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Effectiveness of Kinesiotaping in Shoulder Impingement Syndrome in Cricket Players: A Randomized Controlled Trial

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Abstract

Background: This study examined the response of kinesio taping (KT) in combination with the IFT and home based exercises as compared to IFT and homebased exercises alone on motion, pain with functional performance and subsequent quality of life in subjects having shoulder impingement syndrome,

Methods: An experimental study design, 60 subjects with shoulder impingement syndrome were randomized 30 subjects each into two groups- Control(Group A), and K.T Group (Group B) respectively. Group A received Kinesiotaping with IFT and home based exercises. Group B received only IFT and home based exercises. The duration of intervention was two weeks. Outcome measures such as Visual Analogue Scale, Disability of shoulder arm and hand, Shoulder ROM were measured before, at the end of 2nd week post treatment.

Results: Comparison of post intervention means at 2nd week of treatment there is a statistically significant ($p<0.05$) difference in improvement in outcome measures between both groups. K.T Group subjects showed greater percentage of improvement than Control Group.

Conclusion: The present study concludes that kinesiotaping along with IFT and home based exercises is more effective in improving pain, functional disability and flexibility than IFT and home based exercises for subjects with Shoulder Impingement syndrome.

Keywords: Kinesiotaping, Shoulder, Impingement, DASH, Shoulder Pain.

INTRODUCTION

In cricket, shoulder pain is common due to repeated throwing and bowling actions. Rotator cuff muscles supraspinatus, infraspinatus, subscapularis, and teres minor can become damaged as a result of overuse.The prevalence of shoulder pain in the general population ranges from 6.9% to 34 %. Forty of the population probably will suffer from shoulder pain at some point of their lifetime [1]. Over the past few decades, shoulder impingement syndrome has become an increasingly common diagnosis; [2]

The shoulder joint comprises 3 bones, 3 joints [5]. Mobility of shoulder joint exceeds that of any other joint in the body hence it undergo huge stress [6]. Most of the range of motion of the shoulder occurs at the glenohumeral joint. The acromio-clavicular and sternoclavicular joints connect the shoulder to the trunk. In addition to these, the scapulothoracic space forms an articular-like posterior connection to the trunk and the subacromial space, which consists of the subacromial and subdeltoid bursa, acts like a joint [2.]

Soft tissue structures are the major glenohumeral stabilizers. Static stabilizers consist of the articular anatomy, glenoid labrum, joint capsule, glenohumeral ligaments, and inherent negative pressure in the joint. Dynamic stabilizers include the rotator cuff muscles (supraspinatus, infraspinatus, teres minor, and subscapularis), long head of the biceps tendon, scapulothoracic motion, and other shoulder girdle muscles (eg, pectoralis major, latissimus dorsi, and serratus anterior).[3]

The supraspinatus muscle is responsible for initiating abduction, the infraspinatus and teres minor control external rotation, and the subscapularis controls internal rotation. The rotator cuff muscles provide dynamic stabilization to the humeral head in the glenoid fossa (fulcrum effect) and form a ‘‘force couple’’ with the deltoid to allow elevation of the arm. The rotator cuff is responsible for 45% of abduction strength and 90% of external rotation strength [5].

Based on this notion, many manual therapy interventions have been proposed to restore these alterations and therefore to eliminate pain and disability caused by CR. [4]

The action line of the supraspinatus muscle has a superior (cephalad) translatory component, rather than the inferior (caudal) component The supraspinatus is still an effective stabilizer of the GH joint, however, because its rotatory component is proportionally larger than that of the other rotator cuff muscles.

Shoulder impingement has been defined as compression and mechanical abrasion of the rotator cuff structures as they pass beneath the coracoacromial arch during elevation of the arm[3]. In 1931, Meyer (Meyer 1931) proposed that tears of the rotator cuff occurred secondary to attrition due to friction against the undersurface of the acromion and described corresponding lesions on the undersurface of the acromion and the greater tuberosity.

Codman, in 1934, defined the critical zone where most degenerative changes occur as the portion of the rotator cuff located one centimeter medial to the insertion of the supraspinatus on the greater tuberosity (Codman 1990). Armstrong introduced the term ‘supraspinatus syndrome’ (Armstrong 1949)[2].

The clinical diagnosis of impingement syndrome is commonly based on findings called the impingement sign and the impingement test (Neer & Welsh 1977). The patient’s history typically includes pain at night and positional discomfort called ’painful arc’ (Calvert 1997) [2].

Subacromial or external impingement is the mechanical encroachment of the soft tissue (bursa, rotator cuff tendons) in the subacromial space between the humeral head and the acromial arch. This encroachment particularly takes place in the midrange of motion, often causing a ‘‘painful arc’’ during active abduction.

Internal impingement comprises encroachment of the rotator cuff tendons between the humeral head and the glenoid rim**.**

In primary impingement, a structural narrowing of the subacromial space causes pain and dysfunction, such as acromioclavicular arthropathy, type I acromion, or swelling of the soft tissue in the subacromial space.

