Holistic Impact of Selective Hatha Yoga Practices on Physical and Mental Health of Knee Osteoarthritis Patients in Himachal Pradesh

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ABSTRACT

This study investigates the impact of a structured 12-week selective Hatha Yoga intervention on the physical health of knee osteoarthritis (OA) patients in Solan, Himachal Pradesh. A total of 100 participants aged 45–75 were divided into an experimental group (yoga + medication) and a control group (medication only). The intervention consisted of seven asanas and two pranayama techniques performed daily. Pre- and post-assessment using the SF-36 Health Survey revealed statistically significant improvements ($p < 0.05$) in physical functioning, pain reduction, role limitations due to physical health, and general health in the experimental group. While both groups showed progress, the experimental group demonstrated greater therapeutic gains, suggesting that selective Hatha Yoga practices offer measurable benefits as a complementary approach to conventional osteoarthritis treatment.

Keywords: Hatha Yoga, Knee Osteoarthritis, Physical Functioning, Pain Management, Solan, Himachal Pradesh, Complementary Therapy, SF-36, Pranayama

INTRODUCTION

Osteoarthritis is the most common type of arthritis and it is highly prevalent. Worldwide, 303 million people were affected by osteoarthritis in 2017 (Kloppenburg & Berenbaum, 2020). According to the World Health Organization, 80% of people with osteoarthritis have limited range of movement and 25% are unable to perform their major daily activities (National Health Portal of India, n.d.). Among individuals over the age of 60 years, 9.6% of men and 18.0% of women have symptomatic osteoarthritis. In India, osteoarthritis is the most frequent joint disease, affecting between 22% to 39% of the population. It is more common in women , 45% of women over the age of 65 report symptoms, and radiological evidence is found in 70% of people above that age (Kraus et al., 2015). Osteoarthritis (OA), often referred to as degenerative joint disease or "wear and tear" arthritis, causes discomfort during movement and most commonly affects the hips and knees.

There are two types of osteoarthritis: primary and secondary. Primary osteoarthritis usually manifests in old age and predominantly affects weight-bearing joints like the knees and hips. It results from an intrinsic defect in joint cartilage. In contrast, secondary osteoarthritis arises from an underlying joint condition and can appear at any age after adolescence. Both forms primarily affect the hips and knees, but primary osteoarthritis is more common. Risk factors include congenital joint malformations, joint injuries, certain joint and metabolic diseases, and obesity (Maheshwari & Mhaskar, 2015; Mandal & Choudhury, 2017). While the etiology of primary osteoarthritis remains idiopathic, secondary osteoarthritis is often linked to diabetes, crystal deposition, infections, repetitive injuries, and biomechanical stress. Common clinical features include joint pain, swelling, stiffness, and reduced mobility. As the disease progresses slowly and irreversibly, intervention aims to manage symptoms and preserve function.

Modern medical treatments emphasize disease prevention, symptom management, and recovery, with or without surgery. Therapeutic options include analgesics, cartilage-supporting supplements (e.g., glucosamine, chondroitin sulfate, sodium hyaluronan), supportive therapies (such as exercise, yoga, physiotherapy), and surgery when necessary. Analgesics alleviate pain, while supplements protect cartilage function. Supportive therapies play a critical role in reducing joint strain, alleviating pain and stiffness, improving muscle tone, and aiding weight reduction (Maheshwari, 2011). Among these, selective Hatha Yoga practices offer promising supportive care for knee osteoarthritis patients.

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MATERIALS AND METHODS

The experimental group received a 12-weeks selective Hatha yoga intervention. The control group did not receive any selective practice or protocol to perform (only medications). Subjects in both the groups had a baseline data collection at the starting of the study. Participants were assigned a group based on the willingness of participation in the study. Those who willingly participate in the study were assigned to the experimental group and those who did not show interest were assigned to the control group. In this study, there were two groups. The first group was experimental group (Yoga group) and the second group was control group. The control group only took medications, while the experimental group performed a selective Hatha Yoga practices. Pre data and post data assessment was done on participants before and after the selective Hatha Yoga intervention. Baseline assessment was taken at the starting of the study. The Hatha Yoga practices were given daily for 40 min for the duration of 12 weeks. The sample selected of both male and female knee osteoarthritis patients of Solan, Himachal Pradesh with the age range of 45 to 75 years.

Inclusion criteria

Patients who were 45 to 75 years old, had knee osteoarthritis for at least six months, and lived in Himachal Pradesh. Patients who did not participate in a regular exercise programme during these 12 weeks. Furthermore, patients with mild to moderate knee osteoarthritis are eligible. In addition, patients who volunteered to participate in the study were included in it.

