

A Comparative Study Between The Application Of Apos Therapy And Knee Brace In Pain, Range Of Motion And Functional Disability In Osteo Arthritis Knee.

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Abstracts: Background & Objectives: Osteoarthritis is chronic degenerative disorder of joint having many etiological factors. It is estimated to be the fourth leading cause of disability with prevalence of 22% to 39% in India. There is availability of less evidence of physiotherapy treatment for OA. Hence the need of the study is to find the individual and comparative effect of Apos therapy and knee brace in aspect of pain, range of motion and functional disability in patients with O.A. knee. **Method:** 30 subjects with osteoarthritis of Tibiofemoral joint were selected for the study and randomly divided in to two groups (A&B) of 15 subjects. Group A received Apos therapy and Group B received knee brace. Both groups treated with active exercises plus IFT. Pain was measured by VAS, Range of motion was measured by Goniometer and functional disability was measured by WOMAC scale. **Results:** Intra-group comparison of VAS, ROM and WOMAC score showed significant improvement in both the group but Apos therapy group showed highly significant ($p < 0.001$) improvement. **Conclusion:** In this study both groups have shown significant difference in reducing pain, improving ROM, and improving functional disability but Apos therapy showed more improvement than application of knee brace. [Nambi G NJIRM 2014; 5(3):84-87]

Key Words: Apos Therapy, Interferential therapy, Knee brace, Osteoarthritis.

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Introduction: Osteoarthritis is chronic degenerative disorder having many etiological factors. Osteoarthritis (OA) is estimated to be the fourth leading cause of disability world widely¹. OA is most commonly occurring joint disease with prevalence of 22% to 39% in India². Worldwide estimates indicate that 9.6% of men and 18% of women ≥ 60 years have symptomatic OA³. The American College of Rheumatology has classified OA into primary OA in which there is no obvious cause and secondary OA having a known cause⁴. The main symptoms of OA of the knee are pain, stiffness, and altered function. Initially this tends to be worse with weight bearing and ambulation. Eventually this can progress to pain day and night once cartilage loss leads to bone-on-bone contact⁵.

The American college of Rheumatology guidelines for the management of knee OA recommended non pharmacologic therapies as a first line course of treatment⁶. Various treatments are used for OA knee such as Ultrasound, Hydrotherapy, Low power LASER therapy, TENS, Manual therapy, Acupuncture. Surgical treatment like Cartilage Repair Techniques, UKA, TKA and Osteotomy for

treating OA knee. Yet there is no definite cure for OA knee⁷. Now-a-days, biomechanical treatments such as wedged insoles, foot orthosis, knee braces and Apos therapy are proving more effective for reducing pain and improving function in OA knee⁸. These treatments improve the alignment of knee and thus improve the gait patterns. They reduce the stress on more weight bearing compartments of the knee and slow down the progression of the disease.

Many studies have been done on biomechanical treatments for OA knee but no studies have performed comparison between such devices. It has been proved that knee braces are effective in mediating pain relief in conjunction with knee OA and mal-alignment. Recently a new approach, Apos therapy, also reduces pain and improves function and quality of life of patients with knee OA over the long term. Therefore, the purpose of study is to compare the effects of Apos therapy to knee braces in the treatment of OA knee. The hypothesis of the study is Apos therapy has significant effect on reducing Pain, Range of motion and improving functional disability in osteoarthritis of knee subjects than knee braces.

Material and Methods: Patients coming to C.U.Shah Physiotherapy College out patient department (OPD) diagnosed as OA knee by physicians were included in the study. A total number of 46 subjects were screened out of which 30 subjects who fulfilled the inclusion and exclusion criteria were selected and divided into two Groups (A&B). Group A received Apos therapy with active exercises plus IFT and Group B received knee brace with active exercises plus IFT. Subjects were explained about the research and treatment protocol. Inform consent form was signed by the subject before the treatment started. Patients were randomly allocated by dice method to Apos therapy and knee brace group. Inclusion criteria were^{9,10}: 1) 45 -70 years of age, 2) Unilateral Tibiofemoral osteoarthritis, 3) Medial side Knee pain of atleast 6 months, 4) Osteophytes seen on x-ray, 5) Crepitus on motion, 6) having VAS between 3 to 7 cm. Exclusion criteria were trauma, secondary OA, Congenital disorders, Diabetes, Inflammatory Diseases, Metabolic joint disease, Avascular Necrosis, Hormonal Disorders, Ligament instability, Sports injuries ,Pregnancy, Occupational or Repetitive Joint use and Quadriceps muscle weakness. Institutional scientific and ethical committee approval has been obtained before commencing the study.

