

Research Article

Effect of Integrated Physiotherapy Protocol on Functional Performance and Mental Health Among Subjects with Osteoarthritis Knee

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A B S T R A C T

Introduction: Osteoarthritis (OA) is the most prevalent musculoskeletal condition characterised by asymmetric joint space narrowing, osteophyte development, and articular cartilage degradation resulting in severe discomfort and incapacity with financial, social, and personal impact. Patients diagnosed with osteoarthritis at the knee joint experience psychological co-morbidities such as anxiety and depression.

Aim: The aim of the study was to determine whether integrated physiotherapy protocol affects functional performance as well as the mental health of osteoarthritis patients.

Method: This pilot study was conducted at Rehabilitation Sciences, Jamia Hamdard University after ethical approval from the Institutional Review Board. A total of 40 subjects (mean age 52.4 ± 8.9 years) were recruited by convenience sampling and were divided into two groups, the intervention group (Group A) and the control group (Group B). Integrated physiotherapy was given to the interventional group. The control group was prescribed a home exercise programme. Paired and unpaired t tests were used to perform within and between group analyses using the statistical package SPSS 20.0.

Result: The result shows that group A had significantly improved functional performance (t value 13.22) and had a significant advantage in decreasing anxiety over group B (p value 0.045) and depression was improved in both groups equally.

Conclusion: Integrated physiotherapy protocol is not only beneficial in improving functional health but also improves the mental health of subjects having osteoarthritis knee.

Keywords: Exercise Therapy, Manual Therapy, Knee Osteoarthritis, Anxiety, Depression, Functional Performance

Introduction

Globally, osteoarthritis (OA) is the most prevalent musculoskeletal condition. Asymmetric joint space narrowing, osteophyte development, and articular cartilage degradation are among its distinguishing characteristics. These alterations frequently result in severe discomfort and incapacity and impose a heavy financial, social, and personal impact.¹

Patients diagnosed with osteoarthritis at the knee joint experience psychological co-morbidities such as anxiety and depression. While the physical symptoms of osteoarthritis are more apparent and often receive greater attention from clinicians, the presence of these subclinical psychological issues should not be ignored.¹ Research studies have shown a significant association between osteoarthritis and mental health conditions.² A study done by Stubbs et al. in 2016 concluded that 20% of patients with OA knee had developed depression.³

The chronic pain and physical limitations caused by osteoarthritis can have a profound impact on an individual's emotional well-being.³ The constant pain and discomfort can lead to feelings of frustration, sadness, and helplessness, which may contribute to the development of anxiety and depression.⁴ Treatment approaches for osteoarthritis often involve a multidisciplinary approach, including physical therapy, pain management, medication, and lifestyle modifications.⁴ Additionally, psychological interventions such as cognitive-behavioural therapy (CBT) and relaxation techniques can be beneficial in managing anxiety and depression in patients with osteoarthritis.⁵ By acknowledging and addressing the subclinical psychological comorbidities associated with osteoarthritis, clinicians can improve the overall well-being and quality of life of their patients. It is essential for healthcare providers to adopt a holistic approach that considers the physical, emotional, and psychological aspects of the disease.

Therefore, this study was undertaken with the objective of determining whether integrated physiotherapy protocol has effects on improving functional performance as well as mental health of subjects having osteoarthritis knee.

Materials and Methods

This pilot study was undertaken at the Rehabilitation Centre and Department of Orthopaedic Surgery, HAHC Hospital, Jamia Hamdard, New Delhi. The subjects diagnosed with osteoarthritis of the knee were recruited from the Orthopaedic OPD and the protocol was administered at the rehabilitation facility of HAHC hospital. The study was conducted for a period of 3 months.

A total of 40 subjects (29 males and 11 females) (with a mean age of 52.4 years, mean weight of 68.3 kg, mean height of 158 cm and mean BMI of 27.18 kg/m²) were recruited by convenience sampling after obtaining permission from Institutional Review Board, Jamia Hamdard University. Patients aged between 45 and 79 years and fulfilling American College of Rheumatology (ACR) guidelines were included in the study. Patients with ages more than 80 years, who had undergone any knee surgery, patients using NSAIDs or intra-articular injections within four weeks of recruitment, patients having regular use of steroids or NSAIDs due to any underlying condition, patients having a history of cerebral-vascular accident or myocardial infarction within six months of recruitment in the study and patients diagnosed with rheumatoid arthritis, gout, pseudo-gout, or collagen diseases were excluded from the study.⁶

Informed consent for participation in the study was sought from each subject. The subjects were randomly divided by chit method into two groups: Group A: Interventional group (n = 20) and Group B: Control group (n = 20).