Exclusion criteria

Patients with psychiatric disorders or other bone diseases will be excluded from the study. Also, the patient who had a history of knee surgery in the last six months was excluded from the study. Osteoarthritis patients with diseases, namely heart diseases, tuberculosis, and the habit of drug addiction, were excluded from the study.

Selection of the subjects (OA patients)

The present study analysed the effects of selective Hatha Yoga practices on osteoarthritis patients in the Solan district of Himachal Pradesh. A total of 127 patients, both male and female, were selected from the District Ayurvedic Hospital, Solan, Himachal Pradesh. 127 subjects between the ages of 45 and 75 are included in the sample at random after demonstrating their willingness to participate in the study. The subjects were divided into two groups: yoga (N = 67; experimental) and control (N = 61). For three months, the experimental group engaged in yogic intervention through selective Hatha Yoga practices for 40 minutes per day. On the other hand, the control group did not receive any selective practice or instruction. They only take medications and general care prescribed by doctors. The written permission and approval were taken from the District Ayurvedic Hospital, Solan, Himachal Pradesh. In addition, written and oral consent was also obtained from the subjects at the beginning of the study after explaining the purpose of the study in detail.

Hatha Yoga Practices

These Selective Hatha Yoga practices were introduced to patients with knee OA for the duration of 3 months. The experimental group performed selective Hatha Yoga practices which include 7 asanas and 2 pranayamas. The Hatha Yoga practices are: Trikonasana, Janusirshasana, Paschimottanasana, Upavishatakonasana, Shalabhasana, Uttanapadasana, Shavasana, Nadishodhana Pranayama and Suryabhedana Pranayama. In the first month 30 minutes of intervention was given and in the second and third month 40 minutes of intervention was given. In the first month, patients performed all the asana practices one time. Whereas, patients did five rounds of Nadishodhana Pranayama and seven rounds of Suryabhedana Pranayama. In the second and third month, patients performed all the asana practices twice. Whereas, seven rounds of Nadishodhana Pranayama and nine rounds of Suryabhedana Pranayama were performed by patients. The details of all the selective Hatha Yoga practices are given in the table 1 and 2.

Measures

Outcome measures included physical functioning, role limitation due to physical health, pain, and general health, which were assessed using the Short Form 36 Health Survey Questionnaire (SF36). The SF-36

Questionnaire measures both physical and mental component summary scales. Physical functioning, role limitations due to physical health, pain, and general health parameters all aid in the assessment of the physical health component in osteoarthritis patients.

Statistical Analysis

Descriptive statistics were calculated for both the experimental and control groups, including means, mean differences, standard deviations, t-values, and significance levels. These results are presented in two comparative tables. To assess the effectiveness of the intervention, an independent t-test was conducted to compare baseline and post-intervention outcomes between the two groups. Additionally, paired t-tests were used within each group to examine changes over the 12-week period. Data analysis was carried out using the Statistical Package for the Social Sciences (SPSS), Version 20. A p-value of 0.05 or less was considered statistically significant for all tests.

RESULTS

A total of 127 potential participants met the inclusion criteria and were eligible for the study. Recruitment took almost two months. 27 patients dropped out due to some personal reasons. From the experimental group 17 and from the control group 11 subjects drop the study. Hence, the results presented here are of the 100 subjects who completed the study. Data were collected two time points (baseline and 12 weeks). The selective Hatha Yoga practices for the experimental group are listed in results tables below.

Physical Health

Table 1: Physical functioning in Experimental and Control group.

Physical functioning			
Test	**Group**	**Mean**	**SD**
Pre data	Experimental Group	30.25	28.34
	Control Group	38.15	25.49
Post data	Experimental Group	47.90	27.28
	Control Group	47.50	27.06
Pre data	Experimental Group	30.25	28.34
Post data		47.90	27.28
Pre data	Control Group	38.15	25.49
Post data		47.50	27.06

Table 2: Descriptive analysis table of Physical functioning in Experimental and Control group

Descriptive analysis (Physical functioning)				
	Mean diff	**SD**	**t**	**Sig.**
Pre data Experimental- Pre data Control	7.9	4.89	5.112	.001
Post data Experimental- Post data Control	0.400	5.66	0.223	.828
Pre data –Post data Experimental group	17.65	7.60	7.336	0.00
Pre data -Post data Control group	9.35	8.12	3.639	0.005

Tables 1 and 2 show the baseline and post values for the experimental and control groups, respectively. These tables indicate the significant improvement in physical functioning in the experimental group from 30.25±28.34 to 47.90±27.28 (p<0.05) and in the control group from 38.15±25.49 to 47.50±27.06 (p<0.05). The mean difference in the experimental group is 17.65±7.60 and in the control group it is 9.35±8.12. The mean difference in the experimental group is greater than the control group, which indicates that the experimental group showed better results in physical functioning than the control group.

