



**COMPARATIVE STUDY OF ANALGESIC ALONG WITH TAPING TECHNIQUE
VERSUS ANALGESIC ALONG WITH CRYOTHERAPY IN UNILATERAL
PATELLO-FEMORAL OSTEOARTHRITIS OF KNEE JOINT**

SOUMIK BASU^{*1}, PROF.TUSHAR J PALEKAR² AND PROF.R.BALASARAVANAN³

^{1,2}*Padmashree Dr. D.Y.Patil College of Physiotherapy, Dr.D.Y.PatilVidyapeeth, Pune, India.*

³*Department of Physiotherapy, Kempegowda Institute of Medical Science, Bangalore,India.*

ABSTRACT

Osteoarthritis(OA) is a leading cause of pain and disability in elder people world-wide. Cryotherapy has been proven to control pain in OA knee. Taping has shown relieving the pain.40 patients with unilateral patello femoral OA of knee joint of both the sexes were taken randomly, divided into Group A and Group B. Group A treated with Analgesic and taping Group B treated with Analgesic and Cryotherapy .Both the groups were treated daily for 15 days for 20-25 mins. Patients were evaluated with visual Analog Scale, Goniometer and Western Ontario and Mac Master- Universities Osteoarthritis index on day the1 and the day 15. The values are statistically analyzed to determine their effect in reducing the pain and improving function. In comparison with VAS, ROM and WOMAC-pain, stiffness and difficulty scores, Group A shows significant improvement of all the parameters than Group B.

KEY WORDS: Patello femoral joint, Analgesics, Taping, Cryotherapy, Osteo Arthritis



SOUMIK BASU

Padmashree Dr. D.Y.Patil College of Physiotherapy, Dr.D.Y.PatilVidyapeeth, Pune, India.

*Corresponding author

INTRODUCTION

Osteo Arthritis (OA) is as a non-inflammatory degenerative disorder of joints characterized by progressive deterioration of the articular cartilage and formation of new osteophytes. The term OA was first introduced by John K. Spender¹, in 1886 in England as a preferable term to Rheumatic Arthritis (RA). The more modern usage of the term OA and its clinical differentiation from Rheumatic Arthritis were introduced by Archibald – E, Garrod¹ (1907), who clearly identified the age related onset of the disease. OA according to ACR (American College of Rheumatology) is a heterogeneous group of conditions which lead to joint signs & symptoms clinically characterized by pain and functional limitation, radio graphically by osteophytes and joint space narrowing and histopathologically by alteration in cartilage integrity (Schnitzer, 1996). Restricted joint motion appears to be an important risk factor for the occurrence of locomotor disability in patient with OA knee.² Several environmental risk factors mentioned (obesity, joint injury, overload) are mechanical. Studies have stressed the importance of muscle weakness, joint instability, and malalignment as possible cause of osteo arthritis (previously these factors had been assumed to be the result of the joint damage rather than its cause). In severe osteo arthritis the cartilage can become so thin that it no longer covers the thickened bone ends. The bone ends touch, rub against each other, and start to wear away. The loss of cartilage, the wearing of bone, and the bony overgrowth at the edges all combine to change the shape of the joint. This forces the bones out of their normal positions and causes deformity.³ There are currently no drugs that treat osteoarthritis directly, pain relievers (analgesics) are often prescribed to help ease some of the pain and stiffness associated with osteoarthritis.⁴ Therapeutic tape is a simple, inexpensive strategy that increases the treatment option for the therapist and patients in the conservative management of knee OA. Whilst effective in immediately reducing pain. Therapeutic tape may be used as an adjunct to drug and exercise therapies, potentially augmenting the individual benefits of each.⁵

Cryotherapy showed a significant benefit in improving the Range of Motion (ROM) and function, in the treatment of patello-femoral OA. Cold packs may be used to lessen knee edema in OA of the knee.⁶