Group A was administered a supervised physiotherapy program according to clinical practice guidelines, whereby they were required to attend three sessions a week for four weeks consecutively at the rehabilitation centre, Jamia Hamdard University, New Delhi. Tables 1 and 2 show the supervised exercise protocol for Group A and the home exercises for Group B.

Group B was prescribed a home programme consisting of self-exercises for four weeks which were to be reviewed once at the end of the second week. The exercise regime was customised according to the specific needs of the individual patient.⁶

Table 1. Supervised Exercise Protocol Administered in Group A

S. No.	Exercise	Description	Sets/ Repetitions/ Hold Time	Inter-Repetition/ Inter-Set Rest Time	Duration	Supporting Evidence
1.	Patient education	Four sessions	-	-	4 weeks	Piyakhachornrot et al. 2011 ⁷ Goff et al. 2021 ⁸

3.	Stretching exercise	The therapist performed passive stretching of: <ul style="list-style-type: none"> • Hamstrings • Quadriceps femoris • Gastro-Soleus 	A single set of 3 repetitions with 30 s hold	30 s between repetitions	4 weeks	Anwer et al. 2018 ⁹ ; Abbott et al. 2015 ¹⁰
4.	Muscle energy technique (MET)	Post-isometric relaxation technique was administered after the application of 15 min of superficial moist heat to: quadriceps femoris, hamstrings, hip abductors, Ankle plantar flexors	A single set of 5 repetitions, isometric contraction for 5 s and passive stretch for 10 s	30 s between repetitions	4 weeks	Sartoyo et al. 2022 ¹¹ ; Khan et al. 2018 ¹²
5.	Aerobic exercise	Pedo-cycling: at patient-specific self-selected speed and seat height	3 sets of 50 repetitions	30 s between sets	4 weeks	Luan et al. 2021 ¹³
6.	Neuro-muscular training	Frenkel exercise	3 sets of 15 repetitions	2 s between repetitions and 30 s between sets	4 weeks	Trăistaru et al. 2020 ¹⁴
		Standing balance on an unstable surface	3 sets of 3 repetitions with 60 s hold	120 s between repetitions as well as between sets		

Table 2. Heat Cure Acrylic Resin Incorporated with Auto-Polymerising Acrylic Stains

S. No.	Exercise	Description	Sets/ Repetitions/ Hold Time	Inter-Repetition/ Inter-Set Rest Time	Duration	Supporting Evidence
1.	Aerobic Exercise	Pedo-cycling: at patient-specific self-selected speed and seat height	3 sets of 50 repetitions	30 s between sets	4 weeks	Luan et al. 2021 ¹³
2.	Weight-bearing neuromuscular exercises	Knee bending, squatting and step-ups	3 sets of 10 repetitions	30 s between sets	4 weeks	Benell et al. 2014 ¹⁵
3.	Hip muscle strengthening	Prone leg raises	2 sets of 5 repetitions	20 s between sets	4 weeks	Benell et al. 2014 ¹⁵
4.	Neuromuscular training	Standing single-leg balance training	3 sets of 3 repetitions with 60 s hold	120 s between repetitions as well as between sets	-	Trăistaru et al. 2020 ¹⁴

The Hospital Anxiety and Depression Scales (HADS) was used to assess anxiety and depression and The Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) scale was used to determine the functional performance among the subjects. Both the groups were assessed on the HADS and WOMAC scale once at the baseline and at the end of the 4-week protocol.

Data obtained was compiled in an Excel sheet and analysed using SPSS version 20.0. Paired and unpaired t tests were used to analyse within and between group differences respectively.

Table 3. Within Group Comparison of WOMAC, HADS(A) and HADS(D) Scores Pre- and Post-Test in Group A

Scales	Mean	SD	t Value	p Value
WOMAC				
Pre-test	37.20	4.678	11.605*	0.11
Post-test	32.47	4.068		0.00#
HADS(D)				
Pre-test	10.73	2.344	4.000**	0.07
Post-test	9.67	1.915		0.01#
HADS(A)				
Pre-test	11.80	1.474	5.684***	0.09
Post-test	9.80	1.521		0.001#

* p value for WOMAC = 0.00

** p value for HADS(D) = 0.01

*** p value for HADS(A) = 0.001

#Significant improvement

Results

This pilot study was undertaken on 40 subjects with a mean age of 52.4 ± 8.9 years, mean weight of 68.3 ± 7.5 kg, mean height of 158 ± 4.7 cm and mean BMI of 27.18 ± 2 kg/m².

Group A has demonstrated significant (p value < 0.05) improvement in WOMAC, HADS(A) and HADS(D) when compared using paired t test (Table 3).

Group B also showed improvement in WOMAC, HADS(D) and HADS(A) scores (Table 4). The between-group comparison showed that improvement in WOMAC and HADS(D) scores were non-significant in both groups but scores for HADS(A) improved significantly in Group A.