Table 3: Role limitations due to Physical Health in Experimental and Control group

	Role limitations due to Physical Health		
Test	**Group**	**Mean**	**SD**
Pre data	Experimental Group	42.50	9.98
	Control Group	48.50	7.54
Post data	Experimental Group	73.00	7.74
	Control Group	73.55	4.53
Pre data	Experimental Group	42.50	9.98
Post data		73.00	7.74
Pre data	Control Group	48.50	7.54
Post data		73.55	4.53

Table 4: Descriptive analysis table of Role limitations due to Physical Health in Experimental and Control group

	Descriptive analysis (Physical Health)			
	Mean diff	**SD**	**t**	**Sig.**
Pre data Experimental- Pre data Control	6.00	6.73	1.782	1.73
Post data Experimental - Post data Control	0.550	10.71	0.103	0.925
Pre data -Post data Experimental group	30.50	10.24	5.953	0.001
Pre data -Post data Control group	25.05	3.77	13.25	0.001

The table 3 and 4 shows the pre (base-line) and post values of Experimental group and Control group. These tables indicate the significant improvement in Role limitation due to physical health of Experimental group from 42.50 ± 9.98 to 73.00 ± 7.74 ($p<0.05$) and in Control group from 48.50 ± 7.54 to 73.55 ± 4.53 ($p<0.05$). The mean difference in the experimental group is 30.50 ± 10.24 and in the control group it is 25.05 ± 3.77. The mean difference in the experimental group is greater than the control group, which indicates that the experimental group showed better improvement in role limitation due to physical health than the control group.

Table 5: Pain in Experimental and Control group.

	Pain		
Test	**Group**	**Mean**	**SD**
Pre data	Experimental Group	41.75	5.30
	Control Group	44.30	6.64
Post data	Experimental Group	61.85	6.57
	Control Group	54.45	5.72
Pre data	Experimental Group	41.75	5.30
Post data		61.85	6.57
Pre data	Control Group	44.30	6.64
Post data		54.45	5.72

Table 6: Descriptive analysis table of Pain in Experimental and Control group

Descriptive analysis (Pain)	Mean diff	SD	t	Sig.
Pre data Experimental- Pre data Control	2.55	1.34	2.684	0.227
Post data Experimental - Post data Control	7.40	0.84	12.333	0.052
Pre data -Post data Experimental group	20.10	1.27	22.333	0.028
Pre data -Post data Control group	10.15	0.91	15.615	0.041

The table 5 and 6 shows the pre (base-line) and post values of experimental group and control group. These tables indicate the significant improvement in pain in experimental group from 41.75±5.30 to 61.85±6.57 (p<0.05) and in control group from 44.30±6.64 to 54.45±5.72 (p<0.05). The mean difference in the experimental group is 20.10±1.27 and in the control group it is 10.15±0.91. The mean difference in the experimental group is much greater than the control group, which indicates that the experimental group showed better improvement in pain than the control group. The post data values were more than their pre data values in both the groups however; experimental group showed more significant improvement as compared with the control group value.

Table 7: General Health in Experimental and Control group.

General Health			
Test	Group	Mean	SD
Pre data	Experimental Group	25.41	6.47
	Control Group	28.00	6.70
Post data	Experimental Group	44.75	9.16
	Control Group	35.08	7.31
Pre data	Experimental Group	25.41	6.47
Post data		44.75	9.16
Pre data	Control Group	28.00	6.70
Post data		35.08	7.31

Table 8: Descriptive analysis table of General Health in Experimental and Control group

Descriptive analysis (General Health)	Mean diff	SD	t	Sig.
Pre data Experimental- Pre data Control	2.58	4.61	1.370	0.229
Post data Experimental- Post data Control	9.66	9.00	2.628	0.047
Pre data -Post data Experimental group	19.33	3.37	14.046	0.001
Pre data -Post data Control group	7.08	5.06	3.426	0.019

The table 7 and 8 shows the baseline and post values of experimental group and control group. These tables indicate the significant improvement in general health in experimental group from 25.41±6.47 to 44.75±9.16 (p<0.05) and in control group from 28.00±6.70 to 35.08±7.31 (p<0.05). The mean difference in the experimental group is 19.33±3.37 and in the control group it is 7.08±5.06. The mean difference in the experimental group is much greater than the control group, which indicates that the experimental group showed better improvement in general health than the control group.

