



COMPARISON OF SCAPULAR TAPING AND KINESIO TAPING ON PAIN, SHOULDER RANGE OF MOTION, SHOULDER DISABILITY IN SCAPULAR DYSKINESIS ASSOCIATED WITH PRIMARY SHOULDER IMPINGEMENT SYNDROME STUDY PARTICIPANTS - A RANDOMIZED CONTROLLED STUDY.

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ABSTRACT

Background: Subacromial impingement syndrome (SIS) is one of the leading causes of shoulder pain and impairment. SIS occurs following the entrapment of the supraspinatus, infraspinatus, teres minor muscle and biceps tendon, soft tissues and subacromial bursa between the coracoacromial arch and humeral head and causes swelling, inflammation and pain in the shoulder. Individual effect of Kinesio taping and scapular taping strengthening exercise is effective. But there is lack of studies done on comparison of scapular taping with Kinesio taping in scapular dyskinesis associated with primary shoulder impingement syndrome study participants.

Objective: This study aimed to compare the effect between kinesiotaping and Scapular taping with Conventional Physiotherapy in scapular dyskinesis associated with primary shoulder impingement syndrome study participants.

Methodology: Randomised controlled study [Single blinded]. 45 study participants with shoulder impingement syndrome with age group of 18-70 years and fulfilling the inclusion criteria were selected for the study and randomly allocated in to three groups. [Simple Random sampling] Subjects in Group A (n=15) was received Conventional physiotherapy, subjects in Group B (n=15) was received Scapular taping and Conventional physiotherapy & Group C (n=15) Kinesio taping and Conventional physiotherapy. All groups were treated thrice in a week for 2 weeks. Outcome measures i.e. Numeric pain rating scale (NPRS), shoulder ROM & Shoulder pain and disability index (SPADI) were measured at the baseline and after 2 weeks of treatment period. statistical significant difference at 0.05.

Results: The 2 weeks of KT along with conventional physiotherapy resulted in significant improvement ($P < 0.05$) of functional, and reduction of pain in shoulder impingement syndrome individuals which was not evident alone conventional and scapular taping with conventional physiotherapy. However KT along with conventional physiotherapy was found to have greater improvements in shoulder ROM, shoulder functional and reduction of pain in Shoulder impingement syndrome participants.

Conclusion: In conclusion the treatment program consisting of Kinesiotaping with Conventional Physiotherapy is more effective in scapular dyskinesis associated with primary shoulder impingement syndrome to reduce pain, functional disability and improve Shoulder range of motion.

KEYWORDS

subacromial impingement syndrome, Kinesio taping, scapular taping, scapular stabilization & strengthening exercise, NPRS, Shoulder ROM & SPADI.

Introduction :

The extreme complexity of shoulder results from the coordinated activity of 5 different articulations and therefore the supporting soft tissue girdle. It is a mobile joint that relies on muscle control. Any perturbation thereto has deleterious biomechanical consequences for the shoulder muscle girdle and can eventually cause pain and other functional limitations.

The importance of scapula in maintaining adequate shoulder and upper extremity function has been recognized for many years. The scapula plays several roles in facilitating optimal shoulder function where scapular anatomy and biomechanics interact to supply efficient movement. When the scapula fails to perform its stabilization role, shoulder function is inefficient, which may result not only in decreased neuromuscular performance but can also predispose individual to shoulder injury. Recently, increased attention has been given to inadequate or dysfunctional scapular control as a primary explanation for shoulder pain and arm weakness not only in throwing or overhead athletes but also generally population using their arm frequently overhead.

The scapular motion is controlled through synergistic co-contractions and force couples, which are paired muscles which control the position of the joint. Muscle weakness may be a common finding about the pectoral arch and decreased support may cause pathology. Weakness of the scapulohumeral muscles potentially results in abnormal joint positioning of scapula, disturbances in scapulohumeral rhythm and generalized shoulder dysfunction. Most commonly weak muscles are serratus anterior, lower and middle trapezius and rhomboids.

Common Causes as seen in Scapular Dyskinesia are Postural abnormality, anatomical disruption, increased cervical lordosis, excessive thoracic kyphosis, clavicular fractures, AC joint injuries and Nerve Injuries, Lack of muscular/capsular flexibility or contracture, tightness in pectoralis minor and minor, short head of biceps, Muscle imbalance or weakness, Scapular muscle fatigue, muscular inhibition,

Proprioceptive Dysfunction, direct physical trauma, Bicipital or rotator cuff tendonitis, overuse injuries, Rotator cuff tears, Adhesive Capsulitis, Frozen Shoulder, "1° impingement, 2° impingement", Rotator cuff tears. Most of the abnormal biomechanics and overuse injuries that occur about the pectoral arch are often traced to alterations within the function of the scapular-stabilizing muscles.

