

# Effect of Structured Spinal Exercises as an Adjunct to Knee Specific Exercises in Bilateral Knee Osteoarthritis Patients

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## ABSTRACT

**Introduction:** Osteoarthritis is a condition which causes the joint inflammation that results from cartilage degeneration. There are two types of osteoarthritis one primary OA and second secondary OA. The conventional treatment TENS, Ultrasound, IFT, along with knee specific exercises in one group. And the second group focused on the spinal exercises with all these conventional approach. The purpose of the study was to see the effect of spinal exercises effect on knee OA symptoms and functional ability. The significant difference was found in the pain, range of motion and the timed-up-go test.

**Material and methods:** Total 30 participants were selected. Groups of two were done one experimental given the spinal exercise and conventional treatment second controlled group given the knee exercises and conventional management. The pain, ROM and TUGT were analysed pre and post treatment.

**Results:** According to statistical analysis, the study showed a significant difference in the pain intensity, ROM of knee and TUGT pre and post intervention. The study documented difference in the pain intensity post-intervention (0.0004) at rest and (0.0002) on activity and range of motion of right knee (<0.0001) and of left knee (<0.0001), timed up go test (0.0110) considered significant.

**Conclusion:** The conducted study shows that there was significant difference in values of pain, ROM of knee and timed up go test in experimental group compared to controlled group. So the spinal exercises has proven beneficial in knee osteoarthritis.

**Key words:** Osteoarthritis, visual analogue scale, Kellgren and Lawrence classification, spinal exercises

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## INTRODUCTION

Osteoarthritis is the fourth leading disease having higher prevalence in overall population. Osteoarthritis is a condition which causes the joint inflammation that results from cartilage degeneration. It mainly affects individual above the age of 40-45 years and postmenopausal women too. Osteoarthritis leads to pain, stiffness, crepitus, decreased range of motion. It occurs more frequently in males. There are two types of osteoarthritis one primary OA and second secondary OA. Primary OA is mainly idiopathic its due natural aging of the joint. While the secondary OA is the cause of obesity, repeated trauma, abnormal joints at birth, other hormonal disorders etc.

According to the Kellgren and Lawrence system classification of OA is graded from grade 0 to grade 4. Where the grade 0 is definite absence of changes in X-ray and grade 4 is large osteophytes, marked narrowing of joint space definite deformity of bones. Here in this study we are taking knee OA patients with grade 2 and grade 3.

In conventional treatment given all these years include transcutaneous electric nerve stimulation for pain relief, Ultrasound for swelling, interferential therapy for pain these electrotherapy modalities as used along with the exercises i.e. knee specific strengthening and stretching exercises.

There has been study that suggests that deep squats could cause an increased injury risk of the lumbar spine and the knee joints. So by avoiding deep flexion activity we can minimize the magnitude of knee-joint forces. Which will lead to less pain and better functional mobility in patients with degenerative conditions like knee OA. Unfortunately this suggestion has not taken the influence of the wrapping effect, functional adaptations and soft tissue contact between the back of thigh and calf into account.

Concerns about degenerative changes of the tendofemoral complex and the apparent higher risk for chondromalacia, osteoarthritis, and osteochondritis in deep squats are unfounded.

Various physiotherapy techniques bracing the knee joint. Tapping using the lateral wedge shoe insoles reduce knee load. Exercises which allow to strengthen the muscles which can lead to reduction in pain and swelling. Here

physiotherapy interventions proves beneficial in reducing pain and improve functions of knee joint.

Thermotherapy (86.1%) was the most utilized modality followed by therapeutic exercises (81.3%).

Manual therapy in conjunction with other modalities was chosen as treatment protocol by 18% Nigerian physiotherapist. Some areas of practice are of contemporary guidelines, while some use evidence based practice. So conventional treatment has been more used and beneficial one

Effects of kinesiotherapy and electrotherapy on functional exercise capacity evaluated using six min walk test in patients with bilateral knee OA.

Other outcome measures were VAS, ROM, WOMAC Index. 6MWT can be the tool to evaluate the improvements in functional exercise capacity of patients of OA. Taping of knee improves pain and disability in patients with knee OA that can benefit after stopping treatment too [1].

Based therapeutic exercise is beneficial for people with knee OA in terms of reduced joint pain or improved physical function and quality of life.

Among the therapeutic exercise which land based provides short term benefit that is sustained for atleast 2- 6 months after cessation of formal treatment.

Aquatic exercise has considerable short term effect compared with land based exercise and non-exercise patients of knee OA.

Therapeutic exercise recommended as first line conservative of knee OA and current evidence strongly supports that exercise can be used as pain relieving option for there with knee OA [2].

Spinal alterations are very common secondary to osteoarthritis. Mal adaptations are seen which results in change in spinal mechanism which infact puts additional stress on knee joint causing excessive wear and tear of the joints.

