



## EFFECT OF TAPING AND CLOSED KINETIC CHAIN VERSUS TRADITIONAL APPROACH IN OSTEOARTHRITIS KNEE

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### ABSTRACT

Osteoarthritis of the knee major cause of pain and disability. There is no specific treatment to modify the disease. There are various etiological factors for Osteoarthritis Knee of which highlighted factor biomechanical alteration and quadriceps weakness, the advancement treatment of Osteoarthritis Knee treatment shows biomechanical alteration can reduce the severity. Here the biomechanical factor is considered to be increased lateral vector force to be major source of severity for this medial tapping and close kinetic chain exercise said to reduce the severity. Hence the aim of study to compare the effect of tapping and closed kinetic chain with traditional approach in the management of osteoarthritis knee. For this 30 patients were selected an randomly divided into two group experimental and control group both group were assessed pre and post by WOMAC SCALE and ' Q ' ANGLE. After that experimental group tapping and close kinetic exercise were given. Finally result were tabulated. From the result experimental group show significant improvement than control group. Hence it is concluded that taping and closed kinetic chain exercise has satisfactory effectiveness in management of osteoarthritis knee compared to traditional and therapeutic approach

**KEY WORDS:** CLOSE KINETIC CHAIN EXERCISE, TAPPING, WOMAC SCALE, 'Q' ANGLE.



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## INTRODUCTION

The osteoarthritis is commonest degenerative disease affecting middle age group (45) and older age group. Etiological factors predisposing is not been specific. One of the prime etiological factors said to be quadriceps muscle weakness. Few literature quotes the importance of strengthening exercise particularly closed kinetic chain exercise improving strength and minimizing the shear force and compressive force per unit area which help to reduce patella femoral joint reaction force (PFJRF) <sup>1</sup>. Researchers suggest that increase in lateral vector force will produce more stress on the medial aspect of knee. Which is said to be a hallmark sign of osteoarthritis knee, further it has found that lateral tracking of patella can alter the q-angle. Hence many studies have been carried out to reduce lateral vector force and medial knee pain. The recent literature shows tapping along with closed kinetic exercise prove to be one of the beneficial remedies in rehabilitation of osteoarthritis knee. Hence the purpose of this study is to focus the effect of tapping and closed kinetic chain exercise in treatment of osteoarthritis knee, with keeping q-angle and WOMAC Scale as a main outcome measure 6-14.

## METHODOLOGY

Thirty patient with unilateral osteoarthritis knee, above forty five year were selected by randomized controlled trial and divided into two groups

### **Group A – experimental group**

15 patients with osteoarthritis knee were treated with taping and closed kinetic chain exercise comprise of mini squat

### **Group B – control group**

15 patient with osteoarthritis knee were treated with a traditional approach(Ultra sound, wax, isometric exercise)

## PROCEDURE

Pre and post assessment for both group carried using outcome measurement tool

1. WOMAC score – which assesse pain stiffness and functional activities.

Pain	:	5
Stiffness	:	2
Functional	:	15

2. Q-angle which was assessed to know the difference between involved leg and non-involved leg.

## TREATMENT PLAN

Group A underwent treatment taping and close kinetic chain exercise

### **Closed kinetic chain exercise**

The close kinetic chain exercise comprise of mini squat

### **PROCEDURE OF MINI SQUAT**

Patient were instructed to do mini squat from 0°-60° Patient who find difficult to do exercise without support they are were instructed to do with wall support

### **Intensity of mini squat**

Eight to ten repetition /2 sets

Rest time: 30 seconds between each set

### **APPLICATION OF TAPING**

1. Position of the patient sitting on the couch with the knee in extension and relaxed
2. First applied the talcum powder around the knee joint (avoid the peeling of skin)
3. Second the base micro strap was applied around the knee joint
4. And then adhesive tape was applied horizontally with tracking of patella lateral to medially

One end of the strap was fastened on finger breath from the lateral border of the patella over the lateral condyle of knee and the other end was fastened to the medial condyle by pushing the patella medially. After the training period of 3 weeks post assessment carried. Result were tabulated and analyzed paired 't' test .

## STATISTICAL ANALYSIS

The statistical analysis is performed for the current study using IBM SPSS 19 software. The statistical tools of descriptive analysis and

paired sample test are used for the current study. Paired sample test is carried out to find out the pre and post treatment comparisons. Group A is experimental, for them Taping with

Closed Kinetic training was given , where as traditional approaches of treatment was given for Group B who were considered as Controls.