MATERIALS AND METHODS

A comparative study was done on Patients with unilateral patello femoral Joint OA knee with sample size of 40, Residing in Bangalore. Random Sampling was done by using lottery method. Data was collected from Patients coming to Kempegowda Institute of Medical Science with unilateral Patello femoral OA Knee fulfilling the inclusion and exclusion criteria. Analgesic in both the group was prescribed by the Orthopaedician. Materials used in group A were ether, Hypo allergic adhesive rigid non elastic tape (Leucoplast), Scissors, Marker, Cotton, swabs, Measuring tape, Goniometer, Shaving razor / Hair remover, Recording sheet, VAS Scale, Consent forms. Materials used in group B were Tray of Ice cubes for ice application, Towel for ice application, Two test tubes, one tube containing hot water and other tube containing cold water, VAS scale, Goniometer, Recording sheet, Water proof material (mackintosh), Bucket of water at normal temperature with ice cubes, Gloves, Consent forms. Outcome Measure was recorded by Western Ontario and Mc Master University Osteoarthritis Index (WOMAC), Visual analog scale (VAS), Goniometer. Subjects with patello femoral joint (OA) involvement diagnosed by Orthopaedician, Subject between age 50-70 years age of both sex, All patients with lateral glide of patella and increased Q angle of more than 14 degree in males and more than 17 degree in females, Subjects should have anterior knee pain and to some extent generalized knee pain and have difficulty in walking, using steps and stairs were included in the study. Exclusion criteria was subjects with Cognitive / mental disease, Neurological, cardiac, vascular and sensory problems, Hip or spinal problems referring pain to knee, Any malignancy, Recent significant knee injury, Metal prosthesis in or near the knee, Patients

with knee surgeries, Hyper sensitivity of analgesics, antipyretic NSAIDS or Sulfonamides, Diabetic foot. Rheumatoid Arthritis, Secondary OA due to trauma, Unable to walk without cane or crutch, Skin disease around treatment area.

Procedure

Subjects are thoroughly explained about the procedure and were required to sign the written informed consent document approved by the ethical committee at Kempegowda Institute of Medical Science ,Bangalore,Karnataka. Subject who were selected through inclusion criteria were randomly assigned into 2 groups – A and B by using lottery method. The subject who picked the alphabet 'A' were assigned to Group A (Analgesic and taping) and the subject who picked the letter 'B' were assigned to Group 'B' (Analgesic and Cryotherapy). Both the groups got treatment daily for a period of 15 days for 20-25 mins.

Medial Taping Procedure

Patient in the group A, receiving medial patellar taping were made comfortable in relaxed, supported long sitting with the knee aligned in full extension position. The position of the knee to be treated is shaved and made clean. An adhesive tape (Leucoplast) was secured at the lateral border of the patella medially. Soft tissue is taken up at the medial

aspect of the thigh and then the tape is secured along the medial border of femoral condyle. If the skin becomes irritated by the tape, the patient should remove the tape and treat the skin with topical ointment. To assess the effect of taping, a pain provoking activity is performed immediately prior to taping and repeated afterwards. If the pain persists,after taping,the tape application is modified and reapplied.

Procedure for Ice application

Patients in the Group B, receiving cryotherapy thermal sensitivity of the subjects was assessed in the routine manner to ascertain their suitability for heat or cold application. Here the subjects received 20-25mins of ice as crushed ice in a wet towel wrapping round the affected knee.

HYPOTHESIS

Alternate hypothesis: After the treatment, it may be seen that Group A patients who have been treated with Analgesic and taping shows better results than Group B patients who have been treated with Analgesic and Cryotherapy. Null Hypothesis: After the treatment it may be seen that Group A patients who have been treated with Analgesic and taping shows no better result than Group B patients who have been treated with analgesic and Cryotherapy.

RESULTS

Table 1
Comparison of age between two groups

Age in years	Group A		Group B		Combined	
	No	%	No	%	No	%
Up to 50 years	1	5.0	4	20.0	5	12.5
51-60	8	40.0	8	40.0	16	40.0
61-70	11	55.0	8	40.0	19	47.5
Total	20	100.0	20	100.0	40	100.0
Mean ± SD	60.40±5.88		57.45±7.87		58.95±7.02	