Outcome Measures: Pain intensity was measured by means of visual analogue scale (VAS). A 10 cm line marked with number 0-10 can be used where 0 symbolizes no pain and 10 is maximum pain. Subject is asked to mark his/her pain on this line as per the severity. For knee range of motion universal goniometer was used. Flexion range of motion was measured. For functional disability WOMAC scale was used. The WOMAC consists of 24 items divided into 3 subscales: pain, stiffness and physical function. All the outcomes were measured at baseline, after 1, 2 and 6 months of treatment.

Interventions: Two therapists were there in this study. One was accessing outcome measures before and after the treatment and the other was calibrating the device in both the groups. Patients in the group A received Apos therapy: In this therapy two convex shaped rubber elements were attached to each of the patient's feet. One element

was located under the hind foot region and one was located under the forefoot region of each foot. The elements were attached to the patient's foot by embedding within the sole of a foot-worn device. The elements were embedded to the individual patient according to the pathology and motion characteristics. Patients in the group B were applied with knee brace as per the size and circumference of the joint. Patients of both the groups were taught how to walk by using these devices and instructed to walk by wearing these devices for one month and were also taught active exercises also. Active exercises were selected from Arthritis Research Campaign's "Pain in the knee" booklet (www.arc.org.uk). Active exercises should be performed two times a day for one month. IFT was given for 10 minutes at 10-20Hz frequency. All patients were given instruction booklet and exercise log to document home exercise compliance.

Statistical Analysis: The therapist assessing outcome measures was blinded to group allocation as well as after the treatment. Chi-square test was used to determine if group differences were present at baseline for age, gender and body mass index. Parametric student t test was used for inter group and paired t test for intra group comparisons of ROM. Non parametric Mann Whitney "U" Test was used for inter group and Wilcoxon Sign Rank Test for intra group comparisons of VAS and WOMAC. All data were analyzed at an alpha level of 0.05. All statistical analyses were using SPSS Version 16 for windows software and outcome measures data were presented as mean \pm SD.

Results: The demographic details of both the groups showed homogeneity. Inter-group comparison of Pre VAS, ROM and WOMAC of Group A and B at baseline showed that the data were homogenous .

Table 1: Demographic variables of Group-A and B.

Demographic variables	Mean \pm SD				p value
	Group=A		Group=B		
Age(years)	53.46 \pm 5.28		54.26 \pm 5.94		0.530
Gender	Male	Female	Male	Female	0.342
	11	8	9	12	
B.M.I(kg/m ²)	21.17 \pm 1.41		20.92 \pm 1.29		0.523

Table:2 Intra group comparison of Group-A and B.

Intra- group comparison of VAS, flexion ROM and WOMAC									
Measures		Group=A			p-value	Group=B			p-value
		Min	Max	Mean(SD)		Min	Max	Mean(SD)	
VAS	PRE	3.90	6.8	5.40(±0.93)	0.001	3.50	6.80	5.30(±0.97)	0.001
	POST	0.30	2.50	1.30(±0.60)		2.80	5.20	3.72(±0.67)	
Flexion ROM	PRE	100	112	106.5(±4.3)	0.000	100	113	106(±5.03)	0.000
	POST	128	133	130.8(±1.74)		110	121	116.5(±3.9)	
WOMAC	PRE	32	57.2	43.33(±7.78)	0.001	31	56.5	44.8(±8.61)	0.001
	POST	7	16	11.53(±2.55)		19	32	25.46(±3.90)	