**TABLE 1**  
**PRE AND POST WOMAC SCALE COMPARISION**  
**GROUP A AND B FIRST BOX**

Paired Samples Statistics		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pre womac score Group A	67.3333	15	8.05930	2.08090
	Post womac score Group A	38.6667	15	3.08607	.79682
Pair 2	Pre womac score Group B	61.8667	15	3.81476	.98497
	Post womac score Group B	55.9333	15	3.59497	.92822

**SECOND BOX**  
**Paired Samples Test**

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Interval of the Difference	Confidence of the			
				Lower	Lower			
<b>Pair 1</b> Pre womac score Group A - Post womac score Group A	28.66667	8.27791	2.13735	24.08251	33.25082	13.412	14	.000
<b>Pair 2</b> Pre womac score Group B - Post womac score group B	5.93333	3.71227	.95850	3.87755	7.98912	6.190	14	.000

From the table 1 first box it is infer that the Mean of WOMAC SCORE before treatment for GROUP A is 67.33 with the corresponding s.d of 2.08. Whereas the Mean and s.d of WOMAC SCORE after treatment for GROUP A is 38.66 and 3.08(s.d). The Mean of WOMAC SCORE before treatment for GROUP B is 61.86 with the corresponding s.d of 3.81. The post treatment Mean for GROUP B is 55.93 with the s.d of 3.59. Table 1 second box shows the paired comparison of pre and

post treatment of GROUP A and B. It is inferred from the above table that there is a significant reduction of WOMAC SCORE for GROUP A following treatment (t – 13.412, p - .000). The GROUP B patients also have a significant reduction in WOMAC SCORE following treatment (t – 6.19, p - .000). But on comparison GROUP A have higher improvement than GROUP B because of higher pre post difference Mean (28.66).

**Table 2**  
**PRE TREATMENT AND POST TREATMENT Q ANGLE COMPARISON**  
**FOR GROUP A AND B Paired Samples Statistics**

	Mean	N	Std. Deviation	Std. Error Mean
<b>Pair 1</b>				
Pre Q angle of the involved leg Group A	16.2000	15	1.08233	.27946
Post Q angle of the involved leg Group A	15.9333	15	1.22280	.31573
<b>Pair 2</b>				
Pre Q angle Group B	16.2000 <sup>a</sup>	15	1.14642	.29601
Post Q angle group B	16.2000 <sup>a</sup>	15	1.14642	.29601