Samples are age matched with P=0.391

FIGURE 1

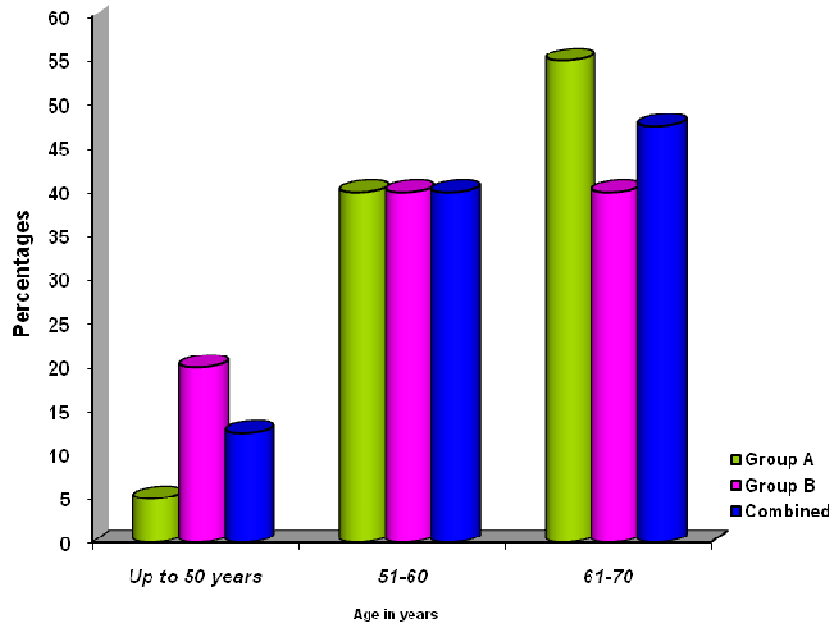


Table 2
Comparison of gender between two groups

Gender	Group A		Group B		Combined	
	No	%	No	%	No	%
Male	12	60.0	6	30.0	18	45.0
Female	8	40.0	14	70.0	22	55.0
Total	20	100.0	20	100.0	40	100.0
Mean ± SD	Samples are gender matched after continuity correction with P=0.112					

FIGURE 2

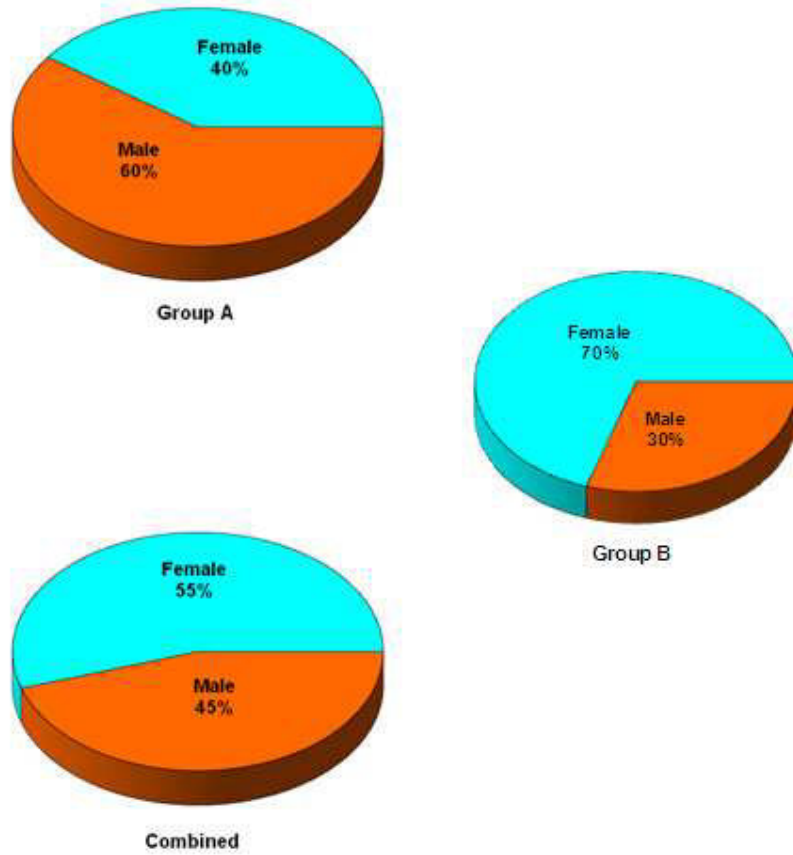


Table 3
Comparison of VAS score between two groups

VAS score	Group A	Group B	Z -values	P values
Day 1	6.00±1.65 (3-9)	6.25±1.62 (4-9)	0.400	0.698
Day 15	2.40±1.14 (0-4)	3.95±1.76 (1-7)	2.886	0.004**
Z - values	3.965	3.186	-	-
P value	<0.001**	<0.001**	-	-
% Change	60.0%	36.8%	-	-

