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Effectiveness Of Movement Corrective Exercise To Reduce Pain And Physical Dysfunction In Subjects With Osteoarthiritis Of Knee Joint

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Abstract
Background: *Knee osteoarthritis is a chronic progressive disease that imparts a substantial socioeconomic burden to society and healthcare system. The prevalence of knee OA has dramatically risen in the recent decades due to consistent increases in life expectancy and obesity worldwide. Patient education, physical exercise and weight loss (for over-weight or obese individuals) constitute the first line knee OA treatment approach.*
Objective: *To determine the recent research evidences for the effectiveness of movement corrective exercise to reduce pain and physical dysfunction in subjects with osteoarthritis of knee joint.*
Subjects and Methods: *Total number of participants in the study is 30 subjects including both male and female ages between 40-65years were conveniently divided into two groups. Group A 15subjects (control group) and Group B 15 subjects (experimental group). Pain intensity, knee range of motion, knee function were evaluated using numerical pain rating scale (NPRS) and Western Ontario and Mc master scale (WOMAC) respectively.*
Results: *The data were analyzed using measures of paired "t" test to find the significance of the interventions used among the groups. The analytical test showed significant in reducing pain and improving functional ability for both the groups. SPSS formula was applied to data's of group.*
Conclusion: *this concludes that movement corrective exercise is more effective than normal exercise program in reducing pain and improving in quality of life.*

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I. Introduction

Osteoarthritis is a chronic degenerative disease, which is evolved by the deterioration of articular cartilage and hypertrophy of the bone margins (osteophytes) . The disease is characterized by musculoskeletal pain, joint line tenderness and impairments in propioception and balance impairment.

It generally affects than women than men with a ratio varying between 1:5 and 1:4 approximately 6% of the adults are affected with osteoarthritis of knee joint. The worldwide estimate indicates 13% of men and 19% of women, over 40 years of age are affected with osteoarthritis of knee . One of the major factors that plays an important role in progression of OA knee is knee alignment.

Movement impairment syndrome (MIS) is defined as the impairment of movement due to localized painful arising from the irritation of myofascial, periarticular or articular tissue which will result in mechanical trauma or most often micro trauma.

Previous studies have demonstrated that mal-alignment is one of the proposed contributing factors which lead to abnormal movement patterns or movement impairment syndrome in increasing the progression of OA knee . Movement impairments of lower extremity in the transverse and frontal planes such as knee valgus, knee varus or rotation impairments have been contributing to knee pain and injuries during the performances of functional activities .

The movement system dysfunctions are induced by pathokinesological or kinesopathological problems. Pathokinesological problems are dysfunction or pathologies of body systems that induce impairments in movement. A kinesopathological problems are the one in which impaired movement induce a pathology in tissue.

One of the proposed contributing factors to injury is abnormal movement pattern or movement impairments. There is growing support that movement impairments may contribute to knee problems such as PFPS, iliotibial band friction syndrome, ACL tears and OA knee .

Movement system syndrome are influenced by variety of factors such as increased age, high body mass, structural alignment, knee laxity and participation in activities that involve deep knee flexion have all been shown to increase risk of OA knee or OA progression. In addiction abnormal posture and malalignment of joints leads to changes in kinetics and kinematics that cause greater loads on the affected joints resulting in pain.

The various classifications of movement impairments of OA knee are tibiofemoral rotation with valgus, tibiofemoral rotation with varus syndrome, tibiofemoral hypomobility syndrome, knee extension syndrome, knee hyper extension syndrome, patellar lateral glide syndrome, tibiofemoral accessory hypermobility syndrome.

In management of OA knee, to date several studies are available with therapeutic exercise of high resistance vs low resistance training, land based vs water based exercise training, dynamic vs isometric exercise training, aerobic vs strength training, non-weight bearing vs propioceptive training and various forms of progressive resistance training these studies has shown training specific improvements and also shown improvements regardless of the form of exercises used. A recent trail involving patient with OA knee demonstrated that pain can decrease with the implementation of a strengthening program.