**Paired Samples Statistics**

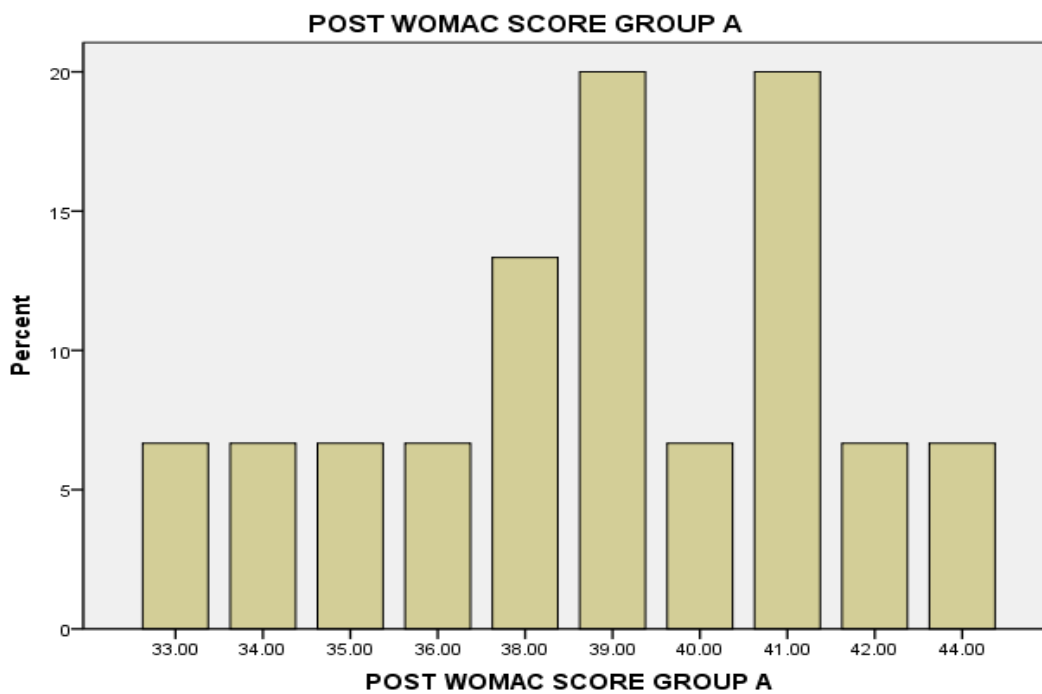
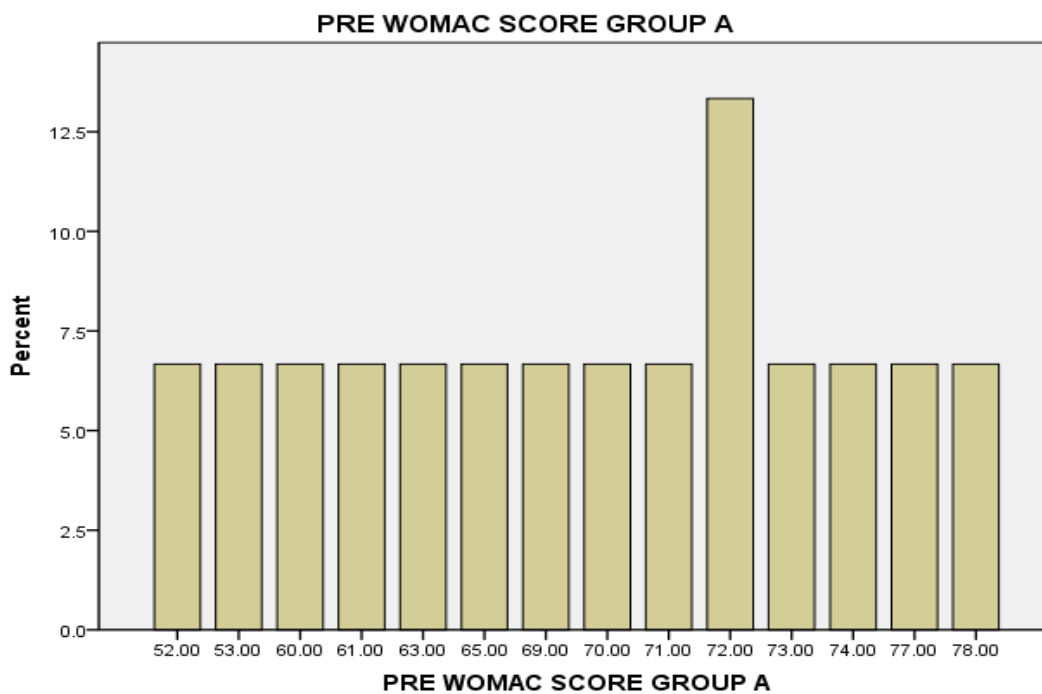
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
				Lower	Upper			
Part Pre Q Angle of the involved leg Group A Post Q Angle of the involved leg Group A	.26667	2.256	14	.041	.52015	2.256	14	.041