Results are presented in Mean ± SD (Min-Max)

FIGURE 3

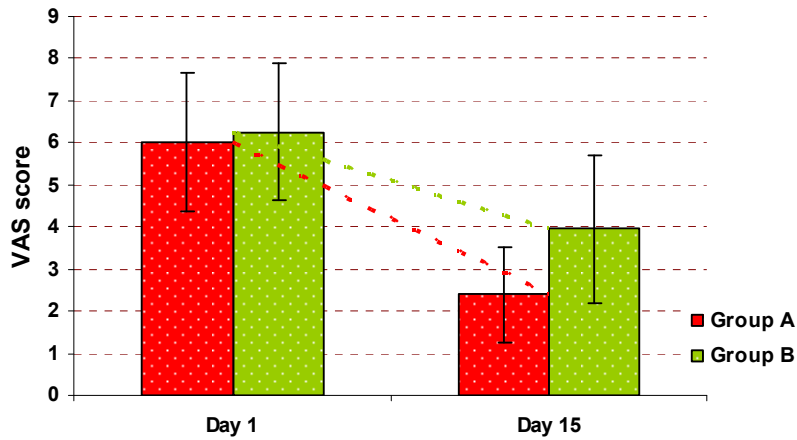


Table 4
Comparison of ROM score between two groups

ROM	Group A	Group B	Z -values	P values
Day 1	128.05±3.75 (120-132)	127.30±3.51 (120-133)	1.084	0.279
Day 15	132.75±2.15 (128-135)	131.80±1.74 (129-135)	1.636	0.102
Z - values	3.932	3.937	-	-
P value	<0.001**	<0.001**	-	-
% Change	3.6%	3.5%	-	-

Results are presented in Mean ± SD (Min-Max)

FIGURE 4

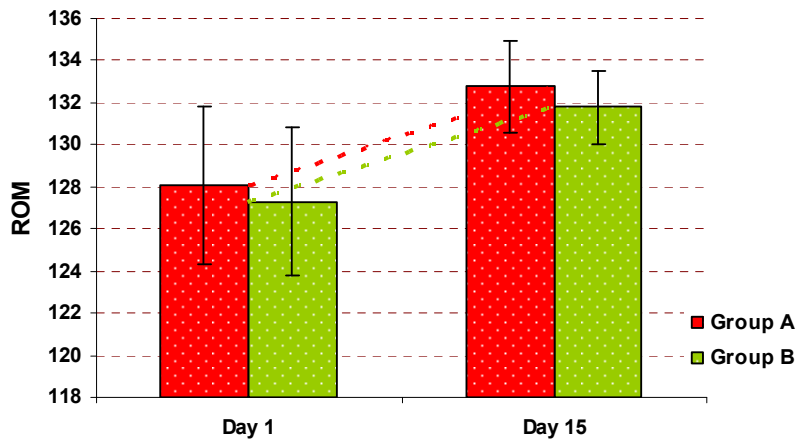


Table 5
Comparison of WOMAC-pain score between two groups

WOMAC-Pain	Group A	Group B	Z -values	P values
Day 1	10.40±3.69 (5-17)	12.00±3.57 (7-17)	1.325	0.185
Day 15	3.70±2.03 (2-9)	7.30±3.39 (2-12)	3.332	0.001**
Z - values	3.929	3.954	-	-
P value	<0.001**	<0.001**	-	-
% Change	64.4%	39.2%	-	-

Results are presented in Mean ± SD (Min-Max)