Mental Health

Baseline and post-intervention values for the experimental and control groups are summarized in the following tables to illustrate the changes observed over the study period.

Table 9: Role limitations due to Emotional Problems in Experimental and Control group.

Role limitations due to Emotional Problems			
Test	**Group**	**Mean**	**SD**
Pre data	Experimental Group	48.66	8.08
	Control Group	50.00	8.71
Post data	Experimental Group	82.00	0.00
	Control Group	76.00	8.00
Pre data	Experimental Group	48.66	8.08
Post data		82.00	0.00
Pre data	Control Group	50.00	8.71
Post data		76.00	8.00

Table 10: Descriptive analysis table in Role limitations due to Emotional Problems in Experimental and Control group

Descriptive analysis (Emotional Problems)				
	Mean diff.	SD	t	Sig.
Pre data Experimental- Pre data Control	1.33	10.26	0.225	0.843
Post data Experimental- Post data Control	6.00	8.00	1.299	0.324
Pre data- post data Experimental group	33.33	8.08	7.143	0.019
Pre data- post data Control group	26.00	3.46	13.000	0.026

*Significant at 5%

Tables 09 and 10 indicate the significant improvement in Role limitation due to emotional problems of Experimental group from 48.66±8.08 to 82.00±0.00 and in Control group from 50.00±8.71 to 76.00±8.00. The t value of pre data- post data in Experimental group is 7.143 (0.019) and t value of pre data- post data in Control group is 13.000 (0.026). The mean difference in the experimental group is 33.33±8.08 and in the control group it is 26.00±3.46. The mean difference in the experimental group is much greater than the control group, which indicates that the experimental group showed better improvement in Role limitations due to Emotional Problems than the control group.

Table 11: Emotional well-being in Experimental and Control group

Emotional well-being			
Test	**Group**	**Mean**	**SD**
Pre data	Experimental Group	56.20	17.68
	Control Group	58.40	14.97
Post data	Experimental Group	82.00	0.00
	Control Group	76.00	8.00
Pre data	Experimental Group	56.20	17.68
Post data		81.10	10.87
Pre data	Control Group	58.40	14.97
Post data		61.80	14.51

Table 12: Descriptive analysis table of Emotional well-being in Experimental and Control group

Descriptive analysis (Emotional well-being)				
	Mean diff.	SD	t	Sig.
Pre data Experimental- Pre data Control	2.20	3.23	1.522	0.203
Post data Experimental- Post data Control	19.30	5.21	8.275	0.001
Pre data -Post data Experimental group	24.90	7.72	7.208	0.002
Pre data -Post data Control group	3.40	1.51	5.013	0.007

*Significant at 5%

The table 11 and 12 shows the pre (base-line) and post values of Experimental group and Control group. These tables indicate the significant improvement in Emotional well-being in Experimental group from 56.20±17.68 to 81.10±10.87 and in Control group from 58.40±14.97 to 61.80±14.51. The t value of pre data- post data in Experimental group is 7.208 (0.002) and t value of pre data- post data in Control group is 5.013 (0.007). The mean difference in the experimental group is 24.90±7.72 and in the control group it is 3.40±1.51. The mean difference in the experimental group is much greater than the control group, which indicates that the experimental group showed better improvement in Emotional well-being than the control group.

Table 13: Social functioning in Experimental and Control group

Social functioning			
Test	Group	Mean	SD
Pre data	Experimental Group	43.75	3.18
	Control Group	51.00	0.00
Post data	Experimental Group	70.00	1.41
	Control Group	57.75	1.76
Pre data	Experimental Group	43.75	3.18
Post data		70.00	1.41
Pre data	Control Group	51.00	0.00
Post data		57.75	1.76

Table 14: Descriptive analysis table of Social functioning in Experimental and Control group

Descriptive analysis (Social functioning)				
	Mean diff.	SD	t	Sig.
Pre data Experimental- Pre data Control	7.25	3.18	3.222	0.192
Post data Experimental- Post data Control	12.25	0.35	49.000	0.013
Pre data- post data Experimental group	26.25	4.59	8.077	0.058
Pre data- post data Control group	6.75	1.76	5.400	0.017