Table 4. Within Group Comparison of WOMAC, HADS(A) and HADS(D) Scores Pre- and Post-Test in Group B

Scales	Mean	SD	t Value	p Value
WOMAC				
Pre-Test	36.53	4.274	13.229*	0.11
Post-Test	33.20	3.877		0.000
HADS(D)				
Pre-Test	10.73	1.907	3.500**	0.67
Post-Test	10.27	1.907		0.59
HADS(A)				
Pre-Test	11.87	1.407	3.761***	0.71
Post-Test	10.93	1.438		0.58

* p value for WOMAC = 0.00

** p value for HADS(D) = 0.59

*** p value for HADS(A) = 0.58

Table 5. Comparison Between Groups of WOMAC, HADS(D), HADS(A) Scores

Scales	Group A (N = 20)		Group B (N = 20)		t Value	p Value
	Mean	SD	Mean	SD		
WOMAC						
Pre-test	37.20	4.678	36.53	4.274	0.407	0.11
Post-test	32.47	4.068	33.20	3.877	0.505*	0.0049
HADS(D)						
Pre-test	10.73	2.344	11.80	1.907	0.000	0.870
Post-test	9.67	1.915	10.27	1.907	0.860	0.69
HADS(A)						
Pre-test	11.80	1.474	11.87	1.407	0.127	0.12
Post-test	9.80	1.521	10.93	1.438	2.097*	0.045

*denotes significant change (p value less than 0.05)

Comparison between Groups A and B showed a mild difference in both groups for WOMAC and HADS(D) scores but scores of HADS(A) had a significant difference (Table 5).

Discussion

The present study was designed to investigate the effect of a supervised physiotherapy program consisting of exercise therapy and manual therapy techniques on anxiety and depression existing in patients with osteoarthritis of the knee and its correlation with the functional performance of the individual.

The results of the study demonstrated that exercise therapy and manual therapy are effective tools in alleviating physical symptoms such as pain, stiffness and reduced functional performance and also significant in alleviating psychological co-morbidities.

The improvement in physical as well as mental symptoms has been reported in both groups with Group A having a significant advantage over Group B, especially in the alleviation of anxiety. A comparison between the two groups indicates that Group A leads over Group B significantly when it comes to post-intervention anxiety (HADS-A) scores. However, the difference between the overall outcome scores in the WOMAC and HADS(D) scores is non-significant.

This significant improvement in Group A indicates the efficacy of exercise therapy and manual therapy treatment protocols in the alleviation of symptoms of osteoarthritis of the knee and improving the individual's physical and functional performance significantly. Although there was not much significance indicated for the WOMAC t value of the two groups, however on comparing the post-test means of Group A and Group B, it is clear that the level of alleviation achieved by Group A according to the post-test score mean was better than that of Group B. Also, the t value of anxiety did show a significant difference.

These outcomes suggest that the functional performance was improved in both groups after the 4-week treatment protocol. Group A shows a better improvement in psychological symptom levels than Group B amid a marginal improvement shown on the WOMAC scale. This may suggest that the difference between the psychological improvements between the two groups can be attributed more to the behavioural response factors than the physical cause.¹⁶⁻¹⁸ These factors include human interaction, motivation, better application of the individual under supervision and a sense of being taken care of.¹⁹

Our study findings are consistent with the results of previous studies where exercise therapy and physical activity have been shown to have positive effects on mental health, including anxiety, depression, and mood disorders. Incorporating exercise as part of a comprehensive treatment approach can contribute to improved well-being

and serve as a valuable adjunct to medication and other therapeutic interventions.²⁰

It is important to note that the specific mechanisms and their relative contributions to pain relief through manual therapy are still an area of ongoing research. The effectiveness of manual therapy can vary depending on the individual, the specific condition being treated, and other contextual factors.²¹⁻²⁴

Understanding the multifaceted nature of manual therapy's effects can help clinicians optimise treatment approaches and tailor interventions to individual patients. This comprehensive model highlights the complex interplay of mechanical, neurophysiological, peripheral, spinal, and supraspinal mechanisms that may collectively contribute to the relief of pain and improvement in function observed with manual therapy techniques.

This study had a few limitations. Since this data was collected during the second wave of the pandemic, the sample size was less, and some patients lost follow-up during the study. In the future, research can be undertaken with a larger sample and by limiting the confounding parameters to increase the generalisability of the study findings.

Conclusion

It was concluded from the present study that physical therapy and exercises are valuable components of a multidisciplinary approach to managing osteoarthritis of the knee. By addressing both the physical and psychological aspects, these interventions can improve pain, function, mobility, and overall well-being in patients with osteoarthritis.

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Conflict of Interest: None

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