In secondary impingement, there are no structural obstructions causing encroachment, but rather functional problems, occurring only in specific positions. Secondary impingement may occur in the subacromial space as well as internally in the glenohumeral joint.[9]

Neer described three stages of the impingement process. Stage 1occurs in people under 25 years of age and is associated with tendinous edema and haemorrhage, and does not require surgery. Stage 2 involves tendinitis and occurs in people aged 25 to 40 and bursectomy and coracoacromial ligament division should be considered after 18 months of conservative treatment. Neer stated that in this group an

acromioplasty is not usually required. Stage 3occurs in people over 40 years of age and is associated with bone spurs and tendon rupture and requires anterior acromioplasty. [10]

Non operative treatment is very successful and the comprehensive rehabilitative protocols for primary and secondary impingement syndrome are similar and follow the postoperative rehabilitation plan for patients who have had a subacromial decompression with a normal rotator cuff. Initial goals of the rehabilitation process are to obtain pain relief and regain range of motion. Various electrotherapy modalities, oral medications and corticosteroid subacromial injections are helpful in the early stages to decrease the inflammatory process allowing for more successful advances in motion and strengthening. Strengthening exercises begin by avoiding impingement positions while performing the exercises. The focus is on closed kinetic chain exercises initially with open chain exercises to follow without aggravating shoulder discomfort. For primary impingement the procedure of choice presently is arthroscopic subacromial decompression, although comparable long-term results can be obtained with a traditional open acromioplasty.

Physiotherapy plays an important role in treatment of Shoulder impingement. The Kinesio Taping Method will assist in reduction of edema and pain, with an increase in muscle activity to provide increased joint stability. Tape also provide proprioceptive stimulus to facilitate a more normal movement pattern. The specific application technique cannot be described for the practitioner; this will need to be determined by the patient's symptoms.

It has been proposed that the control of scapula and the shoulder could be provided by the constant proprioceptive feedback, alignment correction during dynamic movements with kinesio taping. Mainly space and lymphatic correction techniques are used; this technique also helps to maintain scapulothoracic stability via the mechanical correction. [3]

Electrotherapy modalities like IFT (interferential therapy) has been widely used in therapy for many years [8]. To produce low frequency effects at sufficient intensity and at sufficient depth, patients can experience considerable discomfort in the superficial tissues (i.e. the skin). This is due to the impedance of the skin being inversely proportional to the frequency of the stimulation.[9]

IFT helps in Pain relief, muscle stimulation, increased local blood flow, reduction of oedema.[10]

Though there are various claims that Kinesio taping is effective in reducing pain and discomfort in shoulder impingement syndrome and are widely used in Cricketers there is lack of research and evidence, Hence the need arise to check the effectiveness of Kinesio Taping in shoulder impingement syndrome in cricket players.

The objective of the study was to know the effectiveness of Kinesio taping in cricket players with shoulder impingement syndrome.

MATERIALS AND METHODS:

Randomized Controlled Trial (RCT) was conducted to assess the effectiveness of Kinesio taping in cricket players with SIS. The study will be carried out in total of 60 subjects, 30 in control Group A and 30 in Experimental Group B. the patient population was a sample of simple random sampling made up of subjects who agreed to participate and met the inclusion criteria. Patients Included were active cricketers in the age group 20-45 with complaints of pain before 150 degree of active shoulder elevation, positive empty can test or Positive Hawkins- Kennedy test and having difficulty in performing ADL activities.

Patients were excluded if they had taken intra- articular steroid injection, had conditions shoulder girdle fracture, gleno humeral dislocations, acromio-clavicular sprain, symptoms of cervical spine disorders, history of surgery in past 12 weeks, shoulder pain for more than 6 months:

Study Setting and Source of data

Subjects were recruited from KTG Hospital, K.C General Hospital and Ravi Kirloskar Memorial Hospital, Bangalore.

Materials used:

- Kinesio tape
- Micro pore
- Couch
- Scissor
- Goniometer
- IFT

Selection of subjects into groups:

Subjects who will meet the inclusion criteria were informed about the study and a written consent (Annexure - 1) was taken.

Procedure for intervention for Control Group A (n=30)

Subjects in control group were treated with Interferential therapy and home-based exercise programme. Interferential therapy was given for 15 min duration, 5 times a week. Home based exercise programme consisted of pendular exercises, Scapular stabilization exercises, Isometrics for shoulder, Active Rom exercises of shoulder all were performed with 10 repetitions 2 times daily for 2 weeks.

Procedure for intervention for Experimental GROUP B (n=30)

Subjects in this group were applied K taping once in a week for 2 weeks. Subjects were made to do exercise 5 days a week with tape on and instructed to perform the exercises at home twice a day with tape on.

Subjects in experimental group were treated with Interferential therapy , Kinesio taping and home based exercise programme.

Interferential therapy was given for 15 min duration, 5 times a week kinesiotaping was applied to 3 muscles (supraspinatus, deltoid, Teres minor).

For supraspinatus muscle base of the strip placed 3 cm below the greater tuberosity of humerus with no tension. Then, the patient will adduct the shoulder with lateral neck flexion to the opposite side. The rest of the strip will be applied along the spinous process of the scapula with a relatively lighter tension which is described as 15–25% of the full stretch application (100%) [(3)]. Rest of strip will be applied along the spinous process of scapula.

Y shaped taping applied to deltoid muscle, base of the strip placed 3 cm below the deltoid tuberosity of the humerus without tension. Both anterior and posterior tails will be applied with light (15–25%) tension. The anterior and posterior tails will be placed along the outer borders of the anterior and posterior deltoid muscle, respectively, without tension.Lastly taping is done to

Teres minor where I-type strip will be placed on the lower facet of greater tuberosity of humerus. Greater tuberosity of the humerus with no tension. Then, the patient will abduct the shoulder in horizontal flexion with internal rotation. We place the rest of the strip along the border of the scapula with light (15–25%) tension [(3)]

Home based exercise programme consisted of pendular exercises, Scapular stabilization exercises, Isometrics for shoulder, Active Rom exercises of shoulder all are performed with 10 repetitions 2 times daily for two weeks

Outcome Measurements

1. Visual analogue scale (VAS)
2. Disability of arm shoulder and hand (DASH)
3. Shoulder Range of Motion (flexion & abduction)

All the measures were obtained at baseline, at day 1 and day 14 after days after wearing the KT.