FIGURE 5

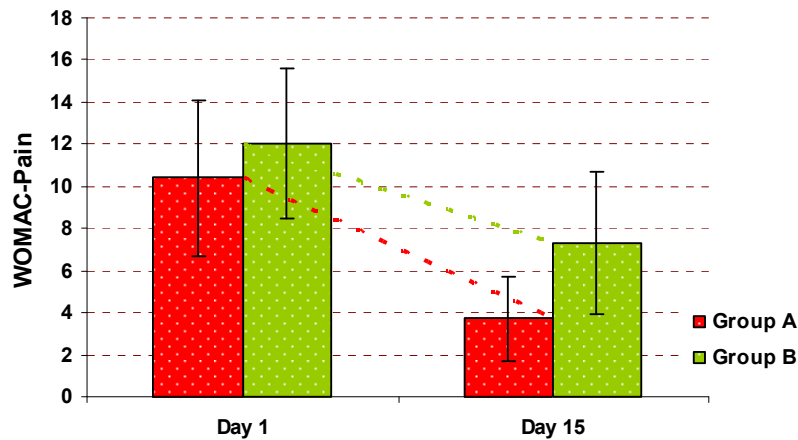


Table 6
Comparison of WOMAC-Stiffness score between two groups

WOMAC-Stiffness	Group A	Group B	Z -values	P values
Day 1	2.35±1.49 (0-5)	2.85±1.46 (1-6)	0.991	0.321
Day 15	0.25±0.55 (0-2)	1.30±1.38 (0-4)	2.833	0.005**
Z - values	3.865	3.912	-	-
P value	<0.001**	<0.001**	-	-
% Change	89.0%	54.4%)	-	-

Results are presented in Mean ± SD (Min-Max)

FIGURE 6

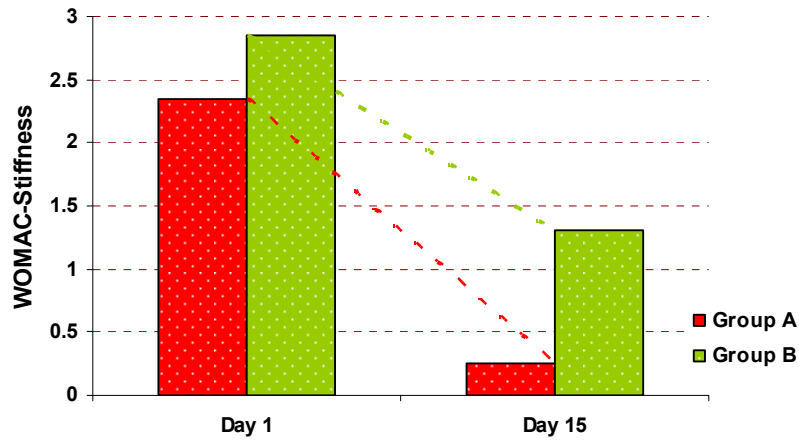


Table 7
Comparison of WOMAC-difficulty score between two groups

WOMAC-difficulty	Group A	Group B	Z -values	P values
Day 1	33.85±12.32 (16-51)	38.80±10.01 (17-53)	1.301	0.123
Day 15	13.40±6.02 (6-24)	26.20±8.92 (6-40)	4.061	<0.001**
Z - values	3.926	3.924	-	-
P value	<0.001**	<0.001**	-	-
% Change	60.4%	32.5%	-	-

Results are presented in Mean ± SD (Min-Max)

FIGURE 7

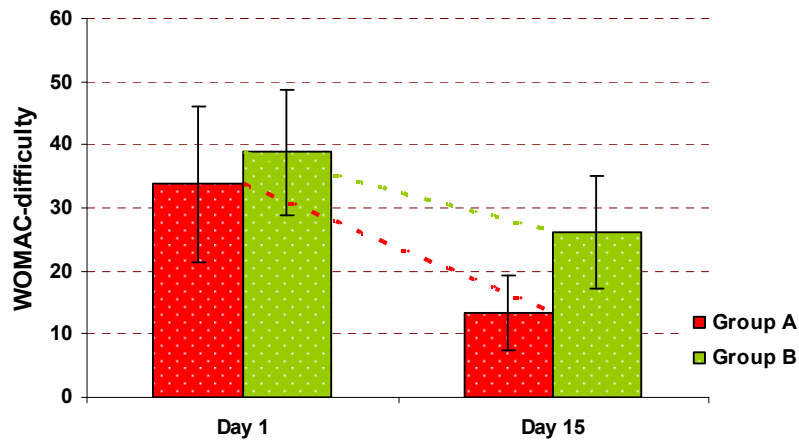


Table 8
Evaluation of efficacy based on outcome
(outcome is the difference of pre and post)

