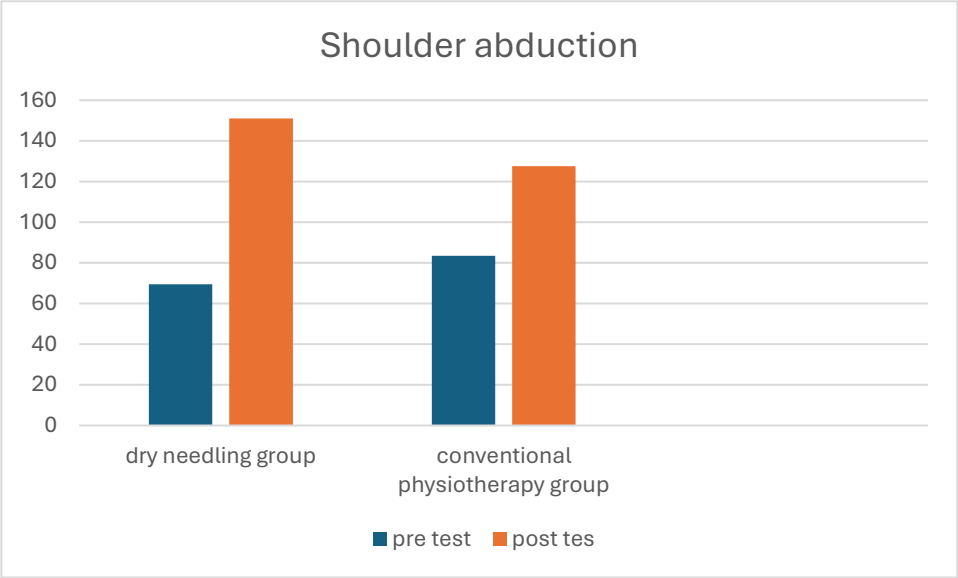


Table 3: Pre-test and Post-test value of dry-needling group and conventional physiotherapy group by using Goniometer (Shoulder abduction in degree)

SHOULDER ABDUCTION		MEAN	SD	T VALUE	P VALUE
DRY- NEEDLING GROUP	PRE- TEST	69. 50	16.06	12.8818	<0.0001
	POST- TEST	151.00	9.37		
CONVENTIONAL PHYSIOTHERAPY GROUP	PRE- TEST	83.50	16.17	12.6433	
	POST- TEST	127.50	9.20		


Shoulder abduction
160
140
120
100
80
60
40
20
0
dry needling group
conventional physiotherapy group
pre test
post tes