Ethical Clearance

As this study involve human subjects, the ethical clearance has been obtained from research and ethical committee of K.T.G College of Physiotherapy, Bangalore as per the ethical guidelines for Bio-Medical research on human subjects, 2000 ICMR, New Delhi.

Data analysis

Statistical Methods:

Descriptive statistical analysis has been carried out in the present study. Out Come measurements are measured for Pain using VAS scale and ability using Quick DASH and the analysis are presented as mean ± SD. Significance is assessed at 5 % level of significance with p value 0.05 less than this is considered as statistically significant difference. **Pearson Chi-Square test** and has been used to analyze the significant of basic characteristics of gender, age and side distribution of the subjects studied.

Paired 't' test as a parametric and **Wilcoxon signed rank test** as a non-parametric test have been used to analysis the variables pre-intervention to post-intervention with calculation of percentage of change.

Independent 't' test as a parametric and **Mann Whitney U test** as a non-parametric test have been used to compare the means of variables between groups with calculation of percentage of difference between the means.

The Statistical software namely SPSS 16.0(originally, Statistical Package for the Social Sciences, later modified to read Statistical Product and Service Solutions was released in its first version in 1968 after being developed by Norman H. Nie, Dale H. Bent and C. Hadlai Hull. It is now officially named "IBM SPSS Statistics"in its version 20.0) , Stata 8.0, MedCalc 9.0.1 and Systat 11.0 were used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables etc.(Other software are PASW Statistics IBM SPSS Statistics)

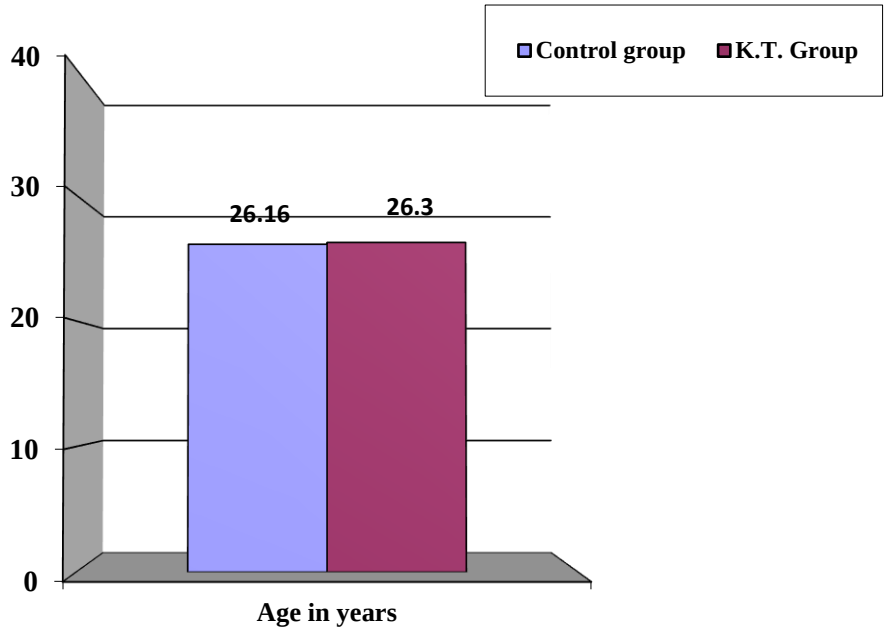
RESULTS

Table 1: Basic Characteristics of the subjects studied

Basic Characteristics of the subjects d studied		Control Group	K.T. Group	Between the groups Significance
Number of subjects studied (n)		30	30	--
Age in years (Mean± SD)		26.16± 4.57 (19-34)	26.3± 3.79 (20-34)	p= 0.902 (NS)
Side Affected	Right	22	21	--
	Left	08	09	

The above table shows that in Control Group there were 30 subjects with mean age 26.16 years and there 22 right side affected and 8 left side affected included in the study. In K.T. Group there were 30 subjects with mean age 26.3 years and there were 21 right side affected and 9 left side affected included in the study. There is no significant difference in mean ages between the groups.

Graph 1a: Age Distribution of the subjects studied



The above graph shows that in Control Group there were 30 subjects with mean age 26.16 years and in K.T Group there were 30 subjects with mean age 26.3 years included in the study. There is no significant difference in mean ages between the groups.

Table 2: Analysis of VAS, Dash test, Shoulder Flrxion and Abduction within Control Group and K.T Group (Pre to post test analysis)