Outcome	Group A	Group B	P values	Effect size
VAS	3.60±0.94	2.30±0.80	<0.001**	1.46(VL)
ROM	4.70±2.43	4.50±2.76	0.620	0.08(N)
WOMAC-Pain	6.70±2.34	4.70±1.22	0.002**	1.05(L)
WOMAC-Stiffness	2.10±1.29	1.55±0.89	0.242	0.50(M)
WOMAC-Difficulty	20.45±8.24	12.60±5.32	0.001**	1.11(L)

FIGURE 8

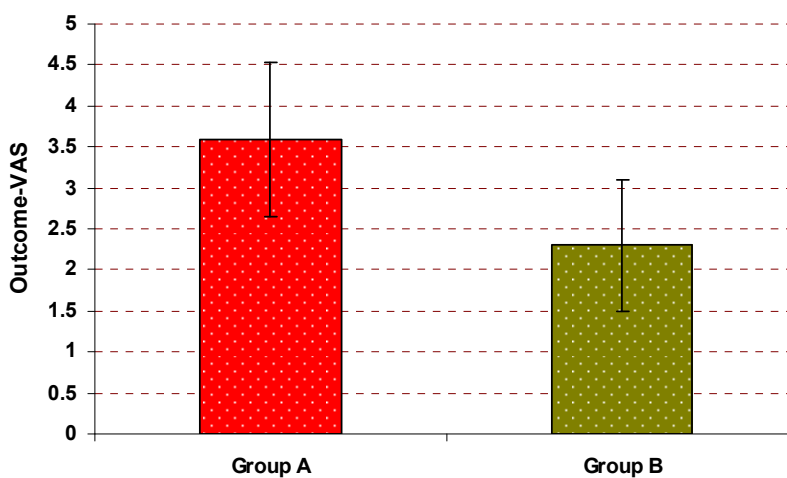


FIGURE 9

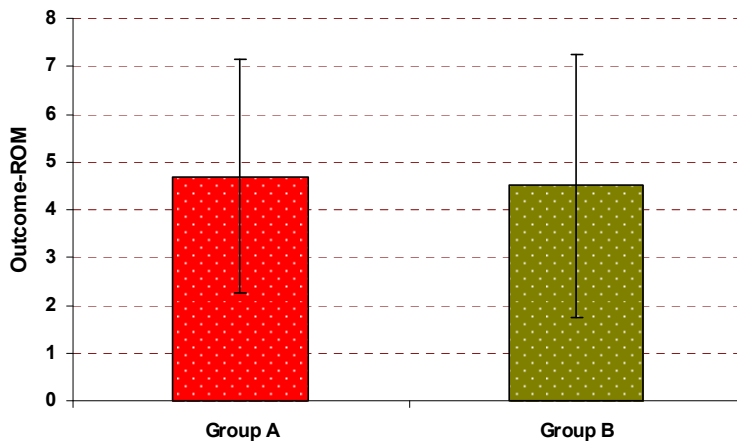


FIGURE 10

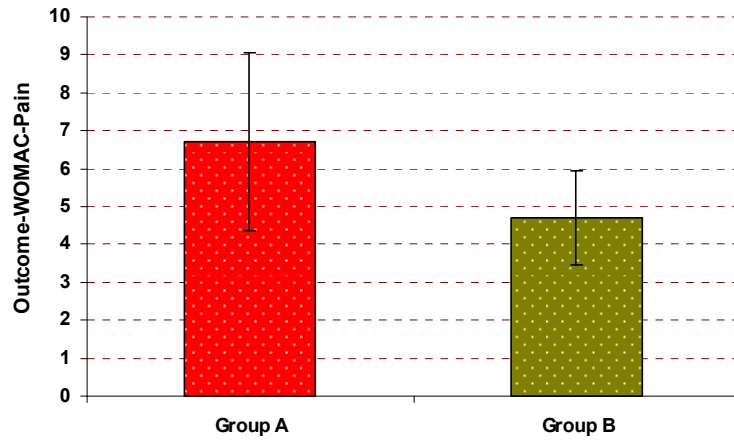


FIGURE 11

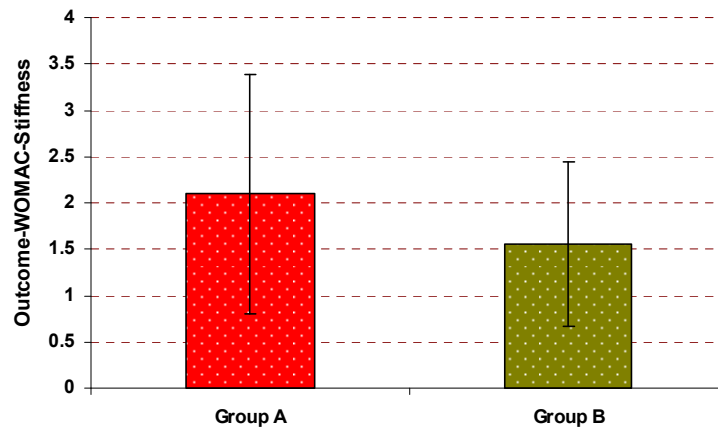
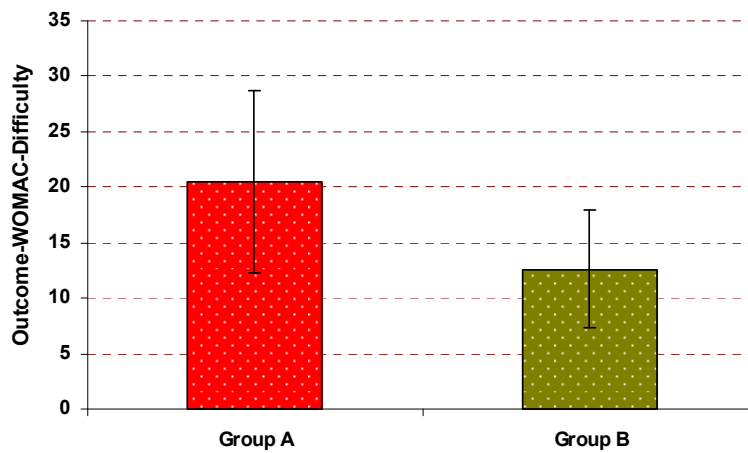


FIGURE 12



Statistical Methods

Descriptive statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean ± SD (Min-Max) and results on categorical measurements are presented in Number (%). Significance is assessed at 5 % level of significance. Mann Whitney U test has been used to test the significance of

study parameters between groups and Wilcoxon signed rank test has been used to find the significance of study parameters between pre and post within each group. Student t test (two tailed, independent) and Chi-square test with continuity correction has been used to find the homogeneity of age and gender between groups.