* Significant at 5%

The table 13 and 14 shows the pre (base-line) and post values of Experimental group and Control group. The Experimental group indicates the significant improvement in Social Functioning from 43.75±3.18 to 70.00±1.41. However the control group also showed significant improvement in Social Functioning which is from 51.00±0.00 to 57.75±1.76. The t value of pre data- post data in Experimental group is 8.077 (0.05) and t value of pre data- post data in Control group is 5.400 (0.017). The mean difference in the experimental group is 26.25±4.59 and in the control group it is 6.75±1.76. The mean difference in the experimental group is much greater than the control group, which indicates that the experimental group showed better improvement in Social functioning than the control group.

Table 15: Energy/ fatigue in Experimental and Control group

Energy/ fatigue			
Test	**Group**	**Mean**	**SD**
Pre data	Experimental Group	30.87	3.96
	Control Group	36.60	6.60
Post data	Experimental Group	60.37	2.39
	Control Group	45.00	4.41
Pre data	Experimental Group	30.87	3.96
Post data		60.37	2.39
Pre data	Control Group	36.60	6.60
Post data		45.00	4.41

Table 16: Energy/ fatigue in Experimental and Control group

Descriptive analysis (Energy/ fatigue)				
	Mean diff.	**SD**	**t**	**Sig.**
Pre data Experimental- Pre data Control	5.72	3.45	3.310	0.045
Post data Experimental- Post data Control	15.37	5.10	6.023	0.009
Pre data- post data Experimental group	29.50	4.30	13.717	0.001
Pre data- post data Control group	8.40	3.83	4.376	0.022

*Significant at 5%

The table 15 and 16 shows the pre (base-line) and post values of Experimental group and Control group. These tables indicate the significant improvement in Energy/ Fatigue in Experimental group from 30.87±3.96 to 60.37±2.39 and in Control group from 36.60±6.60 to 45.00±4.41. The t value of pre data- post data in Experimental group is 13.717 (0.001) and t value of pre data- post data in Control group is 4.376 (0.022). The mean difference in the experimental group is 29.50±4.30 and in the control group it is 8.40±3.83. The mean difference in the experimental group is much greater than the control group, which indicates that the experimental group showed better improvement in Energy/ Fatigue than the control group.

CONCLUSION

Public health has recently placed a greater emphasis on mental health, recognizing its crucial role in overall wellbeing. Osteoarthritis (OA), though primarily a degenerative joint disorder, significantly impacts daily functioning and is often linked to emotional distress, including stress and depression. The management of OA, therefore, becomes essential not only for individual patients but also for broader public health strategies. This study examined the relationship between knee OA and physical & mental health across both genders. The study demonstrates that a 12-week program of selective Hatha Yoga practices, when combined with standard medication, is both effective and safe for managing knee osteoarthritis. The intervention significantly improved various aspects of physical health, including enhanced physical functioning, reduced pain and stiffness, and better general health status. These yoga practices provided measurable gains in mobility and joint comfort, making them a valuable non-invasive addition to conventional OA treatments. Notably, no adverse effects were reported, affirming the safety and practicality of incorporating yoga into therapeutic routines for OA patients.

In addition to its physical benefits, this research reflects the growing emphasis in public health on mental wellbeing. Osteoarthritis, while primarily a musculoskeletal condition, often has profound implications on daily life. It is frequently associated with stress, emotional distress, and depressive symptoms. The close connection between osteoarthritis and mental health reinforces the need for holistic management strategies that consider both physical and psychological dimensions. By alleviating pain and physical limitations, the yoga intervention likely contributed to improved emotional balance and overall quality of life.

This study also examined mental health outcomes in patients of both genders, recognizing that chronic physical illness impacts emotional resilience and cognitive wellbeing. The inclusion of pranayama and meditative techniques within the Hatha Yoga framework appears to have enhanced these psychological benefits, offering participants greater self-awareness and inner calm.

Thus, practicing Hatha Yoga for twelve weeks alongside regular medication wasn't just helpful, it made a real difference. Patients moved better, felt less pain, and, just as importantly, felt more like themselves again. What started as a physical intervention seemed to ripple out, easing not just stiffness in the joints but also the emotional weight that comes with chronic pain. This approach, rooted in movement and breath, offers more than symptom relief; it offers a path toward holistic recovery. For anyone managing knee osteoarthritis, yoga isn't just an add-on, it's a vital part of a more compassionate, integrated care plan.

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