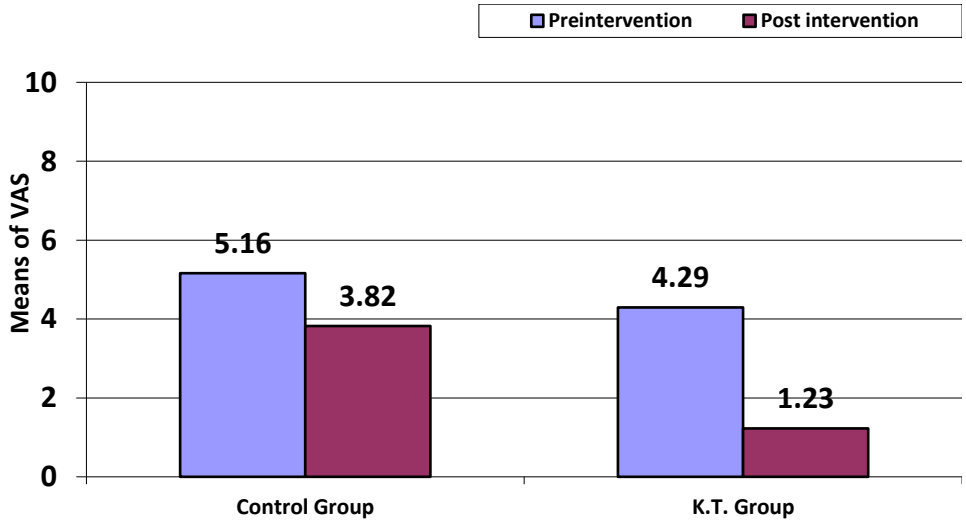
	Pre intervention (Mean±SD) min-max	Post intervention (Mean±SD) min-max	Percentage of change	Z value[b] (Non parametric significance)	t value a (Parametric) **Parametric Significance P value**	95%Confidence interval of the difference		Effect Size (r)
						Lower	Upper	
Control Group								
VAS(cm)	5.16±1.32	3.82±1.74	-25.96%	-3.725 P=0.000**	**4.167 P =0.001****	0.669	2.020	0.397
DASH	25.20±5.86	20.70±6.86	17.85%	-3.945 p=0.000**	**4.579 P =0.000****	2.44	6.55	0.332
Shoulder Flexion	133.5±6.83	142.96±6.65	7.08%	4.793 P=0.000**	**-18.433 P=0.000****	-10.517	-8.416	-0.574

Shoulder Abduction	133.26±6.75	143.43±5.97	7.63%	4.806 P=0.000**	**-15.502 P=0.000****	-11.507	-8.825	-0.623
K.T. Group								
VAS(cm)	4.29±1.13	1.32±1.25	69.23%	-3.923 P=0.021**	**17.300 P=0.000****	2.61	3.33	0.799
DASH	21.45±5.86	8.20±4.12	61.77%	-3.924 P=0.000**	**15.174 P=0.000****	11.42	15.07	0.794
Shoulder Flexion	134.03±6.89	147.9±6.89	10.34%	4.791 p=0.000**	**-26.768 P =0.000****	-14.926	-12.807	-0.709
Shoulder Abduction	134.01±6.57	148.23±6.24	10.61%	4.802 p=0.000**	**-27.052 P =0.000****	-15.201	-13.064	-0.742

** Statistically Significant difference p<0.05; NS- Not significant; a. Pared t test. b. Wilcoxon Signed Ranks Test

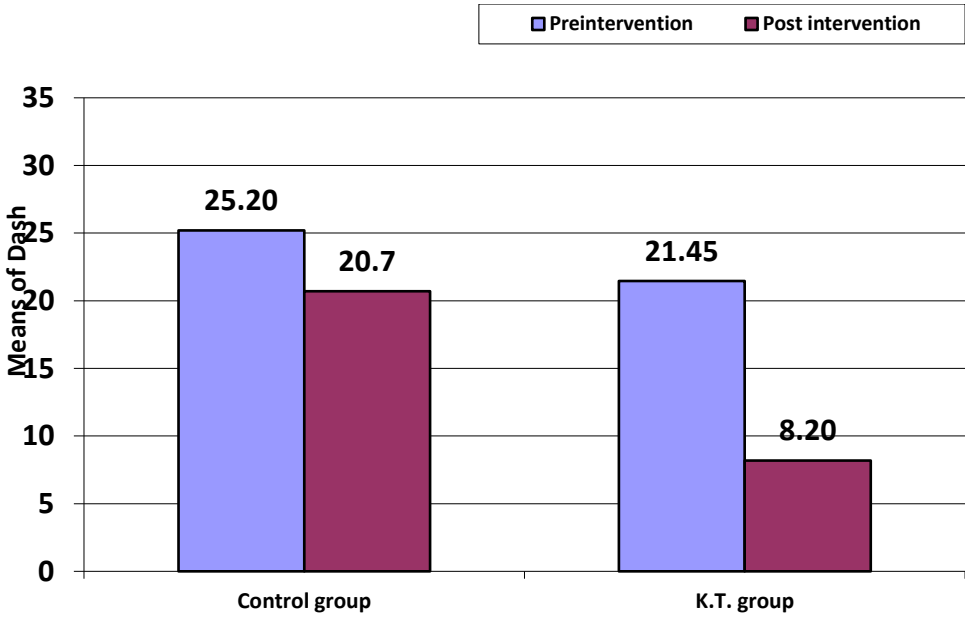
The above table shows that in Control and KT groups there is a statistically significant change in means of VAS, Dash test, Shoulder Flexion and Abduction when means were analyzed from pre intervention to post intervention within the group with p<0.05 with positive percentage of change showing that there is increase in the post means and negative percentage of change showing that there is decrease in post means of Control and K.T Groups.