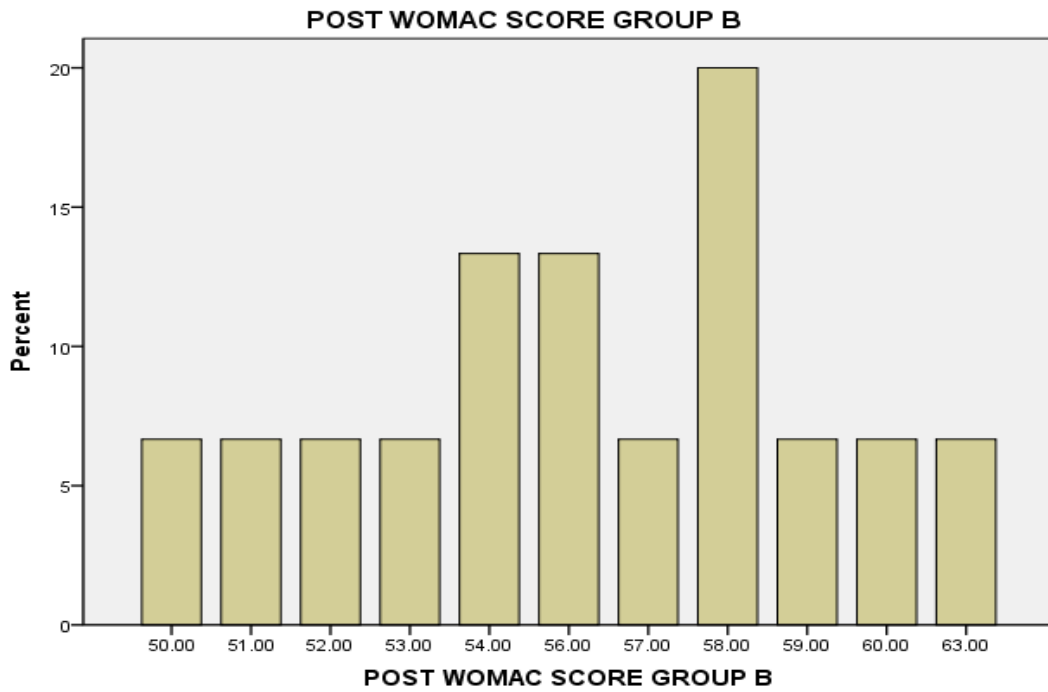
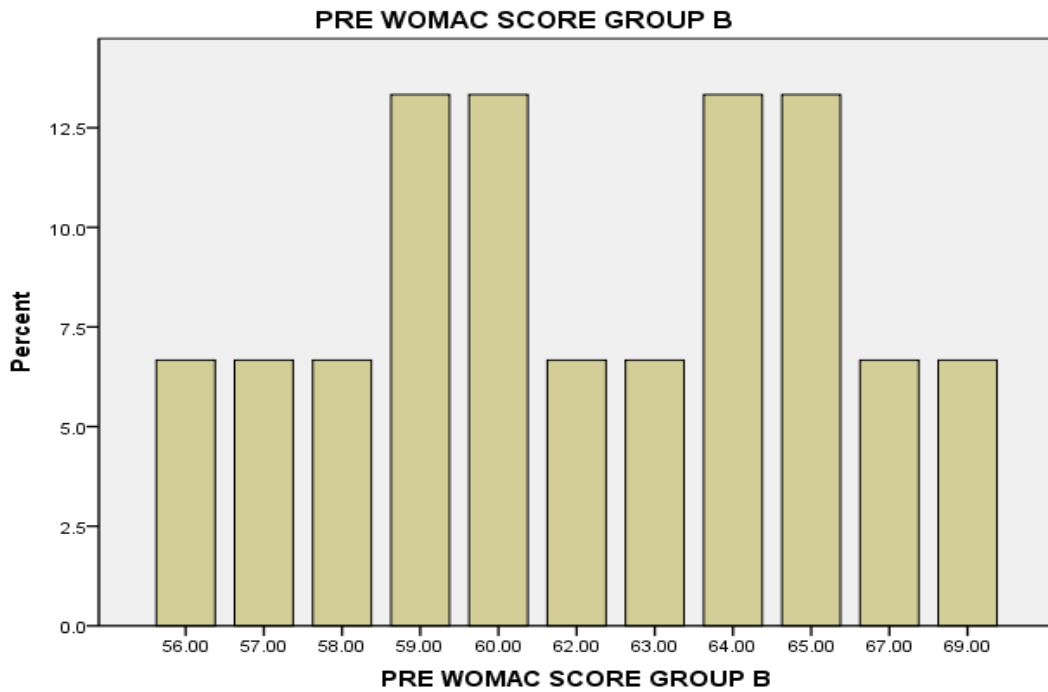
The correlation and t cannot be computed because the standard error of the difference is 0.

