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An Experimental Study To Identify The Role Of Meridian Points With Specific Exercise Program In Managing Knee Pain And Mobility

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ABSTRACT

Background:The prevalence of knee pain has markedly increased in recent years, largely driven by rising cases of knee osteoarthritis (OA), a degenerative condition that significantly impairs mobility and quality of life. Traditional interventions, including pharmacotherapy, physiotherapy, and surgical procedures such as total knee arthroplasty (TKA), often fall short in providing long-term relief. Additionally, systemic factors like osteoporosis, hormonal imbalances, and pelvic floor dysfunction—particularly among women—further exacerbate joint deterioration and functional limitations.

Objective:This study aimed to evaluate the effectiveness of an integrative rehabilitation model combining physiotherapeutic exercise with acupressure-based stimulation of specific meridian points and pelvic plexuses (notably the Iliohypogastric Plexus, also referred to as the Muladhara or Root Chakra), in reducing pain and improving function in individuals with knee osteoarthritis.

Methods:A total of 60 participants diagnosed with knee OA were randomly assigned into two equal groups (n=30 each): Group I (Exercise-only) and Group II (Exercise + Acupressure). Both groups were assessed pre- and post-intervention using the Visual Analog Scale (VAS) for pain and the Knee Injury and Osteoarthritis Outcome Score (KOOS) for function. Group II received acupressure at points ST36, ST35, SP9, and SP10, as well as stimulation of pelvic-associated energy centers.

Results:Both groups demonstrated statistically significant improvements post-treatment; however, Group II showed superior outcomes. VAS scores in Group II dropped from 5.79 ± 2.13 to 0.79 ± 0.77 ($p<0.001$), and KOOS scores improved dramatically from 45.31 ± 15.71 to 3.81 ± 4.55 ($p<0.001$). Improvements were consistent across age and gender subgroups. Right-sided knee involvement was predominant, and occupational patterns suggested a correlation between repetitive tasks and symptom onset. Group II's enhanced outcomes may be attributed to neurophysiological and energetic modulation via acupressure.

Conclusion:This study highlights the potential of a hybrid intervention incorporating acupressure and physiotherapy in managing knee OA. Specifically, targeting acupoints and pelvic plexuses may offer synergistic benefits by addressing both local joint dysfunction and proximal biomechanical imbalances. While the findings are promising, further research with larger populations and imaging-based outcome measures is needed to explore long-term structural effects and validate the physiological mechanisms underlying acupressure-based therapies.

Keywords: Knee osteoarthritis, Acupressure, Physiotherapy, Pelvic floor, Root Chakra, Iliohypogastric plexus, VAS, KOOS, Integrative therapy

1. INTRODUCTION

Knee osteoarthritis (OA) is a leading cause of chronic pain and functional limitation, with a growing incidence across both aging and middle-aged populations. While mechanical wear and traumatic injuries contribute significantly, systemic factors such as osteoporosis, hormonal imbalances, and pelvic floor dysfunction—especially in women—have also been implicated in the progression of knee degeneration. Traditional management strategies, including pharmacological agents, physiotherapy, and surgical interventions like total knee arthroplasty (TKA), often yield inconsistent outcomes and fail to address the multifactorial origins of knee dysfunction.

Recent advances in integrative medicine have encouraged the exploration of Eastern therapeutic practices, including acupressure and meridian-based interventions, as complementary approaches to conventional physiotherapy. Acupressure techniques targeting specific points—such as ST36, ST35, SP9, and SP10—along with stimulation of the Iliohypogastric Plexus (Root Chakra), have shown promise in alleviating musculoskeletal pain and improving neuromuscular coordination. This study investigates the combined effect of targeted exercises and acupressure-based interventions on pain and function in individuals with knee OA, aiming to provide a more holistic and sustainable treatment model.[iiiiii]

BACKGROUND

Knee osteoarthritis (OA) is a leading contributor to chronic pain, disability, and reduced quality of life, with its incidence steadily rising across both elderly and middle-aged populations. While traditionally considered a degenerative condition associated with aging and mechanical wear, emerging evidence highlights a multifactorial etiology involving hormonal imbalances, osteoporosis, neuromuscular dysfunction, and pelvic floor instability—particularly in women.[iv]

Conventional treatments such as physiotherapy, pharmacological management, and total knee arthroplasty (TKA) are widely used, yet often fall short in delivering lasting relief. Many patients report persistent pain and functional limitations even post-surgery, indicating the need for more comprehensive and integrative treatment approaches that address both structural and systemic dysfunctions.[v]