1. Mann Whitney U test

$$Z = \frac{T_{obs} - \mu_T}{\sigma_T}$$

Where T_{Obs} Sum of ranks in n_a Group A and n_b Group B
 μ_T Expected values is equal to $\frac{na(N+1)}{2}$ for TA and $\frac{nb(N+1)}{2}$ for TB

2. Wilcoxon Signed Rank test

Procedure

- Obtain the differences between two sets of data and rank the differences after arranging the differences in ascending and descending order.
- Compute the rank sum of R1 of the positive differences
- Compute

$$T = \frac{[|R1 - (n(n+1)/4) - 1/2|]}{\sqrt{(n(n+1)(2n+1)/24)}}$$

- If $T > Z_{1-\alpha/2}$, then reject the null hypothesis, otherwise accept the null hypothesis

3. Chi-Square Test

$$\chi^2 = \sum \frac{(O_i - E_i)^2}{E_i}$$

, Where O_i is Observed frequency and E_i is Expected frequency

Fisher Exact Test

	Class1	Class2	Total
Sample1	A	B	a+b
Sample2	C	D	c+d
Total	a+c	b+d	n

$$\text{Fisher Exact Test statistic} = \sum p = \frac{(a+b)!(c+d)!(a+c)!(b+d)!}{n!} \frac{1}{\sum a!b!c!d!}$$