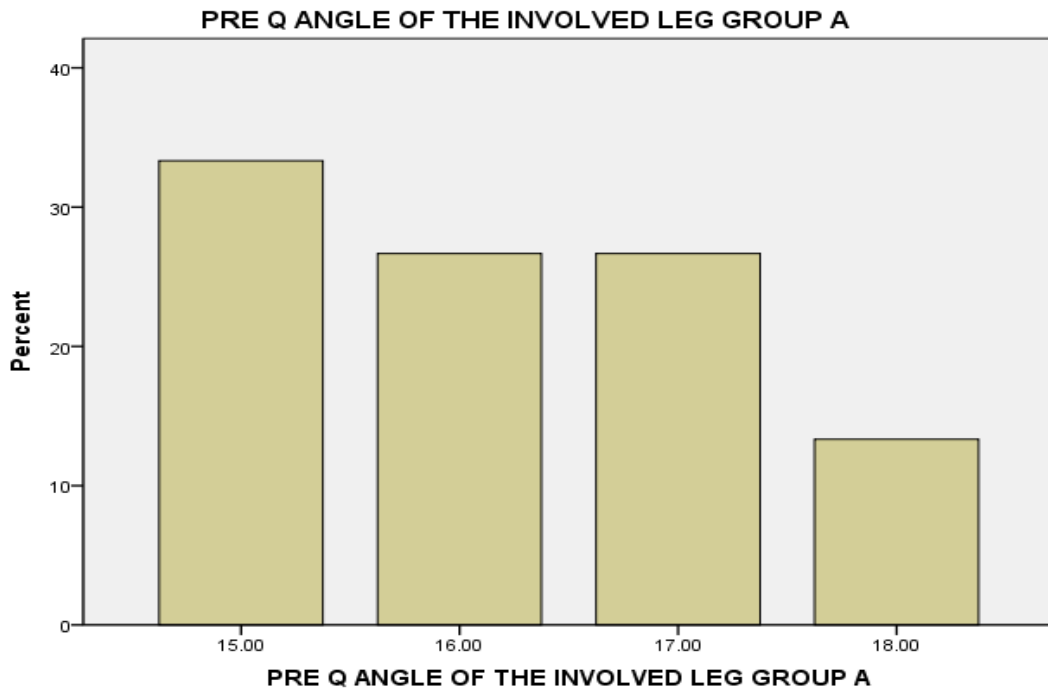
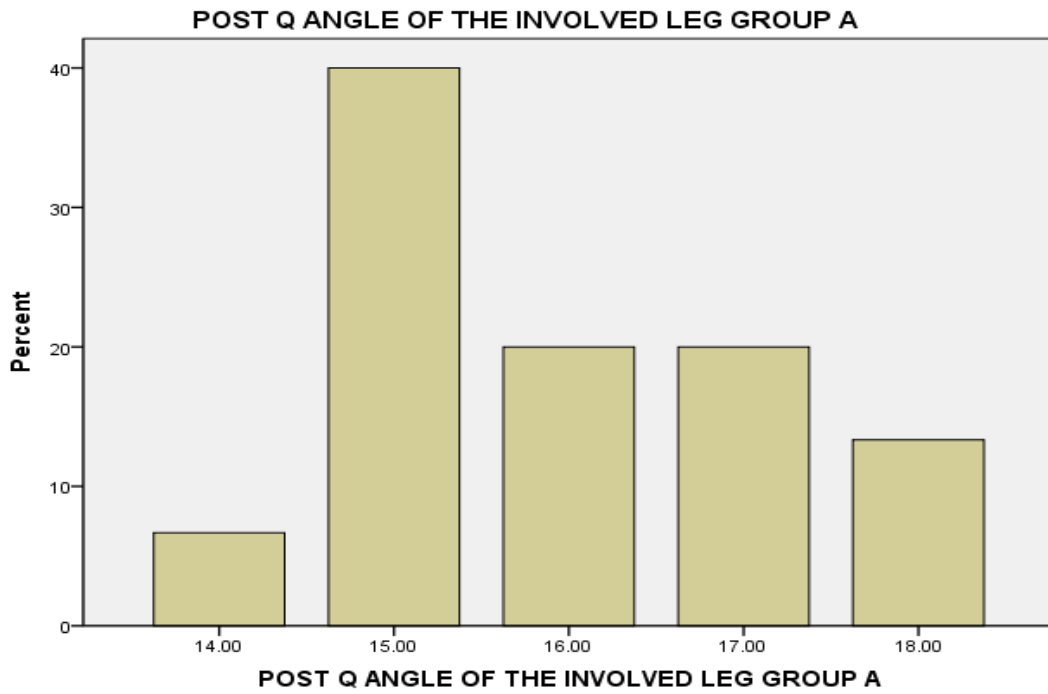
**Paired Samples Statistics**