Spinal muscle strengthening plays a important role in many conditions of spine like paraplegia, back pain.

Here in this study we are seeing the effect of spinal exercise along with knee specific exercises in knee OA. now how does these spinal exercises has effect on knee OA is mainly lumbar joint gets affected in knee OA as in OA patients gait pattern is altered line of gravity also shifts in front causing flexion in lumbar spine[3].

And we have also learnt so far that any alterations in biomechanics of lower limb can also cause alterations in spine. For example – abnormal gait pattern like limp gait also has spine affected and we treat spine so as to correct the spinal abnormalities and many more things like pain [4].

## MATERIAL AND METHOD

### Participant selection

The participants were selected from the Krishna institute of medical sciences. Bilateral knee OA patients coming to the OPD were selected as the sample size. Both male and female participants were selected.

### Osteoarthritis classification

According to the Kellgren and Lawrence system of classification for osteoarthritis

Grade 0 (none) - definite absence of x-ray changes of osteoarthritis.

Grade 1 (definite)- doubtful joint space narrowing and possible joint osteophytic lipping

Grade 2 (minimal)- definite osteophytes and possible joint space narrowing

Grade 3 (moderate) -moderate multiple osteophytes, definite narrowing of joint space and some sclerosis and possible deformity and bone ends.

Grade 4 (severe)- large osteophytes marked narrowing of joint space, severe sclerosis and definite deformity of bone ends.

Grade 2 and 3 patients were selected on basis of this classification.

### Type of study

An experimental study was carried out in which effect of structured spinal exercises was seen as an adjunct to knee specific exercises in bilateral knee OA patients. Study duration was from December 2020 to May 2021.

### Inclusion criteria

- The subjects included should be diagnosed as bilateral knee osteoarthritic.
- Age Groups: 40-60 years.
- Both male and female patients

### Exclusion criteria

- Patients who are underwent any surgical procedure in and around knee joint.
- Having any spinal deformity or pathology.

## RESULTS

On the basis of data analysis, it can be seen that there is a significant effect of structured spinal exercises along with the knee specific exercises in bilateral knee OA patients. Compared to just conventional management of pain.

**Table1: comparison of pre and post treatment values.**

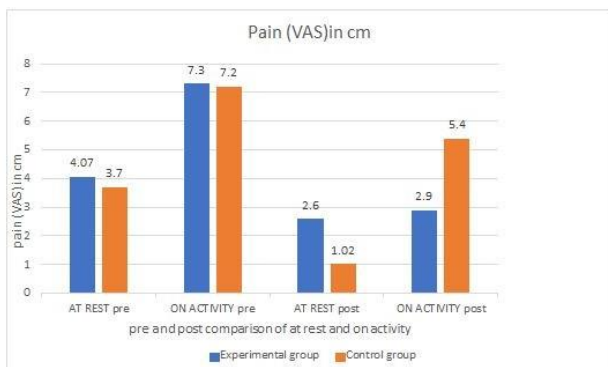
S. No.			Pre-Test (Mean± SD)	Post Test (Mean± SD)	Mean Difference	Paired 't' value	P value
<b>Experimental group (A)</b>							
1	Pain	At rest	4.0±0.86	2.66±0.85	2.415	12.96	<0.0001 considered significant
		On activity	7.3±1.12	2.99±0.65	4.492	18.35	<0.0001 Considered significant
2	ROM of Knee joint	Right	85.76±9.02	97.6±7.23	-11.923	14.14	<0.0001 Considered significant
		Left	87.69±8.82	100.46±8.56	-12.76	13.15	<0.0001 Considered significant
3		TUGT	12.69±4.19	8.28±3.64	-4.14	2.865	0.0085 Considered significant
<b>Control group (B)</b>							
1	Pain	At rest	3.77±2.60	1.02±1.16	1.177	7.832	<0.0001 Considered extremely significant
		On activity	7.20±1.26	5.4±1.98	1.808	5.231	0.002
2	ROM of great toe	Right	82.15±7.38	84.30±6.92	-2.154	5.307	<0.0002 Considered significant
		Left	84.30±6.92	84.30±6.92	-2.615	7.905	<0.001 considered significant
3		TUGT	13.3±3.83	11.69±3.35	-1.7	1.205	0.240considered significant