Graph-2a: Analysis of VAS test within Control group and K.T Group (Pre to post test analysis)



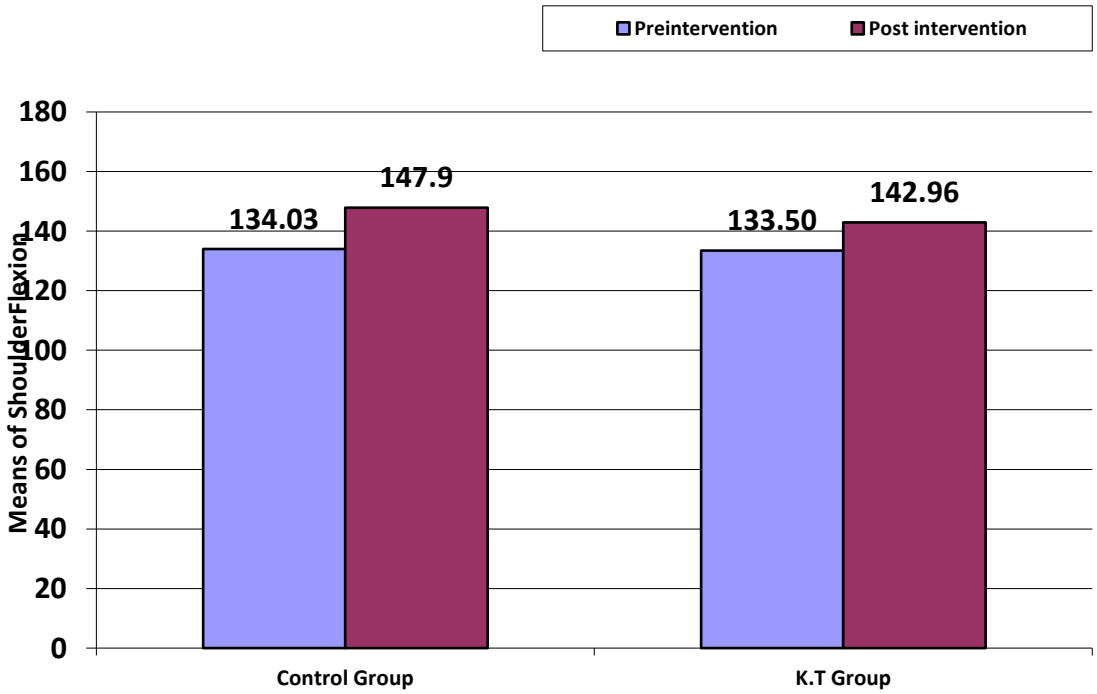
The above graph shows that there is a statistically significant decrease in means of VAS when analyzed from pre intervention to post intervention within Control and K.T. group.

Graph-2b: Analysis of Quick within Control and K.T. Group (Pre to post test analysis)



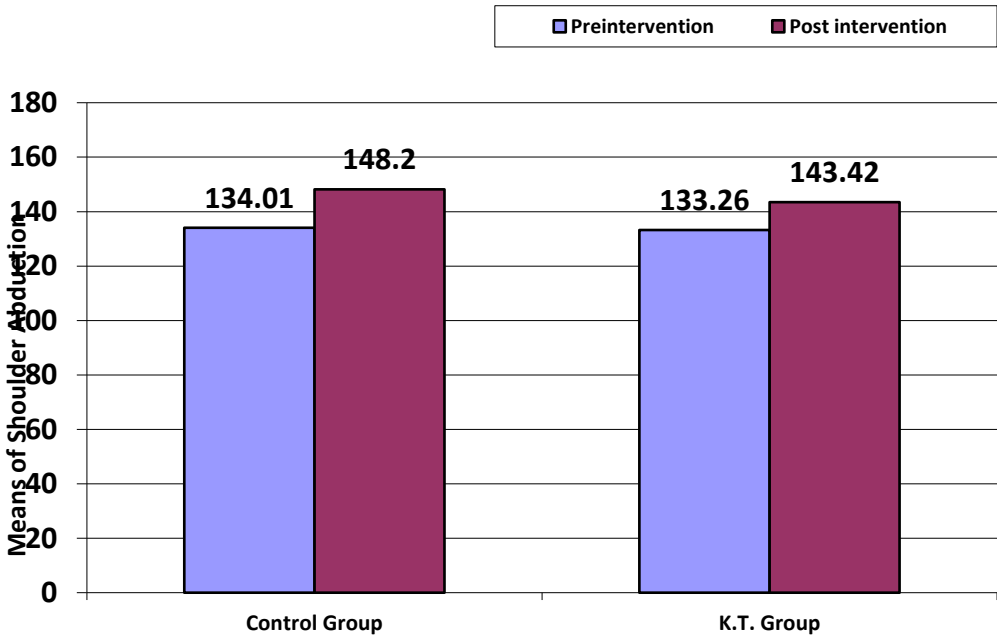
The above graph shows that there is a statistically significant reduction in means Dash scores when analyzed from pre intervention to post intervention within Control and K.T. group.

Graph-2b: Analysis of Shoulder Flexion within Control Group and K.T Group (Pre to post test analysis)



The above graph shows that there is a statistically significant reduction in means of Shoulder Flexion when analyzed from pre intervention to post intervention within Control group and K.T Group.

Graph-2c: Analysis of Shoulder Abduction within Control and K.T Group (Pre to post test analysis)



The above graph shows that there is a statistically significant reduction in means of Shoulder Abduction when analyzed from pre intervention to post intervention within Control and K.T. group.