In recent years, integrative rehabilitation strategies combining modern physiotherapy with principles from Eastern medicine have gained attention. Acupressure, rooted in Traditional Chinese Medicine (TCM), targets specific meridian points believed to influence musculoskeletal and systemic health. When combined with exercise-based rehabilitation, such approaches may enhance neuromuscular control, alleviate pain, and improve joint function.[vi]

This study explores the effectiveness of a hybrid intervention model that integrates acupressure with therapeutic exercises. Special emphasis is placed on stimulating the Inferior Hypogastric Plexus, or Root Chakra (Muladhara), which is anatomically linked to the pelvic floor and lower limb mechanics. By addressing both local knee pathology and proximal contributors such as pelvic instability, this model aims to provide a more holistic and sustainable solution for individuals suffering from knee OA.[vii]

Objectives

To evaluate the effectiveness of an integrated treatment approach combining physiotherapy exercises with acupressure techniques in reducing knee pain and improving functional outcomes in individuals with knee osteoarthritis.

To compare the outcomes of conventional exercise-based physiotherapy alone versus a combined intervention of acupressure and exercise using standardized tools such as the Visual Analog Scale (VAS) for pain and the Knee injury and Osteoarthritis Outcome Score (KOOS) for functional assessment.

To investigate the role of specific acupressure points (e.g., ST36, ST35, SP9, SP10) and stimulation of the Inferior Hypogastric Plexus (Muladhara/Root Chakra) in enhancing neuromuscular control and pelvic floor stability as a means to alleviate knee joint stress.

To assess the impact of the integrative approach across different demographic subgroups, particularly with respect to age and gender, in order to identify population-specific trends in treatment responsiveness.

To explore the potential of bridging Eastern and Western therapeutic philosophies in the management of chronic musculoskeletal disorders, with a focus on knee osteoarthritis.

Research Question

Does the integration of acupressure targeting specific meridian points and the Inferior Hypogastric Plexus (Root Chakra) with conventional physiotherapy exercises result in greater pain reduction and functional improvement in individuals with knee osteoarthritis compared to physiotherapy exercises alone?

Hypothesis

Null Hypothesis (H_0):

There is no significant difference in pain reduction and functional improvement between individuals with knee osteoarthritis treated with physiotherapy exercises alone and those treated with a combination of acupressure and physiotherapy exercises.

Alternative Hypothesis (H_1):

Individuals with knee osteoarthritis treated with a combination of acupressure and physiotherapy exercises will show significantly greater pain reduction and functional improvement compared to those treated with physiotherapy exercises alone.

Definition of study subjects: male and female age between 20-60 with knee pain and tenderness from at least last 2-3 months or more are taken for this study with no underlying condition or pathology mentioned in exclusion criteria. All the subjects are taken with prior information and consent.

2. INCLUSION CRITERIA

Pain and tenderness in knee for at least 3 month or reoccurring.

Informed consent or volunteer.

Age: 20-60 years.

3. EXCLUSION CRITERIA

Unhealed Fracture

Progressive Neurological Disorders.

Pregnancy, Open Wound.

Cancer, Bone Tumor

STUDY SAMPLE DESIGN – Purposive sampling method.

SAMPLE SIZE – 60

Follow up: once a week for 3 weeks.

Parameters used for comparison and statistical analysis used: Paired t -test

Duration of study: 12 weeks

METHODOLOGY: Total 60 subjects are taken age between 20-60 with knee pain and tenderness then dividing into two groups of 30. Both the groups are treated with specific exercise program but GROUP B with meridian points

Group A: Treated with specific exercise program 4 weeks then on follow up every once a week for 3 weeks.

Group B: Treated with specific exercise program along with stimulating meridian points for 4 weeks then on follow up every once a week for 3 weeks. Treatment duration: 30-35 minutes per session.

OUTCOME MEASURE

Visual Analogue Scale (VAS)

The Visual Analogue Scale is a widely used tool for assessing the intensity of pain experienced by patients. It consists of a straight line measuring 100 millimeters, on which the patient marks their pain level—ranging from no pain at one end to the most severe pain imaginable at the other. The measurement is then categorized into four levels of pain severity:

Mild Pain: 0–4 mm

Moderate Pain: 5–44 mm

Severe Pain: 75–100 mm.

Knee Injury and Osteoarthritis Outcome Score (KOOS)

The KOOS questionnaire is designed to evaluate the short- and long-term impact of knee injuries and osteoarthritis on a patient's daily life. It is a self-administered tool that captures the patient's perspective across five specific domains:

Pain – 9 items

Symptoms – 7 items

Activities of Daily Living (ADL) – 17 items

Function in Sports and Recreation – 5 items

Knee-Related Quality of Life (QOL) – 4 items

PROCEDURE

A total of 60 subjects were selected based on the inclusion and exclusion criteria, with informed consent obtained. Participants were randomly divided into two equal groups (n = 30 each).