However, epidemiological studies specific to OA knee have shown that increased quadriceps strength can actually accelerate the progression of OA knee with mal alignment. High level of pain can lead to exercise avoidance and when severe even an avoidance of physical dysfunction such as standing, sitting, descending stairs, ascending stairs, lying on bed etc. Therefore, mal alignment movement which is believed to be loss of precise motion need to be assessed and managed for complete and successful managements of patients with OA knee.

The movement corrective exercises are
- Knee extension with ankle dorsiflexion
- Active hip lateral rotation
- Prone knee flexion
- Hip lateral rotation isometrics with knee flexed in prone
- Hip abduction in prone
- Hip lateral rotation with abduction in side lying

II. Methodology

This study was an experimental study of pre and post type. The study was carried out in Outpatient department Harsha Institute of Physiotherapy, Bangalore. Thirty male and female samples from the osteoarthritis population are selected and convenient sampling method was used to allocate them into two groups, A&B, with fifteen samples in each group. The study duration was three months with intervention duration 40minutes per day/alternate days of a week for three weeks. The main outcome measures are Numerical Pain Rating Scale (NPRS) and Western Ontario and Mc Master Scale (WOMAC).

Inclusion criteria
- Subjects with unilateral OA knee.
- Grade II and III of kellgren and Lawrence radiographic changes in one or more compartments of knee joint.
- Knee pain ranging from 3-8 in numerical pain rating scale.
- Subjects ages between 40-65 years.
- Both male and female..

Exclusion criteria
- Total knee arthroplasty.
- Cortisone injection to knee joint within previous 30 days.
- Musculoskeletal conditions involving knee joint (e.g. Tendon/ligament tear).
- Any other surgical procedure on lower extremity within past 6 months.

Treatment Procedure

Samples are categorized into two groups- Group A & Group B.

Group A: The subjects who fulfilled the inclusion criteria were included in this study. This group received conventional therapy such as Wax Bath, strengthening exercise for both Quadriceps and Hamstring Muscles, stretching for both Quadriceps and Hamstring muscles for four days a week (alternate days) for three weeks. The exercises are asked to perform 10 repetitions 2-3 times a day.

Static Quadriceps Exercise

Group B: The subjects who fulfilled the inclusion criteria were included in this study. This group received Movement corrective exercises along with the conventional therapy. The movement corrective exercises are, 1) Knee Extension with Ankle Dorsiflexion, 2) Active Hip Lateral Rotation, 3) Prone Knee Flexion, 4)Hip Lateral Rotation Isometrics with Knee Flexed in Prone, 5)Hip Abduction in Prone, 6)Hip Lateral Rotation with Abduction in Side Lying. The exercises are asked to perform 10 repetitions 2-3 times a day.

Statistical Analysis
Paired t-test values

Table 1: within group analysis NPRS- Group A

	Group A	Mean	SD	't'-value	p-value
NPRS	Pre test	7.266	0.588	5.555	<0.0001
	Post test	6.466	0.841		

Paired t-test: The 'p' value of NPRS is <0.0001, considered extremely significant.
The 't'value of NPRS is 5.555 with 14 degrees of freedom.

Table 2: within group analysis NPRS- Group B

	Group A	Mean	SD	't'-value	p-value
NPRS	Pre test	6.93	0.702	8.421	<0.0001
	Post test	5.33	0.616		

Paired t-test: The 'p'value of NPRS is <0.0001, considered extremely significant.
The 't'value of NPRS is 8.421 with 14 degrees of freedom.