When the scapulohumeral rhythm is altered, there are changes in glenohumeral angulation, AC joint strain, size of the subacromial space and activation of the structure muscles, with loss of normal arm position and motion.

The symptomatic patient with scapular dyskinesis may complain of pain within the anterior and/or the postero-superior aspect of the shoulder or within the upper part of the lateral arm below the acromion. Occasionally, pain radiates into the lateral aspect of the neck along the upper trapezius (UT) or shows a radicular-like distribution along the upper extremity. In most cases, the presenting symptom is pain in the coracoid region due to tightening of the Pectoralis minor. Scapular dyskinesis is detected by observing the topic from behind. Other test include

Lateral Scapular Slide Test – utilizes the measurement of the amount of lateral scapular 'slide' from a fixed vertebral landmark in 3 positions (0°, 45° and 90°) of glenohumeral Joint.

Conservative treatment of patients with impingement symptoms commonly includes exercise programs intended to revive "normal" kinematics or muscle activity patterns. The clinical efficacy of several different treatment regimens have been studied. Altered function of lower trapezius and serratus anterior has been found to influence the scapular movement and associate with subsequently poor shoulder function and chronic impingement problems. Cools et al. and Ludewig and Cook observed inhibition of the serratus anterior and lower trapezius and over activation of the upper trapezius muscle in the subjects with shoulder impingement syndrome. Most of the current

rehabilitation protocols mainly emphasize the idea of the restoration of the scapular control and the role of various muscles among the subacromial space.

The primary goals of treatment are to enhance function and reduce pain. The first steps in treatment are rest, ice packs and nonsteroidal anti-inflammatory drugs. If healing is not achieved, physical therapy and rehabilitation are administered. Physical therapy programs include mobilization and manipulation techniques, magnetic field therapy, ultrasound, transcutaneous electrical nerve stimulation and infrared therapy. Ultrasound is a frequently used method in physical therapy. Ultrasound increases tissue temperature, blood flow and tissue collagen elasticity and is additionally effective at relieving muscle spasms.

Stabilization exercise on a scapular plane does not place excessive force on the shoulder joints. Therefore, this type of exercise may be used safely by patients with shoulder joint damage. It is often employed to correct abnormal scapular location and movement function disorders associated with abnormal dynamic adjustment and to stabilize the whole pectoral arch.

The restoration of the scapular control has been commonly accentuated within the management of shoulder impingement syndrome. Taping has been recently utilized in patients with shoulder problems to supply support during movement and to regulate scapular movement.

Abnormal scapular movement or dyskinesia can be treated with scapular taping program as a part of the exercise regimen, scapular taping can improve the biomechanics of scapulohumeral and scapula thoracic joints, helping to relieve patients' symptoms.

In recent years, the utilization of Kinesio Tape (KT) has become increasingly popular. KT was designed to mimic the qualities of human skin. It has roughly the same thickness as the epidermis and can be stretched between 30% and 40% of its resting length longitudinally. Kase et al have proposed several benefits, counting on the quantity of stretch applied to the tape during application: (1) to supply a positional stimulus through the skin, (2) to align fascial tissues, (3) to make more room by lifting fascia and soft tissue above area of pain/inflammation, (4) to supply sensory stimulation to help or limit motion, and (5) to assist in the removal of edema by directing exudates toward a lymph duct. KT is exclusive in several respects in comparison to most commercial brands of tape. It is latex free and therefore the adhesive is 100% acrylic and warmth activated. The 100% cotton fibers allow for evaporation and quicker drying. This allows KT to be often applied to virtually any muscle or joint within the body.

METHODOLOGY

In this intervention Assessor blinded Randomized controlled study, after institutional ethical approval obtained, participants recruited through c.u.shah physiotherapy musculoskeletal outpatient department the total 60 were interested to participate in the study. A total 45 S study subjects who fulfilled selection criteria were recruited to this study. Using computer generated randomization [simple random sampling] method 45 participants were randomly assigned in Group A (n=15) was received Conventional physiotherapy, subjects in Group B (n=15) was received Scapular taping and Conventional physiotherapy & Group C (n=15) Kinesio taping and Conventional physiotherapy. The included criteria's 1) age of 18-60 years 2) a history of proximal anterior, lateral shoulder pain persisted for more than 1 week during the last six months 3) painful arc with active shoulder

elevation 4) tenderness to palpation of rotator cuff tendons 5) pain with resisted isometric shoulder abduction 6) positive empty can test 7) positive Hawkins-Kennedy test 8) Positive lateral scapular slide test 9) NPRS Score Between 4 to 7 10) subjective complaint of difficulty performing activities of daily living 11) subject willing to participate

The excluded criteria's 1) any recently undergone intra-articular steroid injection of shoulder 2) girdle fracture, glenohumeral dislocation/subluxation, 3) acromioclavicular sprain, concomitant cervical symptoms consistent with radiculopathy 4) history of a shoulder surgery within the previous 12 weeks 5) any skin allergy 6) shoulder pain which lasted more than 6 months.

