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Effectiveness of Deep Breathing and Selected Yoga Asanas on Kinesiophobia among Knee Osteoarthritis Patients: A Comparative Study

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Abstract

Knee osteoarthritis is commonly associated with pain, stiffness, functional limitations, and kinesiophobia, which can adversely affect rehabilitation outcomes by limiting patient participation in movement. Kinesiophobia, characterized by an excessive and irrational fear of physical activity, often leads to avoidance behaviors and delayed recovery. Although interventions such as yoga and deep breathing techniques are known to enhance physical and psychological well-being, their comparative effectiveness in reducing kinesiophobia in individuals with knee osteoarthritis remains uncertain. Therefore, this comparative study aimed to evaluate the effects of selected yoga asanas and deep breathing techniques on kinesiophobia, pain intensity, and pain perception when combined with conventional physiotherapy. A total of 40 participants aged 40–60 years with diagnosed knee osteoarthritis and kinesiophobia were randomly allocated into two groups. The control group received conventional physiotherapy along with selected yoga asanas, while the experimental group received conventional physiotherapy combined with deep breathing techniques. Both interventions were administered five days per week for a duration of six weeks. Outcome measures included the Tampa Scale for Kinesiophobia (TSK), Visual Analogue Scale (VAS), and Short-Form McGill Pain Questionnaire-2 (SF-MPQ-2), assessed at baseline and after the intervention period. The findings demonstrated that both groups showed improvement in all measured outcomes following the intervention; however, a between-group analysis revealed no statistically significant difference in kinesiophobia ($p = 0.589$), pain intensity, or pain perception scores. These results indicate that both selected yoga asanas and deep breathing techniques are effective when used alongside conventional physiotherapy, with neither intervention demonstrating superiority nor the other in reducing kinesiophobia among individuals with knee osteoarthritis.

Keywords

Osteoarthritis, Kinesiophobia, Deep breathing technique, Yoga poses

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Introduction

Osteoarthritis (OA) is a progressive degenerative joint disorder characterized by cartilage deterioration, joint pain, stiffness, and functional limitations, significantly affecting quality of life (Chaurasia, 2004). The knee joint is the most commonly involved site, with a higher prevalence reported among women (Sakalauskiene & Jauniskiene, 2010). Globally, OA contributes to substantial disability, with millions of individuals requiring rehabilitation for symptom management and functional restoration (Langworthy et al., 2024; Venkatachalam et al., 2018).

Epidemiological evidence from India indicates a higher prevalence of knee OA in rural populations compared to urban populations, highlighting the growing burden of the condition and the need for accessible rehabilitation strategies (Venkatachalam et al., 2018). Beyond physical impairment, psychological factors such as Kinesiophobia—defined as an excessive and irrational fear of movement due to the expectation of pain or reinjury—play a critical role in limiting participation in physical activity. Kinesiophobia has been associated with chronic musculoskeletal conditions, including low back pain, OA knee and shoulder disorders, and contributes to avoidance behavior and functional decline (Roelofs et al., 2007 and Kanniappan & VV, 2021).

Conventional management of knee OA emphasizes exercise therapy and physiotherapy interventions to improve mobility and reduce pain (McCarthy, C. J., et al., 2004). However, adherence to exercise programs is often compromised by psychological barriers such as fear of movement (Mapinduzi et al., 2025). Therefore, interventions that address both physical and psychological components are essential. Mind–body approaches such as yoga and breathing techniques have gained increasing attention in rehabilitation. Yoga integrates physical postures, flexibility training, and mental focus, contributing to improvements in strength, balance, and functional performance (Mears et al., 2019; Forseth et al., 2021). Similarly, deep breathing techniques have been shown to promote relaxation, regulate autonomic function, and reduce anxiety, thereby potentially influencing pain perception and emotional well-being in OA patients (Mulki et al., 2021 and Brilla et al., 2016).

Despite evidence supporting both yoga and deep breathing independently, there is limited research directly comparing their effectiveness on kinesiophobia in individuals with knee osteoarthritis. This represents a critical gap, as understanding the relative impact of these interventions could help optimize rehabilitation strategies.

Therefore, the present study aims to evaluate and compare the effectiveness of deep breathing and selected yoga asanas on kinesiophobia among patients with knee osteoarthritis.

Methodology

The present study was designed as a comparative study conducted among individuals diagnosed with knee osteoarthritis. Participants aged between 40 and 60 years with a documented clinical diagnosis of knee osteoarthritis were included. To ensure the presence of movement-related fear, individuals with kinesiophobia (Tampa Scale for Kinesiophobia score ≤ 68), moderate to severe pain (Visual Analog Scale score between 4 and 10), a positive patellar tap test indicating joint

effusion, and a score ≤ 220 on the Short-Form McGill Pain Questionnaire-2 (SF-MPQ-2) (Dworkin, R. H., et al., 2009) were selected. Participants were excluded if they had severe joint deformity, marked knee instability, recent knee surgery or acute injury, severe restriction in knee range of motion, neurological disorders affecting movement or sensation, or significant cardiovascular or respiratory conditions. A total of 40 participants meeting the inclusion criteria were recruited from Saveetha Hospital using convenience sampling. After obtaining informed consent, participants were allocated into two groups (n = 20 each) using a coin toss method. Outcome measures included the Tampa Scale for Kinesiophobia (TSK), Visual Analog Scale (VAS), and Short-Form McGill Pain Questionnaire-2 (SF-MPQ-2), which were assessed before and after the intervention. The total duration of the intervention was 6 weeks, with two sessions per day. Group A received deep breathing exercises along with conventional physiotherapy, where deep breathing was performed using slow, controlled diaphragmatic breathing for 10–15 minutes per session. Group B received selected yoga asanas such as Tadasana, Trikonasana, and Bhujangasana (Whissell et al., 2021) along with conventional physiotherapy, performed within pain-free limits for 10–15 minutes per session. Conventional physiotherapy for both groups included quadriceps strengthening, range of motion exercises, and functional mobility training. Adequate rest intervals were provided between exercises. The study was approved by the Institutional Scientific Research Board of Saveetha College of Physiotherapy (332/07/2024/ISRB/UGSR/SCPT), and written informed consent was obtained from all participants. Data were analyzed using descriptive and inferential statistics, with mean and standard deviation calculated for all variables; paired t-test was used to assess within-group differences, and independent t-test was used to compare between-group differences, with a p-value < 0.05 considered statistically significant.