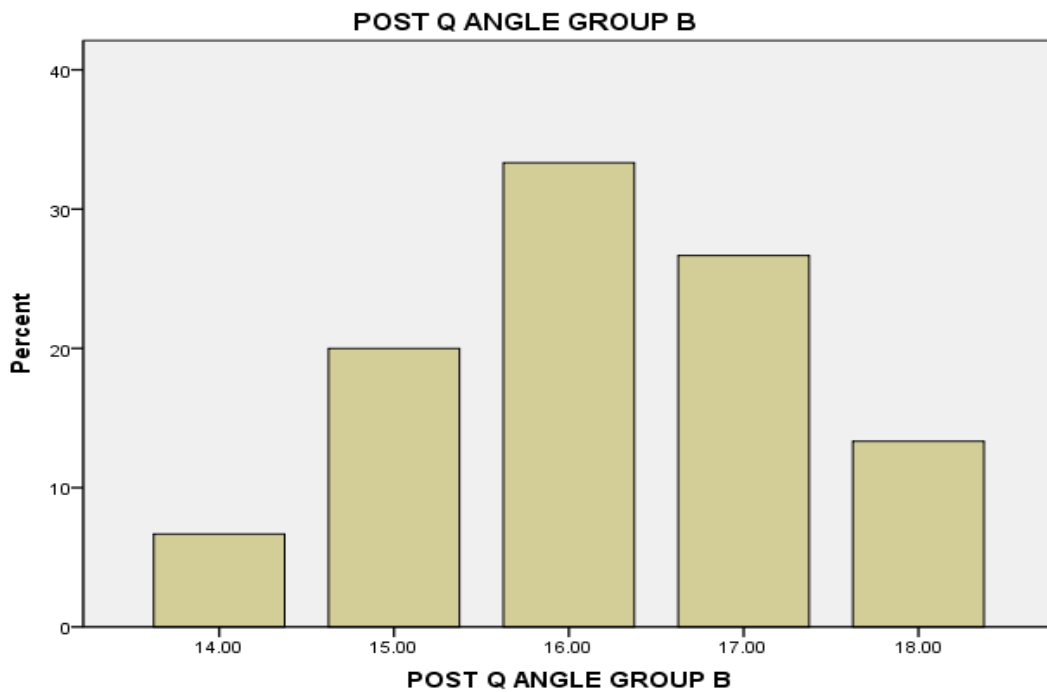
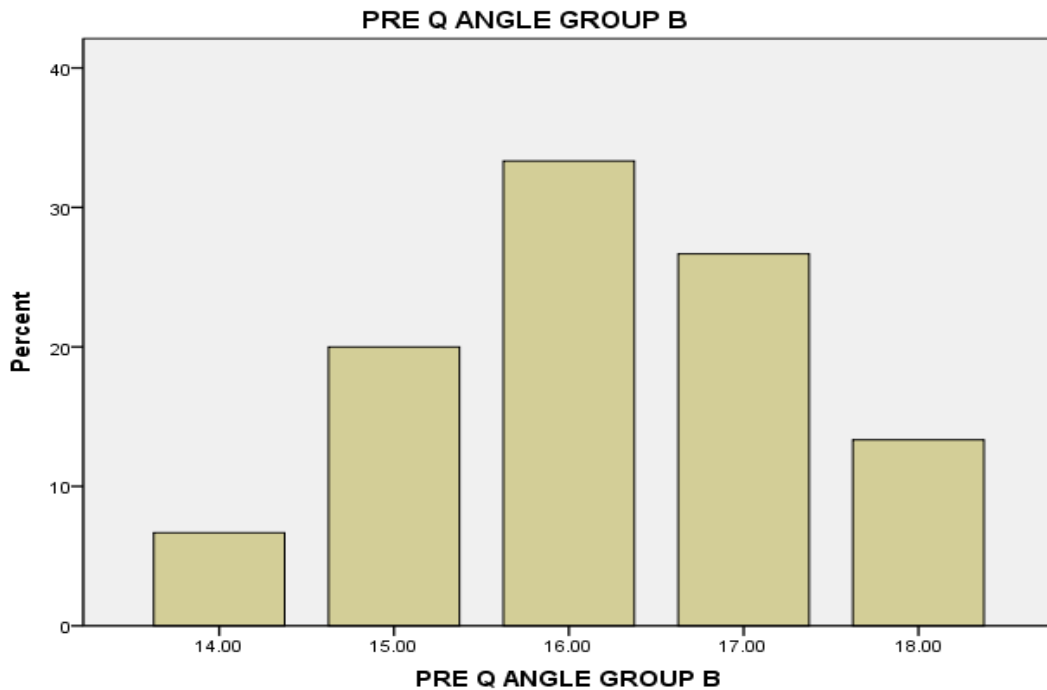
From the table 2 first box it is infer that the Mean of Q ANGLE before treatment for GROUP A is 16.20 with the corresponding s.d of 1.08. Whereas the Mean and s.d of Q ANGLE after treatment is 15.9.3 and 1.22 (s.d). The Mean of Q ANGLE before treatment as well as after treatment for GROUP B is 16.20 with the corresponding s.d of 1.14 for both pre as well as post treatment. Table 2