SAMPLING TECHNIQUES:

All 45 Shoulder Impingement study subjects were randomly assigned in to three groups; Group A (n=15) was received Conventional physiotherapy, subjects in Group B (n=15) was received Scapular taping and Conventional physiotherapy & Group C (n=15) Kinesio taping and Conventional physiotherapy and same allocation was done by using simple random sampling (computerized randomized table)

OUTCOME MEASURES:

The pre-intervention outcome measures consisted of pain assessment using numerical pain rating scale (NPRS), Shoulder range of motion was assessed by using Universal goniometer and Shoulder functional disability was assessed by using shoulder pain and disability index (SPADI).

NPRS is a self-assessing questionnaire. Pain intensity was measured by using the Numerical pain rating scale ranging from 0-10 numerals on a line. The NPRS is one of the most basic pain measurement tools. It consists of a line, bounded by 0-10 numerals. Beneath the numerals were written in cues (no pain, maximum pain). Line have numerical markings on it and patients were allowed to mark on the line numerical to the intensity of pain. The place on the line was measured a score between 0 and 10, where 0 was no pain at all and on 10 pain as bad as it could be.

The shoulder pain and Disability Index (SPADI) may be a self-administered questionnaire that consists of two dimensions, one for pain and therefore the other for functional activities. The pain dimension consists of 5 questions regarding the severity of an individual's pain. Functional activities are assessed with eight questions designed to live the degree of difficulty a private has with various activities of daily living that need upper extremity use. The SPADI takes 5 to 10 minutes for a patient to finish and is that the only reliable and valid region-specific measure for the shoulder.

Shoulder Range of motion was measured by using Universal Goniometer with a scale from 0 degree to 360 degree. Four Range of motions were measured was Flexion, Abduction, internal rotation, external rotation. patient were positioned in supine lying for measuring the range of motion.

STATISTICAL ANALYSIS

All statistical analysis was done using SPSS 16.0 software for windows. Descriptive analysis was used to obtain mean and standard deviations. Intergroup comparison of pre & post treatment pain score, Shoulder ROM and Shoulder pain and disability index was done using one way ANOVA. Intra group comparison of pain score, Shoulder ROM and Shoulder pain and disability index was done using t-Test (Paired Sample Test). Further, Bonferroni post hoc analysis was performed for multiple inter group comparison. Confidence interval were set at 95%, p=0.05 for all the analysis.

RESULTS

The demographic details (Age =0.800, Body Height: p=0.967, Body Mass :p=0.052, BMI: p=0.184 & Duration of the condition (p=0.579) of groups were homogenous with >0.05 (Table-I). pre treatment NPRS (p=0.902), HHD (p=0.613)

Table 1: Demographic details

Variables	Control Group (n=15)	ST Group (n=15)	KT [®] Group (n=15)
	Mean ±SD	Mean ±SD	Mean ±SD
Age (Y) [†]	46.73±2.96	51.67±3.13	51.87±3.71
Gender	Male = 60 % Female = 40%	Male = 53.33 % Female = 46.67%	Male = 60 % Female = 40%
Affected limb	Right = 60 % Left = 40 %	Right = 53.33 % Left = 46.66 %	Right = 40 % Left = 60 %

*ST= Scapular taping, KT[®]=Kinesiotaping & Y[†]=years.

Table-II:

GROUP	PRE	POST	p VALUE (INTRA)
Control (A)	6±0.93	4.87±1.06	0.000
Scapular Taping + Control Group	6.33±0.62	4.93±0.59	0.001

Kinesio Taping + Control Group	6.07±0.96	3.13±0.83	0.000
p VALUE (INTER)	0.528	0.000	

Table-III:

GROUP	PRE	POST	p VALUE (INTRA)
Control (A)	114.67±11.09	126.00±6.04	0.000
Scapular Taping + Control Group	115.67±12.23	126.00±8.06	0.000
Kinesio Taping + Control Group	120.33±8.34	134.00±7.12	0.000
p VALUE (INTER)	0.310	0.004	

Table-IV:

