



ORIGINAL ARTICLE

# Effectiveness of acupressure versus isometric exercise on pain, stiffness, and physical function in knee osteoarthritis female patients



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## ABSTRACT

Osteoarthritis (OA) is the most common form of arthritis and a leading cause of disability in older adults. Conservative non-pharmacological strategies, particularly exercise, are recommended by clinical guidelines for its management. The aim of this study was to assess the effectiveness of acupressure versus isometric exercise on pain, stiffness, and physical function in knee OA female patients. This quasi experimental study was conducted at the inpatient and outpatient sections at Al-kasr Al-Aini hospital, Cairo University. It involved three groups of 30 patients each: isometric exercise, acupressure, and control. Data were collected by an interview form and the Western Ontario and McMaster Universities Osteoarthritis index (WOMAC) scale. The study revealed high initial scores of pain, stiffness, and impaired physical functioning. After the intervention, pain decreased in the two intervention groups compared to the control group ( $p < 0.001$ ), while the scores of stiffness and impaired physical function were significantly lower in the isometric group ( $p < 0.001$ ) compared to the other two groups. The decrease in the total WOMAC score was sharper in the two study groups compared to the control group. In multiple linear regression, the duration of illness was a positive predictor of WOMAC score, whereas the intervention is associated with a reduction in the score. In conclusion, isometric exercise and acupressure provide an improvement of pain, stiffness, and physical function in patients with knee OA. Since isometric exercise leads to more improvement of stiffness and physical function, while acupressure acts better on pain, a combination of both is recommended. The findings need further confirmation through a randomized clinical trial.

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## Introduction

Worldwide, osteoarthritis (OA) is the most common form of arthritis and a leading cause of disability in older adults [1]. It accounts for more limitations in walking, stair climbing, and other daily activities than any other disease [2]. The individual, societal, and financial burdens of this disease warrant

rigorous scientific investigation in order to identify coping strategies for those afflicted [3].

The pathology is the OA which causes body structural and functional limitations such as muscle weakness, decreased joint range of motion (ROM), joint instability, fatigue, stiffness, and pain. The consequences are activity avoidance, muscle atrophy, difficulty in performing functional tasks involving ambulation and transfer, and reduced quality of life [4]. According to the World Health Organization, about 5.5 million people suffer from OA in Egypt, representing about 7% of the population [5].

Therefore, conservative non-pharmacologic strategies, particularly exercise, are recommended by all clinical guidelines for the management of OA and meta-analyses support these exercise recommendations [6–9]. Isometric strengthening exercises and acupressure intervention are beneficial for improving pain and function [10]. An individualized approach to exercise prescription is required based on an assessment of impairments, patient preference, co-morbidities [11]. Maximizing adherence is a key element dictating success of exercise therapy. This can be enhanced by the supervised exercise sessions in the initial exercise period followed by home exercises [11,12].

Hernandez-Molina et al. [13] mentioned that therapeutic exercise, especially that incorporating specialized supervised exercise training and an element of strengthening, is an efficacious treatment for OA. Another study done by McCarthy et al. [14] found that supplementing a home-based exercise program for 8 weeks led to significantly greater improvements in locomotor function and walking pain at 12 months. The number of directly supervised exercise sessions can also influence treatment effect sizes.

Complementary and alternative medicine is commonly used to manage joint and arthritis pain among persons with knee OA [15]. Previous reviews cited evidence-based effectiveness of acupuncture for OA in reducing pain [16,17]. Acupuncture and acupressure use the same acupoints (acupuncture points, sometimes called trigger or active points) for treatment purpose, but acupuncture employs needles, while acupressure uses the fingers to press acupoints on the surface of the skin to stimulate the body's natural self-curative abilities. Traditional Chinese medicine holds that certain channels called meridians in the human body regulate the flow of vital energy (called Qi), and it is the unbalanced flow of Qi that results in disease [18].

Stimulation such as needling or pressing at the acupoints on the meridians is believed to open the channels and balance energy, thus restoring health to the body. In addition, mechanical pressure, such as massage and acupressure, has been known to decrease tissue adhesion, promote relaxation, increase regional blood circulation, increase parasympathetic nervous activity, increase intramuscular temperature, and decrease neuromuscular excitability [18].

Self-administered acupressure, if proven feasible and effective, is convenient and inexpensive. A few researchers have investigated the usefulness of acupressure for knee pain [19]. Recently, Zhang et al. [20] reported a potential positive impact on physical function and pain scores of WOMAC subscale. Mann–Whitney *U* tests indicated that physical function changes from baseline to 12 weeks were different between the acupressure and control group ( $p = 0.03$ ), with the acupressure group showing greater improvement. Another study carried out by Litscher [21] highlighted the electroencephalographic similarities of acupressure induced sedation and

general anesthesia as assessed by bispectral index and spectral edge frequency.

Preserving function, preventing disability, and managing arthritis pain represent an imposing challenge to those who care for chronically diseased patients [22]. Affordable community-based approaches geared to help OA patients would be desirable [23]. Nursing may contribute through comprehensive exercise and complementary therapy program which include supervised physical therapy and unsupervised home exercise focusing on range of motion, muscle strengthening, and endurance [24].

The aim of this study was to assess the effectiveness of acupressure versus isometric exercise on pain, stiffness, and physical function in knee OA female patients. It was hypothesized that the symptoms of pain, stiffness, and physical function in knee OA female patients improve by either acupressure or isometric exercise interventions in adherence, with no difference between the two approaches.

## Subjects and methods

### *Research design and setting*

The researchers used a quasi experimental design with pre-post assessment and control group. The study was conducted at the inpatient and outpatient sections in Al-kasr Al-Aini hospital, affiliated to Cairo University.

### *Participants*

The study involved three groups: two interventions and one control. The sample size for each group was calculated to estimate an improvement in the WOMAC score of 20% or more, with 30% standard deviation. Using Epi-Info software package, with a confidence level 95% and power 90%, the sample size required per group was calculated to be 26. This was increased to 30 to account for a dropout rate of about 10%. Women were consecutively recruited according to the following criteria: female, age 45–60 years, and diagnosed by rheumatologist as having moderate OA in one or both knees based on X-ray, no prior knee surgeries, not having any other chronic disease, pregnancy. All patients were on the same protocol of medical treatment and physiotherapy technique of hospital, which includes stretching, strengthening, and resistive exercise for quadriceps, abductors, extensors, hamstrings, and calf muscles, which are important for function. TENS to relieve pain for 20 min and ultrasound continuous to accelerate tissue repair 1.5 w/cm<sup>2</sup> for 3–5 min.

### *Data collection tool*

An interview questionnaire form was utilized to collect data. It consisted of two parts: The first part was concerned with personal data such as age, occupation, duration of illness, body weight, height, as well as patient compliance to exercise or acupressure during the program.

The second part of the tool consists of the Western Ontario and McMaster Universities Osteoarthritis index (WOMAC) scale developed by Bellamy et al. [25] to assess the symptoms of pain, stiffness, and physical function in patients with hip

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