Table 3: within Group analysis WOMAC- Group A

	Group A	Mean	SD	t-value	p-value
WOMAC	**Pre test**	70.33	6.195	4.940	0.0001
	Post test	63.66	7.852		

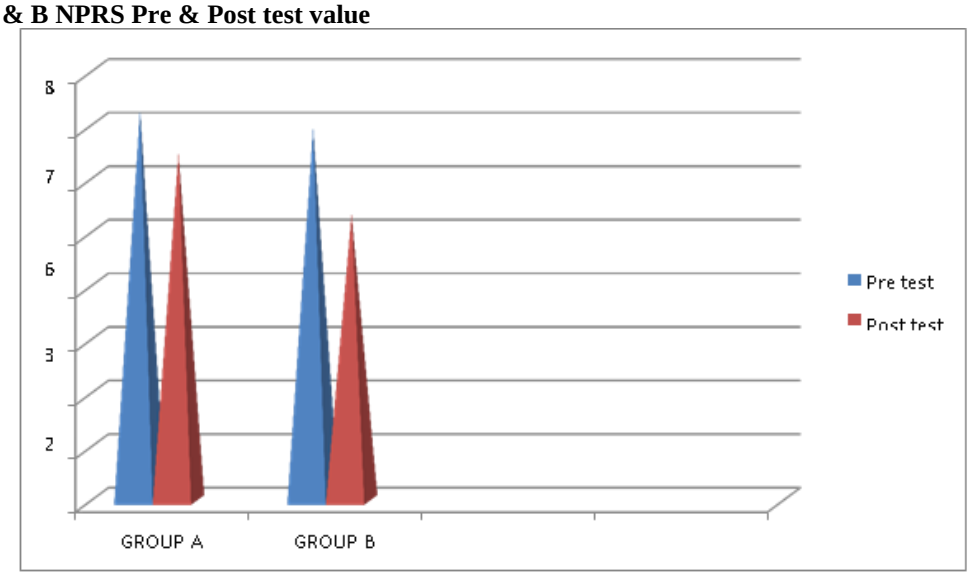
Paired t-test: The 'p' value of WOMAC is <0.0001, considered extremely significant.
The 't'value of WOMAC is 4.940 with 14 degrees of freedom.

Table: 4 within Group analysis WOMAC- Group B

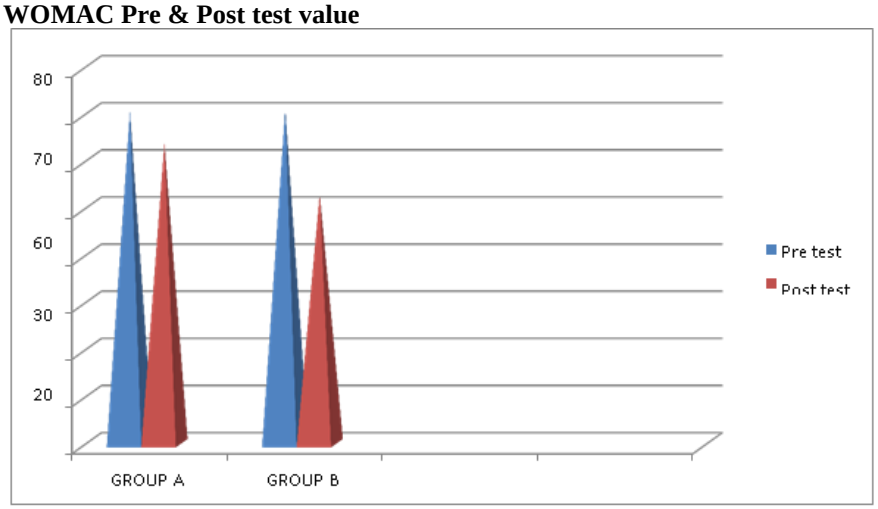
	Group A	Mean	SD	t-value	p-value
WOMAC	**Pre test**	70.86	4.436	7.852	0.0001
	Post test	52.8	7.627		

Paired t-test: The 'p' value of WOMAC is <0.0001, considered extremely significant.
The 't'value of WOMAC is 7.852 with 14 degrees of freedom.