Table 3: Comparison of VAS scores and Quick Dash between Control and K.T. group. (Pre and post test comparative analysis)

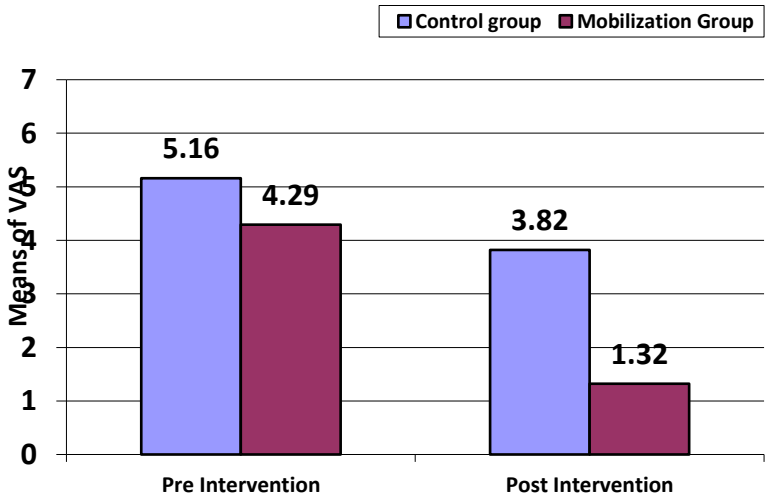
	Control Group (Mean± SD) min-max	**K.T. Group** (Mean± SD) min-max	Percentage of change	Z value [b] (Non parametric significance)	t value [a] (Parametric) **Parametric Significance P value**	95%Confidence interval of the difference		Effect Size (r)
						Lower	Upper	
Pre intervention								
VAS(cm)	5.16±1.32	4.29±1.13	-16.86%	-2.518 p=0.120 (NS)	2.231 P =0 .691 (NS)	0.080	1.659	0.333
DASH	25.20±5.86	21.45±5.86	-14.88%	-1.968 p=0.490(NS)	2.023 P =0 .533(NS)	-0.003	7.503	0.304
Shoulder Flexion	134.03±6.89	133.5±6.83	-0.39%	0.259 p=0.795(NS)	**0.300 P =0 .764 (NS)**	-3.015	4.082	0.038

Shoulder Abduction	134.01±6.57	133.26±6.75	-0.55%	0.477 p=0.632(NS)	**0.484 P =0.629(NS)**	-2.610	4.276	0.056
Post intervention								
VAS(cm)	3.82±1.74	1.32±1.25	32.00%	-4.057 p=0. 0.000**	5.200 P =0.000**	1.523	3.473	0.636
DASH	20.70±6.86	8.20±4.12	-60.38%	-4.575 p=0.000**	6.984 P =0.000**	8.876	16.123	0.741
Shoulder Flexion	147.9±6.89	142.96±6.65	-3.34%	2.607 p=0.009**	**2.819 P =0.006****	1.430	8.435	0.342
Shoulder Abduction	148.23±6.24	143.43±5.97	-3.23%	2.705 p=0.006**	**3.043 P =0.003****	1.642	7.957	0.365

** Statistically Significant difference p<0.05; NS- Not significant; a. Independent t test. b. Mann Whitney U Test

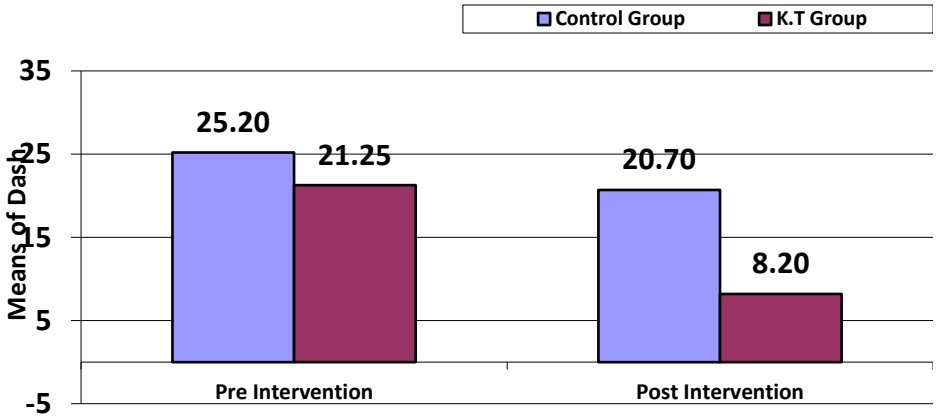
The above table shows that, when pre-intervention means were compared between the Control and Mobilization groups there is no statistically significant difference in means of VAS and DASH, Shoulder Flexion and Shoulder Abduction means. When post-intervention means were compared between the Control and K.T. groups there is highly statistically significant difference in means of VAS, DASH, Shoulder Flexion and Shoulder Abduction with larger effect size with p<0.05 with positive percentage of change showing that there is increase in the means of K.T. and negative percentage of change showing that there is decrease in means of K.T. when compared with Control Group.

Graph-3a: Analysis of VAS between Control group and K.T. Group (Pre to Pre and Post to Post test analysis)