second box shows the paired comparison of pre and post treatment Q ANGLE of GROUP A and B. It is infer from the above table that there is no significant reductions in Q ANGLE for GROUP A following treatment (t –20.49, p - .041) at 0.01 levels. For group B comparison cannot be made as pre and post differences are same which shows that there is no change in Q angle for group B following treatment.









## RESULTS

Pre and post value of WOMAC score for group A and group B were 67.33, 61.86 and 38.66, 55.93 respectively. The result shows that group 'A' has comparatively higher reduction in pain; stiffness than in group B. Similarly, group A patient has more functional

improvement than in group 'B' patient. Pre and post value of Q-angle group A 16.20 and 15.93 was respectively. Pre post mean value for group B was 16.20. The 't' value group A and group B were t-13.412, p-000, and t-6.19, p-000 respectively. Hence there was not



significant improvement in 'Q' angle following treatment for both groups.

## DISCUSSION

The purpose of the study was to compare effectiveness of closed kinetic chain exercise and taping with traditional therapeutic approach. The study participant were thirty subjects with complaints of unilateral osteoarthritis knee. The subjects were randomly divided into two groups, group A and B. The subjects were assessed for pain, stiffness and functional activities using WOMAC score scale which especially designed for osteoarthritis knee, BELLAMY et al 1988 a, 1988 b. It is a subjective type question focuses on three separate dimensions: pain (5 questions), stiffness (2 questions) and functional (15 questions). For this study the scale was modified by neglecting two functional outcome measures as it is not applicable for this study population<sup>15</sup>. Since the 'Q' angle has a direct correlation with lateral tracking of patella, the second tool of assessment is carried out by measuring 'Q' angle. The subjects' 'Q' angle were assessed pre and post between involved and uninvolved legs. After the assessment, the group A was organized to perform taping and closed kinetic chain exercise. McConnell taping regime was followed where patella was tracked from lateral to medial and it has to be worn for 24 hours. Before taping, the closed kinetic chain exercise was administered which comprise of mini squat from 0° to 60° with or without assistance. The closed kinetic chain exercise given from 0° to 60° of mini squat since one of the study conducted by SIMON et al concluded that maximum vastus medialis oblique activation can be obtained at this range<sup>16</sup>. Coming to the group B treatment regime was given on the basis of traditional therapeutic approach, which comprise of ultrasound therapy, wax and isometric exercise.

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The result of study revealed the group A has significance reduction in pain and stiffness then compared to group B, and also improvement functional activities significantly higher in group A compared to group B. The improvement mean value is 38.66 and 55.93 respectively. The result obtained correlated with similar study conducted by KELLY et al where they shown improvement in pain up to 50% and also may quote the reduction of pain mainly acquired due to the neural inhibition provided by tape where large fiber input may override the pain signals<sup>17</sup>.

The present study shows higher rate of improvement of percentage when compared to similar study conducted by KELLY et al. The reason for the higher percentage of improvement may be due to inclusion of closed kinetic chain exercise along with taping. Since closed kinetic minimized shear force and compression force per unit area. Study conducted by KELLY et al had given suggestion to include closed kinetic chain exercise in the treatment regime for osteoarthritis knee<sup>17</sup>. Coming to the 'Q' angle there was no significant difference between pre and post for both groups. For group A pre and post mean value is 16.20 and 15.93 respectively and for group B pre and post value remains same with mean of 16.20. This shows the patella position is not altered hence it reveals that patella position has not influence in the reduction of pain. The improvement in pain might be due to the neural inhibition as said by KELLY et al<sup>17</sup>. The lack of durability of taping, extensibility of tape at different angle and duration of study might be one of the reasons for non-significant 'Q' angle. Further study should be carried out considering following factors: durability and extensibility of tape, inclusion of isolate vastus medialis oblique muscle strengthening along with closed kinetic chain exercise for better sustainability of result.

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