GROUP	PRE	POST	p VALUE (INTRA)
Control (A)	120.00±10.14	121.00±9.30	0.000
Scapular Taping + Control Group	108.67±9.15	119.33±7.76	0.000
Kinesio Taping + Control Group	114.67±12.60	130.33±7.67	0.000
p VALUE (INTER)	0.318	0.001	

Table-V:

GROUP	PRE	POST	p VALUE (INTRA)
Control (A)	54.33±3.72	60.60±4.10	0.000
Scapular Taping + Control Group	54.67±3.52	61.53±3.80	0.000
Kinesio Taping + Control Group	56.67±3.62	66.00±3.87	0.000
p VALUE (INTER)	0.174	0.001	

Table-VI:

GROUP	PRE	POST	p VALUE (INTRA)
Control (A)	56.33±5.50	61.67±5.11	0.000
Scapular Taping + Control Group	47.33±5.30	54.00±5.41	0.000
Kinesio Taping + Control Group	48.00±4.55	59.33±7.53	0.000
p VALUE (INTER)	0.314	0.004	

Table-VII:

GROUP	PRE	POST	p VALUE (INTRA)
Control (A)	54.67±3.46	46.6±1.24	0.000
Scapular Taping + Control Group	56.27±2.40	38.47±2.03	0.000
Kinesio Taping + Control Group	48±4.55	32.53±1.68	0.000
p VALUE (INTER)	0.000	0.000	

DISCUSSION

The scapular kinematics alteration in Shoulder impingement is due to alteration in muscle activities, muscle fatigue, muscle tightness as well as thoracic kyphosis. In Shoulder impingement there will be tightness of soft tissue, muscles around the glenohumeral joint that might restrict normal scapular motion leading to scapula-thoracic alteration. The important muscles or tissues that get tightened around shoulder are pectoralis minor and posterior shoulder musculature.

Results indicate that there is significant improvement in Pain, functional disability and Shoulder ROM in patients with primary shoulder impingement syndrome at the end of 2nd week in all the 3 groups via, Conventional Physiotherapy in Group 1, Scapular Taping and Conventional Physiotherapy in Group 2 and Kinesiotaping and Conventional Physiotherapy in Group 3. All the 3 treatment groups obtained successful outcomes as measured by significant reduction in NPRS, Shoulder ROM and SPADI measurement at the end of 2nd week follow-up.

In this study efforts were made to compare the effectiveness of Kinesiotaping versus Scapular taping in treating patients with shoulder impingement. The patients were randomly divided into 3 groups with the help of simple random sampling (computer Allocation).

The present study also showed that KT group had a more significant functional improvement (a decrease in pain from 6.07±0.96 to 3.13±0.83 points compared to 6.33±0.62 to 4.93±0.59 and 6±0.93 to 4.87±1.06 points for the scapular taping and control group) and improvement in SPADI (from 48±4.55 to 32.53±1.68 compared to 56.27±2.40 to 38.47±2.03 and 54.67±3.46 to 46.6±1.24 for the scapular taping and control group).

The kinesio tape is found to be advantageous than classic tape. As it does not limit the patients freedom of movement. The K tape was applied to the deltoid to reduce the passive tension caused due to prolonged fatigability. For supraspinatus, KT was applied to reduce tension due to prolonged elongation. Also the strips were applied in such a way that it was assistive in increase the tension of external rotators by inhibiting the internal rotators.

The results showed highly significant improvement statically in all parameters. According to Mark D Thelan and Kumbrick KT activates skin receptors as well as proprioception, in skin assist in increasing tonus regulation and position of body respectively K tape helps in elimination of circulatory impairment in muscular by lifting the skin in area increasing the space decreasing the pressure and lymphatic drainage. Kinesio tape also stimulates mechanoreceptors in skin helps in inhibiting the nociceptive stimulation at spinal level on basis on pain gate control theory. These above factors might have assisted in gaining improvement in all parameters. However, KT application for 2 weeks was effective in bringing back scapula to its normal level. This could be due to its beneficial effect in inhibiting the over tensed muscle and retraining the weekend muscles. The additional Kinesiotaping is more effective in reducing pain, functional disability and shoulder ROM.

LIMITATIONS

1. small sample size.
2. longterm followup was not done.

CONCLUSION

In conclusion the treatment program consisting of Kinesiotaping with Conventional Physiotherapy is more effective in scapular dyskinesis associated with primary shoulder impingement syndrome to reduce pain, functional disability and improve Shoulder range of motion.

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CONFLICT OF INTEREST:

We declare that there were no conflicts of interest in the entire journey of the study



Figure 2 [consort format]

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