GROUP A (Control Group): traditional generalized physiotherapy protocol

Exercises | Intensity and Frequency

[Week 1–Week 4]

Ankle pumps – 10 to 30 reps

Quadriceps isometric – 5 reps (3 sec hold) to 20 reps (5 sec hold)

Glutes isometric – 5 reps (3 sec hold) to 20 reps (5 sec hold)

Straight leg raises in supine – 10 reps (3 sec hold, active-assisted) to 20 reps (5 sec hold, with resistance)

Adductor isometric in supine – 10 reps (3 sec hold) to 20 reps (5 sec hold)

Abductor isometric – 10 reps (3 sec hold) to 20 reps (5 sec hold)

Clamshells in side line – 10 reps (3 sec hold) to 20 reps (5 sec hold, with resistance)

Hip extension in prone – 10 to 20 reps (with resistance)

Knee flexion-extension in high sitting – 10 reps (active-assisted) to 20 reps (active with resistance)

Heel and toe raise – 10 to 20 reps

Wall squats – 5 to 20 reps

Side, front, and back walk – 5 rounds of 10 steps to 10 rounds of 5 steps

Cycling – 5 to 15 minutes

Stair climbing – introduced after 4 weeks, mild to moderate intensity

GROUP B (Acupressure Group):

Patient-specific protocol including the same exercise program as Group A, along with stimulation of points related to the **Muladhara chakra or Iliohypogastric plexus**. Acupressure was applied using the thumb (therapist or patient), with **mild pressure** for **30–90 seconds** per point.

Points used:

Bladder 60, Large Intestine 5, Kidney 2, Lung 10, Stomach 41, Gall Bladder 38, Spleen 2, Liver 2, Triple Heater 6, Small Intestine 5, Pericardium 5, Small Intestine 1, Heart 1.

Results & Tables

Table 1: Gender-wise Distribution

Gender	Group I	%	Group II	%
Female	14	46.67%	15	50.00%
Male	16	53.33%	15	50.00%

Total	**30**	**100.00%**	**30**	**100.00%**

Table 2: Age-wise Distribution

Age group (yrs)	Group I	%	Group II	%
21-30	5	16.67%	-	0.00%
31-40	16	53.33%	3	10.00%
41-50	5	16.67%	14	46.67%
51-60	4	13.33%	13	43.33%
Total	**30**	**100.00%**	**30**	**100.00%**

Table 11: VAS Scores (Mean ± SD)

Group	Pre VAS	Post VAS	p-value
Group I	6.48 ± 1.51	4.75 ± 2.03	<0.001
Group II	5.79 ± 2.13	0.79 ± 0.77	<0.001

Table 16: KOOS Scores (Mean ± SD)

Group	Pre KOOS	Post KOOS	p-value
Group I	59.31 ± 14.39	43.05 ± 13.90	<0.001
Group II	45.31 ± 15.71	3.81 ± 4.55	<0.001

Graph 1: Pre vs Post VAS Scores

Group I: Decrease from 6.48 to 4.75

Group II: Decrease from 5.79 to 0.79

Graph 2: Pre vs Post KOOS Scores

Group I: Decrease from 59.31 to 43.05

Group II: Decrease from 45.31 to 3.81

Key Findings

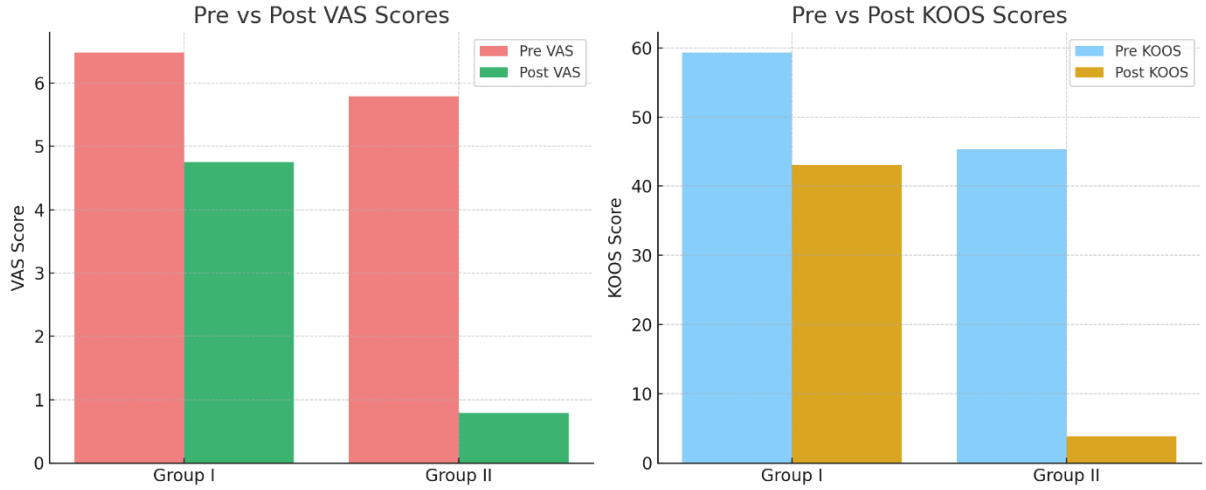
Gender distribution was nearly equal in both groups.