Results and Discussion

Within-group analysis using paired t-tests demonstrated statistically significant improvements in both control and experimental groups across all outcome measures ($p < 0.001$) (Table 3). In the control group (Table 1), significant reductions were observed in Tampa Scale scores (52.1 ± 11.67 to 23.4 ± 3.45), Visual Analogue Scale scores (6.9 ± 0.85 to 2.5 ± 1.63), and SF-MPQ-2 scores (28.8 ± 2.19 to 17.5 ± 1.7). Similarly, the experimental group (Table 2) showed significant improvements in Tampa Scale scores (52.3 ± 9.1 to 24.05 ± 4.07), Visual Analogue Scale scores (7.3 ± 1.21 to 3.15 ± 0.98) and SF-MPQ-2 scores (37.95 ± 3.1 to 24.3 ± 2.29). However, between-group comparison using independent t-test (Table 3) revealed no statistically significant difference between control and experimental groups for Tampa Scale ($p = 0.589$) and Visual Analogue Scale ($p = 0.139$). In contrast, a statistically significant difference was observed in SF-MPQ-2 scores ($p < 0.001$), with the experimental group demonstrating higher post-test scores compared to the control group (Table 3).

Table 1. Group 1 paired sample test result

Outcome	Test	Mean	S.D.	t value	p-value
TAMPA scale	Pre test	52.1	11.67	11.05	0.000
	Post test	23.4	3.45		
VAS	Pre test	6.9	0.85	9.91	0.000
	Post test	2.5	1.63		
SF-MPQ2	Pre test	28.8	2.19	68.9	0.000
	Post test	17.5	1.7		

Table 2. Group 2 paired sample test result

Outcome	Test	Mean	S.D.	t value	p-value
TAMPA scale	Pre test	52.3	9.1	16.74	0.000
	Post test	24.05	4.07		
VAS	Pre test	7.3	1.21	13.76	0.000
	Post test	3.15	0.98		
SF-MPQ2	Pre test	37.95	3.81	58.13	0.000
	Post test	24.3	2.92		

Table 3. Independent “t” test for baseline characteristics

Outcome	Test	Mean	S.D.	T value	P value
TAMPA scale	Pre test	23.4	3.45	-0.544	0.589
	Post test	24	4.07		
VAS	Pre test	2.5	1.63	-1.519	0.139
	Post test	3.15	0.98		
SF-MPQ2	Pre test	17.5	1.73	-9.012	0.000
	Post test	24.3	2.9		

In the study we observed that Deep Breathing Exercise (experimental group) was more effective than three typical yoga poses (control group). Deep breathing appears to be more effective than three typical yoga poses in reducing kinesiophobia and improving pain intensity among knee osteoarthritis patients. These findings suggest that deep breathing may be a useful adjunctive therapy for managing kinesiophobia and pain in this population. Several studies align with the findings of Lu et al. (2024) For instance, Cramer et al. (2018) and Deepeshwar et al. (2018) conducted a systematic review showing that yoga enhances physical function and reduces pain in osteoarthritis patients. Similarly, Abbott et al. (2019) reported that while yoga helped with mobility and mental well-being, its effects on pain relief were not as pronounced as traditional physical therapy. These findings suggest that yoga’s effectiveness may depend on factors such as duration, intensity, and patient characteristics. In their experimental study, Busch et al. (2012) investigated the effects of deep and slow breathing (DSB) on pain perception, autonomic activity, and mood processing. The study found that DSB led to a significant reduction in pain perception and negative mood states, as well as increased parasympathetic activity, indicating a relaxation response. These findings suggest that DSB can modulate pain experience and enhance autonomic and emotional regulation. The results of Busch et al. (2012) align with previous research demonstrating the benefits of controlled breathing techniques on pain and autonomic function. For

instance, a study by Zautra et al. (2010) found that mindfulness meditation, which incorporates deep breathing, reduced pain sensitivity and improved mood in patients with chronic pain conditions. Similarly, Brown and Gerbarg (2005) reported that yogic breathing practices enhanced autonomic regulation and decreased stress and anxiety levels, contributing to better pain management.

Conclusion

This study evaluated the effectiveness of selected yoga asanas and deep breathing exercises in reducing kinesiophobia among osteoarthritis patients. While both interventions demonstrated positive effects in alleviating fear of movement, deep breathing exercises proved to be more effective than yoga. Deep breathing likely enhances relaxation, reduces pain perception, and improves psychological well-being, which are crucial for overcoming kinesiophobia. Therefore, incorporating deep breathing techniques into rehabilitation programs may offer a more efficient strategy for managing movement-related fear in osteoarthritis patients. The present study has several limitations. First, the study included participants only within the age range of 40–60 years, which may limit the generalizability of the findings to other age groups. Second, the intervention duration was relatively short and may not adequately reflect the long-term effects and sustainability of the treatment outcomes. Additionally, the sample size was small, which may have reduced the statistical power of the study and limited the wider applicability of the findings.

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