# <u>original research</u>

# Investigation of the Therapeutic Effect and Mechanism of Holographic Meridian Scraping Therapy on Knee Osteoarthritis

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#### ABSTRACT

**Methods** • A prospective study was conducted, enrolling seventy KOA patients admitted to the Hebei Provincial Hospital of Traditional Chinese Medicine between August 2021 and April 2022. The patients were divided into two groups using the random number table method: control group (n = 35) and treatment group (n = 35). The control group received oral celecoxib capsules (100 mg, twice daily), while the treatment group received an additional daily holographic meridian scraping session (20 minutes/ day). Throughout the two-week study, the researchers continuously monitored the visual analogue scale (VAS) score, the Western Ontario and McMaster Universities Arthritis Index (WOMAC) score, and the changes in serum IL-1 $\beta$  and TNF- $\alpha$  expression.

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#### INTRODUCTION

Osteoarthritis (OA) is a degenerative joint disease that affects various joints, including the hands, knees, and hips. As of 2021, the overall prevalence of OA in China is alarmingly high, reaching 46.3%, with a higher prevalence in women (11.2%) than in men (5.6%).<sup>1</sup> Among the different

**Results** • The treatment group demonstrated significantly better overall efficiency and efficacy compared to the control group (P < .05). Both groups exhibited decreased VAS and WOMAC scores after treatment in comparison to pre-treatment levels (P < .05), with the treatment group showing lower scores than the control group after treatment (P < .05). Furthermore, serum TNF- $\alpha$  and IL-1 $\beta$  levels in both groups decreased after treatment compared to pretreatment levels within the same group (P < .05). The treatment group had significantly lower serum TNF-a and IL-1 $\beta$  levels than the control group after treatment (*P*<.05). **Conclusions** • Combining holographic meridian scraping therapy with celecoxib effectively treats KOA and significantly improves patient conditions, along with reductions in serum TNF-α and IL-1β levels. (Altern Ther Health Med. 2023;29(7):440-443).

types of OA, knee osteoarthritis (KOA) is a relatively common occurrence, often afflicting middle-aged and elderly individuals. KOA is characterized by pain, tenderness, and limited mobility.<sup>1,2</sup> A national longitudinal study revealed regional disparities in the prevalence of KOA, with a higher risk observed in rural areas.<sup>2</sup> Considering the growing elderly population in China, KOA imposes significant mental and economic burdens on a large number of elderly patients.

Holographic Meridian Scraping Therapy is an external treatment method of traditional Chinese medicine that combines the principles of traditional Chinese medicine meridian theory with modern holographic theory applied to traditional scraping therapy. In contrast to conventional scraping methods, holographic meridian scraping involves the targeted scraping of specific selected areas and acupoints, aiming to stimulate the body's disease resistance and repair abilities to achieve therapeutic results.<sup>3</sup>

However, there is limited availability of existing literature on holographic meridian scraping therapy for knee osteoarthritis. The objective of the present study was to conduct a prospective investigation into the potential benefits of holographic meridian scraping for patients with KOA.

## PATIENTS AND METHODS

#### Study Design

A total of 70 patients, aged 55 to 75 years, diagnosed with KOA according to the 2021 Guidance for Osteoarthritis Diagnosis and Treatment by the Chinese authority, were prospectively enrolled at the First Affiliated Hospital of Hebei University of Chinese Medicine between August 2021 and April 2022. The KOA cases were further imaged and classified using the Kellgren-Lawrence system.<sup>4</sup> Ethical approval for the study (approval no: HBZY2021-KY-093-01) was obtained from the First Affiliated Hospital of the Hebei University of Chinese Medicine, and informed consent was acquired from all enrolled patients.

#### Inclusion and Exclusion Criteria

Inclusion criteria were as follows: (1) patients diagnosed with KOA within the age range of 55 to 75 years; (2): admitted to the Hebei Provincial Hospital of Traditional Chinese Medicine between August 2021 and April 2022; (3) KOA diagnosis confirmed according to the 2021 Guidance for Osteoarthritis Diagnosis and Treatment published by the Chinese authority; (4) KOA cases imaged and classified using the Kellgren-Lawrence system.<sup>4</sup>

Exclusion criteria were as follows: (1) history of bone and joint surgery or trauma in the scraping area within the past 3 months; (2) severe impairment of knee joint function; (3) joint deformities evident in imaging examinations; (4) cognitive and language impairments; (5) presence of immunological disorders or undergoing chronic immunosuppressive treatment; (6) individuals on anticoagulant treatment within the last 2 weeks; (7) history of allergic reactions to holographic meridian scraping therapy; (8) discontinuation of scraping therapy in the presence of adverse effects; (9) failure to adhere to the prescribed therapy procedures; and (10) subjects with incomplete data collection or those who chose to withdraw from the study were not included in the final analysis.

#### **Treatment Regimen**

Patients were randomly assigned to the control or treatment groups comprising 35 individuals with KOA. Patients in the control group received oral celecoxib capsules (100 mg, twice daily) from Pfizer Pharmaceutical Co. (NMPA approval no. J20140072). In addition to celecoxib, patients in the treatment group underwent holographic meridian scraping applied to specific acupoints on the head, back, and hands once daily until the skin flushed and accompanied by a hot sensation.

The acupoints on the head included the upper 1/3 of the parietotemporal anterior oblique zone on the opposite side, while the acupoints on the back were located between Mingmen and Yaoyangguan. As for the hands, the acupoints on the affected side comprised the inner knee eye, outer knee eye, Heding, Liangqiu, Zusanli, Xuehai, Yinlingquan, Yanglingquan, Weiyang, Weizhong, Chengshan, and Yingu. The treatment regimen for both groups continued daily for a duration of 2 weeks. Furthermore, both groups received standard care, psychological counseling, dietary management, and health education.