Group II had a relatively older population.

Group II demonstrated significantly greater improvement in VAS and KOOS scores.

Acupressure combined with physiotherapy yielded superior outcomes versus physiotherapy alone.

Graphs are provided below for visual comparison of VAS and KOOS score changes



4. DISCUSSION

The increasing incidence of knee pain has prompted a growing focus on both traditional and contemporary therapeutic interventions. Among the various etiologies, knee osteoarthritis (OA) stands out as one of the most prevalent causes, contributing significantly to disability and impaired quality of life in affected individuals. Over the past decade, the rising burden of OA has led to a notable increase in surgical solutions, particularly total knee arthroplasty (TKA). While such procedures are often recommended in advanced cases, post-operative dissatisfaction and lingering pain among many patients suggest a need for more comprehensive, sustainable strategies that address not only structural damage but also functional and energetic imbalances.[viii]

Furthermore, knee pain is not solely the result of injury or cartilage wear. Systemic conditions such as osteoporosis—which compromises bone strength—also play a crucial role, and their prevalence is expanding beyond the elderly to include middle-aged populations. Hormonal disturbances, especially in women due to menopause, PCOD, and PCOS, further compromise musculoskeletal integrity, contributing indirectly to degenerative changes in the knee joint. These observations highlight the multifactorial nature of knee pain, where mechanical, hormonal, neurological, and metabolic factors intersect.[ix]

Although conventional physiotherapeutic modalities, pharmacological agents, and surgical methods form the cornerstone of musculoskeletal rehabilitation, these approaches often fail to deliver long-term relief across a broad patient base. Importantly, many patients continue to report persistent pain and reduced mobility even after undergoing surgical procedures like TKA. This discrepancy points to the need for a treatment framework that not only addresses local joint pathology but also restores systemic harmony and functional coordination between interconnected body regions.[x]

Integration of Eastern Medicine in Orthopedic Rehabilitation

In response to the limitations of mainstream interventions, this study adopted an integrative model combining Western physiotherapy with Eastern medical practices, specifically focusing on acupressure and meridian theory. Acupressure, derived from the principles of Traditional Chinese Medicine (TCM), targets specific points along meridians—energy pathways believed to regulate organ and musculoskeletal functions. These points, when stimulated, can help correct energy imbalances, alleviate muscle stiffness, enhance blood flow, and promote healing.[xi]

Previous studies have reported the benefits of acupuncture and acupressure in reducing pain intensity and improving joint function, even among patients who did not respond adequately to conventional therapies. Our study builds upon these findings by combining acupressure with a structured exercise regimen aimed at restoring muscle strength, flexibility, and biomechanical alignment.[xii]

The choice to incorporate points related to the Inferior Hypogastric Plexus—also referred to as the Muladhara or Root Chakra in Eastern philosophy—was based on the understanding that pelvic floor dysfunction can lead to instability in the lower limbs. Since the pelvic muscles, particularly gluteals, sartorius, and hip stabilizers, anchor and influence knee joint mechanics, any weakness or imbalance in these structures can result in compensatory stress and eventual degeneration of the knee joint. By focusing treatment on both the symptomatic joint and the contributing proximal regions, the intervention aimed to achieve a more holistic and lasting resolution of symptoms.[xiii]

Key Findings and Their Implications

The results from the present study reinforce the effectiveness of this integrative treatment model. While both groups (exercise-only and exercise-plus-acupressure) demonstrated significant improvements in pain reduction and functional scores, Group B (acupressure + exercise) showed statistically superior outcomes across multiple parameters, including VAS (Visual Analog Scale) for pain and KOOS (Knee Injury and Osteoarthritis Outcome Score) for joint function and quality of life.[xivxv]

These findings suggest that acupressure provides additional therapeutic benefit beyond physical exercise alone, likely due to its influence on neurophysiological mechanisms such as gate control theory, central pain modulation, and autonomic nervous system regulation. Moreover, the patient-specific nature of acupoint selection, based on meridian pathways and individual complaints, adds a level of precision that generic exercise protocols often lack.