Group A & B NPRS Pre & Post test value



Group A & B WOMAC Pre & Post test value



Unpaired t test values

Table: 5 within Group analysis Group A&B

	Group A	Mean	SD	t-value	p-value
NPRS	**A**	6.466	0.84	4.231	0.0001
	B	5.33	0.616		

Un Paired t-test: The 'p' value of NPRS is <0.0001, considered extremely significant.
The 't'value of NPRS is 4.231 with 28 degrees of freedom.

Table: 6 within Group analysis Group A&B

	Group A	Mean	SD	t-value	p-value
WOMAC	**A**	63.66	7.825	3.851	0.0001
	B	52.8	7.627		

Un Paired t-test: The 'p' value of WOMAC is <0.0001, considered extremely significant. The 't'value of WOMAC is 3.851 with 28 degrees of freedom.

III. Result

The data were analyzed using measures of paired't' test to find the significance of the interventions used among the groups. The analytical test showed significant in reducing pain and improving functional ability of the both the groups. SPSS formula was applied to data's of group.

In that group B showed significant improvement in reducing pain (NPRS: pre test mean= 6.93 : post test mean= 5.33) and functional ability (WOMAC: pre test mean= 70.86, post test mean= 52.8) than group A (NPRS: pre test mean= 7.266 : post test mean= 6.466) and functional ability (WOMAC: pre test mean= 70.33, post test mean= 63.66). Group B showed significant p value <0.0001 for NPRS & WOMAC Scale.

IV. Discussion

Osteoarthritis is the commonest joint disease worldwide. It is a chronic degenerative disorder of multifactorial etiology characterized by loss of articular cartilage and per articular bone remodelling. OA causes joint pain, typically worse with weight bearing activity as well as can manifest with stiffness after inactivity.

The aim of this study is to examine the effectiveness of movement corrective exercises to reduce pain and physical dysfunction in patients with OA knee.

Thirty (30) participants with OA knee ages between 45-65 were selected for this based on theinclusion and exclusion criteria. Out of 30 subjects, 15 subjects were grouped in controlgroup as Group A and 15 subjects were grouped in experimental group as Group B.

Numerical pain rating scale (NPRS) & Western Ontario and Mc Master Scale (WOMAC) were taken as outcome measure .WOMAC which consists of subscales of pain, stiffness; physical dysfunction was used to measure the dependent variables such as pain, physical dysfunction and other symptoms

In group A the pre test value of NPRS is (mean value = 7.266, SD= 0.588). And the post test value of NPRS is (mean value = 6.466, SD= 0.841). In this,,t" value is 5.555, p<0.0001. The pre test value of WOMAC is (mean value = 70.33, SD = 6.195). And post test value of WOMAC is (mean value = 63.66, SD =7.825). In this,,t"value = 4.940, p<0.0001.

In group B the pre test value of NPRS is (mean value = 76.93, SD= 0.702). And the post test value of NPRS is (mean value = 5.33, SD= 0.616). In this,,t" value is 8.421, p<0.0001. The pre test value of WOMAC is (mean value = 70.86, SD = 4.436). And post test value of WOMAC is (mean value = 52.8, SD =7.627). In this,,t"value = 7.852, p<0.0001.

The analysis of the obtained values, result suggests that the experimental group who received movement corrective exercise along with conventional therapy has a marked improvement than the control group who received conventional treatment alone.

V. Conclusion

The study concludes that movement corrective exercise is more effective than normal exercise program in reducing pain and improving in quality of life.

VI. Limitations And Recommendations

- This study consists of only small quantity of subjects ; which should be revised to large quantity of subjects.
- This was a short term study of 3 weeks and no further follow up of subjects were carried out
- Studies are needed on bilateral osteoarthritis knee joint.
- Home program taught to patient was not supervised.
- In further study specific gender can be taken.
- In further study we can use this exercise to prevent deformity.

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