4. Student t test (Two tailed, independent)

$$t = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{s^2(1/n_1 + 1/n_2)}}$$

$$\text{Where } s^2 = \frac{(n_1 - 1) \sum_{i=1}^{n_1} (x_1 - \bar{x}_1)^2 + (n_2 - 1) \sum_{i=1}^{n_2} (x_2 - \bar{x}_2)^2}{n_1 + n_2 - 2}$$

5. Effect Size

$$d = \frac{\text{mean1} - \text{Mean2}}{\text{PooledSD}}$$

No effect	d < 0.20
Mild effect	0.20 < d < 0.50
Moderate effect	0.50 < d < 0.80
Large effect	0.80 < d < 1.20
Very large effect	d > 1.20

6. Significant figures

+ Suggestive significance 0.05 < P < 0.10

* Moderately significant 0.01 < P ≤ 0.05

** Strongly significant P ≤ 0.01

Statistical software: The Statistical software namely SPSS 15.0, 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. In these two groups the basic characteristics of Age was not influencing the study result. (Table 1 and FIGURE 1)

In Group A male subjects were 60% and female subjects were 40%.

In Group B males were 30% and females were 70% (Table 2 and FIGURE 2)

The efficacy of the study was based on VAS, ROM and WOMAC on Day 1 and Day 15.

According to table 3 and FIGURE 3, there was a gradual decrease in VAS score in group A on Day 15 from 6 to 2.4 which shows there was 60% change. In Group B, on Day 15, VAS score decrease from 6.25 to 3.95 which shows 36.8% change. This tells that group A shows a significant decrease in VAS than group B.

In relation to ROM, group A shows increase in ROM than group B on Day 15. The percentage of change in ROM in 3.6 in group A and 3.5% in group B which signifies notable increase of ROM in group A (Table 4, FIGURE 4)

In relation to WOMAC – pain score group A subjects have lesser pain score than group B subjects. The percentage of pain score in group A is 64.4% and 39.2% in group B. This signifies there is remarkable decline of WOMAC pain score in group A subjects than group B (Table 5, FIGURE 5)

In relation to WOMAC –stiffness score group A subjects have lesser stiffness score than group B subject. The percentage of stiffness score in group A is 89.0% and 54.4% in group B. This signifies there is remarkable decline in WOMAC stiffness score in group A subjects than group B. (Table 6, FIGURE 6).

In relation to WOMAC – difficulty score, group A subjects have lesser difficulty score than group B subjects. The percentage of difficulty score in group A is 60.4% and 32.5% in group B. This signifies there is remarkable decline in WOMAC – difficulty score in group A subjects than group B. (Table 7, FIGURE 7).

As per the basis of outcome the difference between pre and post scores of the VAS, ROM, WOMAC – pain, stiffness and difficulty, the VAS in group A is highly significant with effect size being very large i.e. 1.46. (Table 8, FIGURE 8)

The ROM scores do not show much difference in both the groups and effect size is 0.08. which tells that there was no effect (Table 8, FIGURE 9)

The WOMAC – pain score shows group A is significant with effect size showing large effect i.e. 1.05. (Table 8, FIGURE 10)

The WOMAC –stiffness score shows group A is significant with effect size showing mild to moderate effect i.e. 0.50. (Table 8, FIGURE 11)

The WOMAC – difficulty score shows group A is significant with effect size showing large effect i.e. 1.11. (Table 8, FIGURE 12)

DISCUSSION

In this study significant improvement is seen in both the group i.e. Group A and Group B But Group A shows better improvement on all the parameters i.e. VAS, ROM and WOMAC – pain, stiffness and difficulty than Group B after 15 days of treatment. The improvement

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can be attributed due to as Taping is used mainly to relief pain and realigning patella passively, thus giving advantage to Vastus Medialis obliquus fibres. The pain is relieved by “unloading” the joint and soft tissue and by pulling the patella medially. Taping improves alignment of patella. Lateral structures are put at stretch passively by taping thus improving patellar tracking and decreasing pain

CONCLUSION

In this study group A who were treated with Analgesic and Taping experienced effective percentage change in VAS, ROM and WOMAC – pain, stiffness and difficulty than group B who were treated with Analgesic and Cryotherapy. Hence the study can be concluded stating that Analgesic and Taping technique gives better improvement than Analgesic and Cryotherapy in treatment of patello-femoral OA knee.