**Table2: comparison of pre-treatment values.**

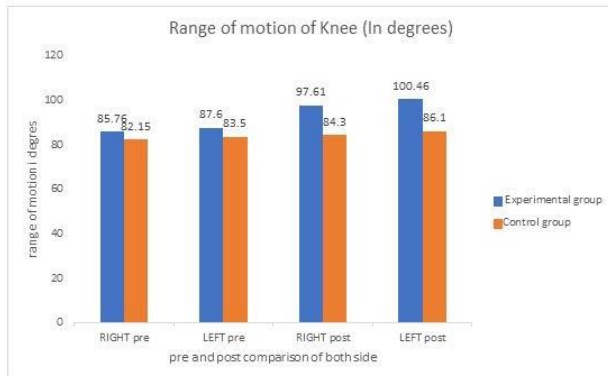
S. No.	Considered significant		Experimental group (A) (Mean± SD)	Control group (B) (Mean± SD)	Mean Difference	Unpaired 't' value	P value
1	Pain	At rest	4.07±0.86	3.77±2.60	-0.3	0.398	0.6963 Considered not quite significant
		On activity	7.30±1.12	7.20±1.26	-0.1	0.2139	0.8325 Considered not quite significant
2	ROM of knee joint	Right	85.76±9.02	82.15±7.38	-76.7	3.35	0.0026 not quite significant
		Left	87.6±8.82	83.5±6.8	-4.1	1.32	0.196 not quite significant
3		TUGT	12.69±4.19	13.3±3.83	0.61	0.387	0.701 Considered not significant

**Table3: comparison between post treatment values.**

S. No.			Experimental group (A) (Mean± SD)	Control group (B) (Mean± SD)	Mean Difference	Unpaired 't' value	P value
1	Pain	At rest	2.66±0.85	V	-1.64	4.112	0.0004 Considered extremely significant
		On activity	2.9±0.65	5.4±1.98	2.5	4.325	0.0002 Considered extremely significant
2	ROM of Knee joint	Right	97.61±7.23	84.30±6.92	-13.31	4.79	<0.0001 Considered significant
		Left	100.46±8.56	86.1±7.1	-14.36	4.65	<0.0001 Considered significant
3	TUGT		8.28±3.64	11.69±3.35	3.31	2.755	0.011 Considered significant



**Figure1: Pain assesment (vas) (pre and post values).**



**Figure2: Range of motion of knee (pre and post values).**

**DISCUSSION**

The aim of the study was to the effect of spinal exercises as an adjunct to knee specific exercises in bilateral knee Osteoarthritis patients. Osteoarthritis is the degenerative joint disease which causes joint space narrowing is the fourth leading disorder in entire world and mainly affects 50 % of population of entire world . Osteoarthritis can lead to weakening of the quadriceps and the tight hamstrings because of the changed gait pattern. Along with the pharmacological treatment physical therapy has beneficial effects. here in this study grade 2 and 3 patients will take. As they have mild to moderate joint

degeneration. Here we can't prevent further joint narrowing but can help minimize the symptoms of knee OA [5].

Knee OA is a prevalent chronic joint disease causing pain and disability. Physiotherapy has number of modalities and is non invasive treatment option. various physiotherapy techniques bracing the knee joint. Tapping using the lateral wedge shoe insoles reduce knee load. Exercises which allows to strengthen the muscles which can lead to reduction in pain and swelling . here physiotherapy interventions proves beneficial in reducing pain and improve functions of knee joint [1].

The study done by Hinman RS, Crossley KM, McConnell J, Bennell KL aims that the treatment strategy that is taping of knee improves pain and disability in patients with knee OA that can benefit after stopping treatment too. 87 patients participated in the study. it was proved that therapeutic knee taping is an efficacious treatment for management of pain and disability in patients with knee OA.

The study is done to examine efficacy of exercise intervention in patients with knee OA. 180 knee OA patients were Randomized and an exercise intervention group or control group. pain and function were used as baseline , 2 weeks and 3 months using pain scale and knee injury outcome score .the exercise intervention group had significant improved p4 scores , KOOS pain score ,KOOS functional score compared to there of control group at 2 weeks [2].

We divided the patients into two groups of 15 each . later the two individuals from each group discontinued the treatment .so 13 participants in each group were left. The first group i.e the experimental group were given the spinal exercise along with the conventional management. (tens +US+IFT+exercises).the second group was given the therapeutic exercise and conventional management. The group given the spinal exercises were having significant difference in the pain and range of motion of knee . whereas the timed-up-go test was having significant difference in both groups . hence it was proved that the study was having much effect on the functional mobility , gait of the individuals[3] .

Every study that was conducted has limitations. In our study, the limitations were less sample size, short

duration protocol, only, many individuals with spinal pathology or deformity were excluded. So, it is recommended that, further studies should make more attention towards these limitations for more effectiveness of the study[4].

### CONCLUSION

According to results, it is concluded that the spinal exercises with an adjunct to knee specific exercises and conventional treatment has more beneficial effect than just conventional treatment. The pain, range of motion, were having significant difference in experimental group than in the controlled group. Whereas the timed up go test wasn't having much significant effects in both the group.

### FUNDING

The funding was done by Krishna Institute of Medical Sciences Deemed to Be University, Karad.

### ETHICAL APPROVAL

The study was approved by the institutional ethical committee.

### CONFLICT OF INTEREST

There is no conflict of interest

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