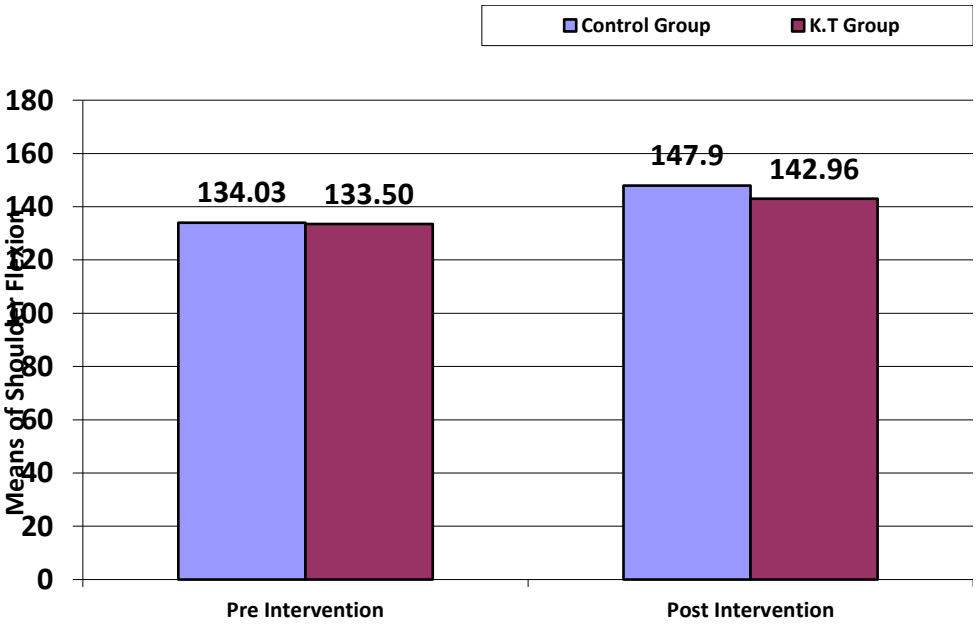
The above graph shows that there is no statistically significant difference in means of VAS scores when analyzed from pre intervention to pre intervention and there is significant difference when analyzed from post intervention to post intervention between Control and K.T. group.

Graph-3b: Analysis of DASH between Control group and K.T. Group (Pre to Pre and Post to Post test analysis)



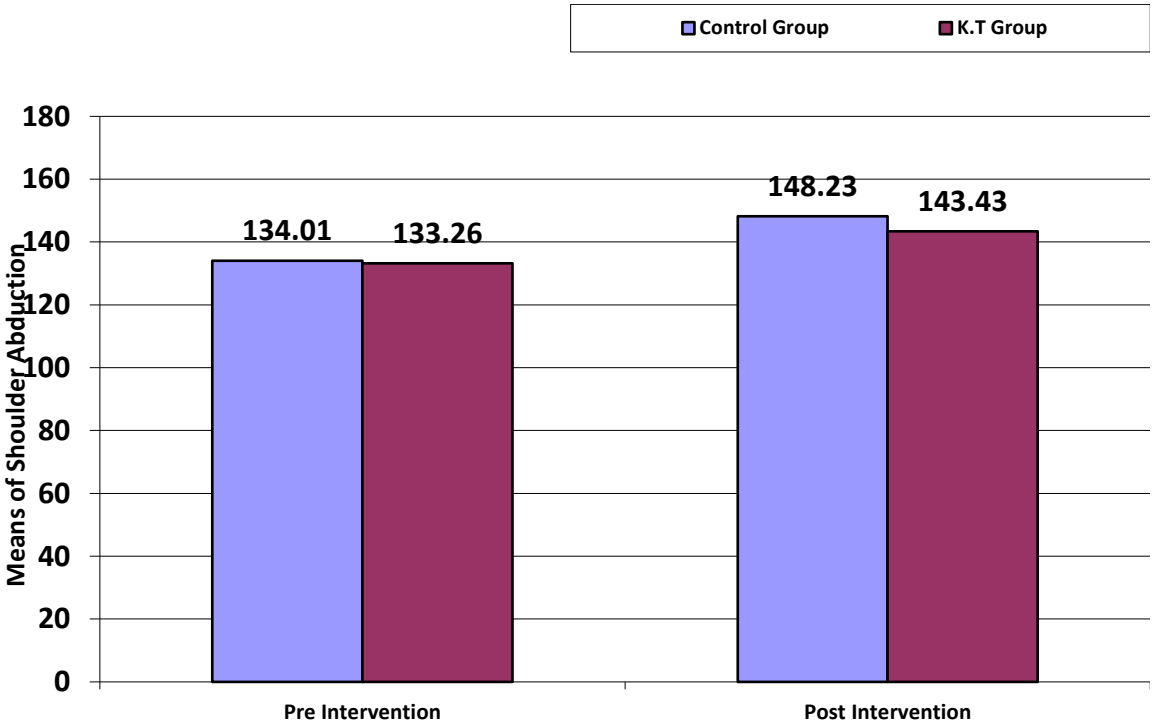
The above graph shows that there is no statistically significant difference in means of DASH scores when analyzed from pre intervention to pre intervention and there is significant difference when analyzed from post intervention to post intervention between Control and K.T. group.

Graph-3c: Comparison of Shoulder Flexiom between Control Group and K.T Group.



The above graph shows that when pre-intervention means were compared between the Control and KT groups there is no statistically significant difference in means of Shoulder flexion, when means of post intervention were compared between the groups there is a significant difference in means of Shoulder flexion between the groups.

Graph-3d: Comparison of Shoulder Abduction between Control Group and K.T Group.



The above graph shows that when pre-intervention means were compared between the Control and K.T groups there is no statistically significant difference in means of Shoulder abduction, when means of post intervention were compared between the groups there is a significant difference in means of shoulder abduction between the groups.

DISCUSSION

In the present study an experimental study design of 60 subjects with shoulder impingement syndrome were randomized into two groups: Control Group A (n=30) and K.T. Group B (n=30). Subjects in Group A received IFT and Home based exercises and K.T group B received Kinesiotaping, IFT and home based exercises for two weeks. Subjects were assessed for pain and functions Pre and Post using Visual Analog Scale (VAS), and DASH test, Shoulder ROM

It was found that K.T group as well as control group both are effective on reducing pain and improving functions in subjects with shoulder impingement syndrome. There exists a significant difference between both the groups who received K-taping with IFT and home based exercises over the group which received only IFT and home based exercises. Exercises along with K-taping were found to be more effective.