Gender and age subgroup analysis also revealed interesting trends. For instance, women—particularly in older age groups—responded more favorably to acupressure-based interventions, possibly due to the compounded effect of hormonal imbalances and pelvic floor weakening. This further strengthens the case for targeting chakra or plexus regions as part of individualized knee pain rehabilitation.[xvi]

Bridging Traditional Wisdom and Modern Science

The integration of chakra theory, particularly the Root Chakra, with anatomical understanding of the inferior hypogastric plexus, represents a step toward aligning traditional healing systems with biomedical science. While scientific validation of chakra energy systems remains limited, accumulating anatomical and clinical evidence suggests a correlation between these energy centers and neural or fascial plexuses. Targeting such zones may influence musculoskeletal coordination, proprioception, and pain perception at both central and peripheral levels.[xvii]

This study, therefore, demonstrates that blending traditional Eastern frameworks with evidence-based physiotherapy offers a promising direction for managing complex, chronic conditions like knee osteoarthritis. It opens the door to a more inclusive, multidimensional rehabilitation model that respects the bio-psycho-social intricacies of each patient.

5. CONCLUSION

In recent years the incidence and prevalence of knee pain is significantly increased especially in female population as increasing pelvic floor prolapse is contributing to knee pain and hence increasing osteoarthritis in long run. Pain and tenderness are very common symptoms seen in osteoarthritis population and limitations seen in activities of daily living gets hindered by the pain and tenderness. All the conventional treatment methods whether physiotherapy or medicines focuses on reducing pain and tenderness which helps in facilitating activities of daily living. Many recent studies done using acupuncture points showed a significant reduction in pain and tenderness. Many practitioners especially from Singapore and China practice acupuncture points using moxibustion, stimulation, kneading and needling in their regular practices and recorded significant changes in reducing pain and tenderness.

Also, many recent studies proved the presence of acupoints anatomically and physiologically along with providing more evidence for chakra system which are referred as plexuses in human body. In this study we are taking Iliohypogastric plexus also known as Muladhara Chakra or Root Chakra, which is known to control pelvic floor and sciatic nerve. Hence, indirectly controlling knee as pelvic floor muscle failure is a major cause of knee pain which is evidently proven in many studies. Also, all the major muscles arise from pelvic and hip complex such as gluteal muscles, sartorius etc. Failure of any of these muscles can cause osteoarthritis due to biomechanical region.

Therefore, through this study we are trying to manage knee pain with balancing Root Chakra or Iliohypogastric plexus and activation and balancing muscles through exercises.

All the subjects taken for study were selected as per the inclusion and exclusion criteria, after randomly dividing all subjects into two groups—control group and acupressure group. Both groups were treated according to procedure: control group with exercises and acupressure group with acupoints and exercises. All the post recordings were done and both groups showed reduction in pain and tenderness. However, significant reduction in pain and tenderness is seen in Group 2, the acupressure group.

It can be concluded that acupoints help in reducing pain and tenderness, especially when done specifically such as Root Chakra points for knee pain. Further studies with more population are required to strengthen the claim and also, there isn't any supporting evidence to prove changes in other symptoms such as degeneration, arthritic changes, joint space and regeneration of cartilage. Future studies should be done to rule more connections between acupoints and physiology involved behind it.

6. LIMITATIONS

The study was limited to a small sample size of 60 participants, which may affect the generalizability of the findings.

The duration of the intervention was short, and long-term effects of acupressure combined with exercise were not assessed.

Only specific acupressure points were targeted; the effect of other potential points remains unexplored.

Subjective assessment tools such as VAS and KOOS were used, which might be influenced by patient perception.

The study lacked imaging or laboratory-based outcome measures to evaluate structural or biochemical changes.

7. RECOMMENDATIONS

Future studies should involve a larger and more diverse sample to validate the findings across different populations.

Longitudinal studies should be conducted to observe the sustainability of the treatment effects.

Use of advanced diagnostic tools such as MRI or ultrasound can help track structural joint changes.

Exploration of additional acupressure points and chakra-related interventions could provide a broader therapeutic scope.

Studies comparing different forms of acupressure techniques (manual, electrical, moxibustion) may yield deeper insights into efficacy and mechanisms.

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