Graph 1: Pre And Post Values Of

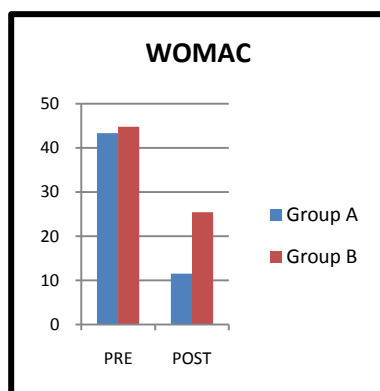
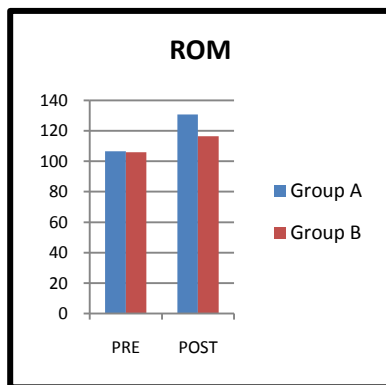
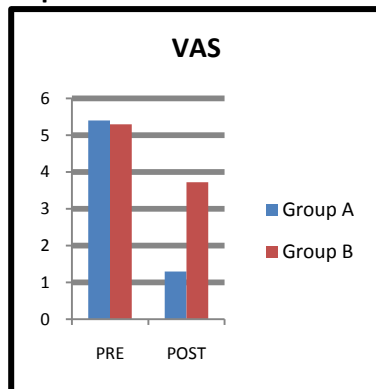


Table 3: Pre treatment comparison of Group-A and B.

Pre treatment group comparison							
Measures	Group=A			Group=B			p-value (>0.05)
	Min	Max	Mean(SD)	Min	Max	Mean(SD)	
VAS	3.90	6.8	5.40(±0.93)	3.50	6.80	5.30(±0.97)	0.917
Flexion ROM	100	112	106.5(±4.3)	100	113	106(±5.03)	0.174
WOMAC	32	57.2	43.33(±7.78)	31	56.5	44.8(±8.61)	0.693

Table 4: Post treatment comparison of Group-A and B.

Post treatment group comparison							
Measures	Group=A			Group=B			p (<0.05)
	Min	Max	Mean(SD)	Min	Max	Mean(SD)	
VAS	0.30	2.50	1.30(±0.60)	2.80	5.20	3.72(±0.67)	0.000
Flexion ROM	128	133	130.8(±1.74)	110	121	116.5(±3.9)	0.007
WOMAC	7	16	11.53(±2.55)	19	32	25.46(±3.90)	0.000

Discussion: None of the studies were strongly suggesting the use of proper biomechanical device for treatment of OA knee. This study of one month showed that Apos therapy was found to have significant improvement in pain (VAS), range of motion (ROM) and functional disability (WOMAC) compared to knee braces. Researchers have presented several theories explaining how Apos therapy may reduce pain and improve function in patients with OA of the knee. Several studies by Haim et al.¹¹ showed that the device used in this therapy can unload the diseased articular surface of the joint with knee OA and thereby reduce pain. This was seen in the current study in that immediately after calibration patients reported diminished pain or no pain while using the biomechanical device. By reducing pain, the therapy gives the patients the ability to train without pain. Over time the therapy may allow the patient to regain strength, function and lower pain levels. The Apos therapy uses COP manipulation to

realign the limb towards a normal biomechanical alignment while minimizing any pre existing pain. By combining the changes in alignment with perturbation and repetition over time, the therapy may educate the neuromuscular system to acquire the ability to walk in the new alignment, which in turn allows the patient to walk in the new gait pattern even when the biomechanical device is removed.

Given the encouraging evidence indicating that knee braces are effective in mediating pain relief in conjunction with knee OA and mal alignment, knee brace should be fully utilized before joint realignment or replacement surgery is considered. More work, however, is needed to substantiate their long-term benefits, given that patient compliance is an issue. They are reportedly difficult to wear for extended periods because of the degree of force they impart to the limb to alter alignment. Also, bracing in combination with other conservative modalities may provide additional benefit. Hewett et al¹² saw no change in the adduction moment with the application of bracing, yet significant pain relief was reported, along with extended walking time after 9 weeks of wearing the brace. Similarly, Pollo et al¹³ found that external varus moments were only marginally reduced. Limitation of the study is that it lacks in which stage of OA knee apos therapy is effective.

Conclusion: There is significant difference in pain checked by visual analogue scale, range of motion measured by universal goniometer and functional disability by WOMAC scale between Apos therapy and knee brace in patients with osteoarthritis of knee. Thus, Apos therapy has significant effect on reducing pain, improving range of motion and function disability in osteoarthritis of knee subjects than knee brace.

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