In Control **group A** with IFT and home based exercises there exist a significant difference which was seen on comparing the pre intervention and post intervention values between the groups, which suggests that IFT and home based exercises are effective in reducing pain, disability and improving functions of shoulder in shoulder impingement.

Since patients with shoulder pain modify their activities following exercises and reduction in pain following IFT which in return changes the biomechanics of shoulder also which in turn changes the biomechanics of movement.

Isometric exercise might be the most appropriate and easy to understand by the patients and can be easily and safely performed at home because it requires no or minimal apparatus. Further, isometric exercise causes the least intra-articular inflammation, pressure, and bone destruction[20] "isometric exercises" are simple and inexpensive to perform and that they rapidly improve strength[21]

Stronger rotator cuff muscles strength had less shoulder pain and better physical function as compared with those with the least strength. Strong muscles stabilize the joints in a proper alignment, attenuate shocks that are transmitted to the joints and minimize the effect of impact by spreading the forces out over a greater area so it may be hypothesized that improvement in muscle strength is one of the main causes of reduced pain and disability. In the present study, the reduction in pain and disability in the experimental group may be attributed to increased muscle strength and thereby improved stability, which leads to reduction of pain and disability [22-25.]

Improvement in function may be attributed to the reduction of pain, reduction in abnormal joint kinetics and kinematics during functional movements and improved muscle activation pattern. Studies have shown that compared to forward walking; backward walking creates more muscle activity in proportion to efforts.[26]

In group B with subjects received K.T, IFT along with home-based exercises which were effective in reducing pain improving functions. Similar to the results of this study, the findings of previous studies have shown that KT decreased the discomfort of acute whiplash associated disorders[27] and rotator cuff tendinitis/ impingement[8] by 10 and 2.2, respectively. Generally, shoulder impingement pain becomes worse with physical activity such as overhead activities and movement.[28] According to the results of this study and those of a previous study, VAS scores during walking were higher than those at rest.[29,30] This type of pain is known as movement-evoked pain and is related to motor function. In this study, movement-evoked pain decreased by 25.7% after applying KT. A response of 23% or greater is regarded as the minimum clinically important improvement.[31] In addition, the large ESs were observed by KT intervention. Thus, KT application to the shoulder in patients with impingement may be effective to decrease movement evoked pain of Shoulder impingement.

It was proved that elasticity of KT conforms to the body, allowing for movement compare to rigid ones. Researchers attributed taping in response to proprioceptive feedback and alignment correction during movements. Correction of the scapular alignment during shoulder movement may improve normal glenohumeral motion and decrease the micro trauma and mechanical irritation of the soft tissues in between the subacromial structures, resulting in improvement of the upper extremity function. Some investigators reported negative effects of the use of rigid tape on performance of upper extremity because of movement restriction and skin irritation [32]. In this study, we used KT and not rigid tape to minimize the skin irritation following taping. Exercise programs for SIS aimed to stimulate recovery in the affected tissues and improve shoulder movements without an increase in pain [33]. The significant result may be supported by the finding of another study by Celik, et al. that noticed a significant reduction in level of pain following their exercise treatment which they applied beneath the painful arch for 2 weeks in subjects with SIS [23]. The above finding may be justified by the statement that when performed with therapeutic KT these exercises & activities were observed improvement in ROM, muscle strength, and functional status followed by decreasing pain in the short-term.

Out of 11 randomized controlled studies investigating the effects of exercise in SIS, 6 discussed the effects of exercise on pain and found exercise therapy alone to be efficient in pain control in both the short- and long-term [34]

Kinesio tape may enhance joint stability and movement biomechanics with the mechanical support. It is believed that the skin receptors are stimulated and proprioception increases, particularly when KT is applied with the correction technique and extra stretching. This result is also supported by the finding of another study by Lin, et al. who observed a change in scapular muscle activity and an increase in proprioception following KT application in subjects with no shoulder problems. Motor neurons are believed to be activated by the stimulated cutaneous mechanoreceptors [35].

However both group were found significant improvements, the Experimental group B has shown greater significant improvement in percentage of change with a larger effect size than that of control group A this is due to the effect of Kinesio tape with IFT and home based exercises over IFT and home based exercises. Since pain and disability are interdependent, a reduction in one will cause a reduction in the other[35.] These data offer interesting suggestions for some unsolved issues.

Therefore, considering significant difference in subjective and objective measure means the study accepts the alternate hypothesis.

CONCLUSION

The present study concluded that both K-taping with IFT and home based exercises and only IFT and home based exercises are shown to have short term effect on improving shoulder functions in shoulder impingement. However K taping with IFT and home based exercises were found clinically more effective with greater percentage of improvement on reducing pain and improving functions in subjects with shoulder impingement. It is recommended that application of K taping with IFT and home based exercises are clinically beneficial on reducing pain and improving functions in shoulder impingement syndrome.

LIMITATIONS OF THE STUDY

It is a short duration study in which follow up was not done, therefore long-term effects were not known. The Sample Size was small with a fixed population. Chronicity of Impingement was not known

RECCOMENDATION FOR FUTURE RESEARCH

Further study can be done measuring effect on other outcome measures. Further randomized controlled trial is needed to find long term effects of Kinesio Taping. Follow up after 8 weeks of intervention can be used to find further effectiveness of the techniques on subjects with Shoulder impingement syndrome.

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