#### **Evaluation of Pain and Joint Function**

Patients' pain sensation was quantified using the Visual Analog Scale (VAS), where patients marked their pain score on a scale from 0 to 10, with 0 indicating no pain and 10 representing unbearable severe pain. For the assessment of pain, stiffness, and joint function, the Western Ontario and McMaster Universities Arthritis Index (WOMAC) questionnaire was employed. This questionnaire consists of a total of 24 items, and higher scores indicate more severe conditions and poorer joint structure and function.<sup>5</sup>

#### **Measurement of Pro-inflammatory Mediators**

Blood samples were collected from the patient's cubital vein in the morning and left to stand at room temperature for 1 hour. Subsequently, sera were obtained by centrifuging the blood samples at 2000 rpm for 10 minutes. The serum IL-1 $\beta$ and TNF- $\alpha$  levels were determined using a chemiluminescence immunoassay kit by Sichuan Orienter Biotechnology, China.

### **Statistical Analysis**

Data analysis was conducted using the statistical software SPSS version 23.0. Quantitative data were presented as mean  $\pm$  standard deviation, and comparisons between study groups were performed using the *t* test. Qualitative data were analyzed as categorical variables using the chi-square ( $\chi^2$ ) test. Statistical significance was determined by a *P* < .05.

## RESULTS

#### **Cohort Characteristics**

Seventy patients with KOA were recruited and randomly assigned to either the control or treatment groups (n = 35 in each group). In the treatment group, there were 35 cases, comprising 15 males and 20 females, with an age range of 57 to 73 years and an average age of  $(64.7 \pm 4.7)$  years. The disease's duration ranged from 1 to 7 years, averaging 2.26 years. Among them, 27 cases had left knee disease, 2 had right knee disease, and 6 had double knee disease.

The control group also had 35 cases, including 13 males and 22 females, with an age range of 56 to 73 years and an average age of  $(64.5 \pm 4.8)$  years. The disease's duration ranged from 1 to 9 years, with an average of 2.43 years. Among them, 25 cases were affected in the left knee, 3 cases in the right knee, and 7 cases had double knee disease. There were no significant differences in demographic data between the two groups (P > .05), and they were comparable.

During the course of the study, the treatment group had 3 dropouts, with 2 patients deciding to leave the study and another experiencing an accident unrelated to the present study. In the control group, there were two dropouts, with one patient sustaining a fracture and the other using medicinal plaster on their own.

#### Changes in VAS and WOMAC

The assessment of pain level was done using the VAS. In the treatment group, the average VAS score before and after therapy was  $7.70 \pm 0.64$  and  $1.20 \pm 0.74$ , respectively. Meanwhile, in the control group, the average VAS score before and after therapy was  $7.20 \pm 1.07$  and  $2.30 \pm 1.34$ , respectively. The reductions in VAS scores after therapy were statistically significant in both groups (P < .05). Notably, the post-therapy VAS score in the treatment group was significantly lower than that of the control group (P < .05).

Additionally, the changes in WOMAC scores for both groups before and after treatment were compared (Table 1). In both groups, the total WOMAC scores significantly decreased. Remarkably, the post-therapy WOMAC score in the treatment group was substantially lower than that of the control group (P < .05). These findings collectively indicate the effectiveness of holographic meridian scraping in alleviating the symptoms of KOA.

#### **Modulating Effect on Inflammatory Mediators**

The blood levels of IL-1 $\beta$  and TNF- $\alpha$  in patients with KOA were assessed (Table 2). In both groups, the levels of IL-1 $\beta$  and TNF- $\alpha$  were significantly reduced after the respective treatments (P < .05). Notably, after therapy, the levels of these inflammatory mediators in the treatment group were significantly lower than those in the control group (P < .05).

#### DISCUSSION

The current study investigated the beneficial effects of holographic meridian scraping in alleviating the symptoms of knee osteoarthritis within a Chinese patient cohort. KOA significantly impacts the patient's quality of life, as it affects various components of the knee joint structure, including the articular cartilage, synovium, subchondral bone, meniscus, and periarticular muscles. Notably, inflammation of the synovial soft tissues and cartilage destruction contribute to the pain experienced by KOA patients.

Extensive evidence has shown the pivotal role of interleukin-1 (IL-1) and interleukin-6 (IL-6) in promoting the expression of tumor necrosis factor-alpha (TNF- $\alpha$ ) and prostaglandin E2 (PGE2), which subsequently intensifies the inflammatory response in soft tissues. Consequently, the current treatment approach for KOA involves administering non-steroidal anti-inflammatory drugs, such as celecoxib, to inhibit PGE2 production by suppressing COX-2 expression.<sup>2-5</sup>

In accordance with modern medicine, this study demonstrated that meridian scraping has the capability to suppress key inflammatory mediators, including IL-1 $\beta$  and TNF. Numerous studies have indicated that excessive IL-1 $\beta$  and TNF- $\alpha$  play a significant role in the progression of KOA, leading to the degradation of the cartilage matrix and destruction of the articular cartilage.<sup>6</sup> Chondrocytes,

**Table 1.** The WOMAC of the Control and Treatment Groupsbefore and after the Study

	Treatment (n = 32)		Control (n = 33)	
Items	Pre-Therapy	Post-Therapy	Pre-Therapy	Post-Therapy
Pain	$12.7 \pm 2.1$	$7.6 \pm 1.5^{a,b}$	$13.2 \pm 2.4$	$9.5 \pm 2.5^{a}$
Stiffness	$5.3 \pm 1.4$	$3.7 \pm 1.4^{a,b}$	$4.5 \pm 1.2$	$4.2 \pm 1.4$
Joint function	$20.0 \pm 4.4$	$8.1 \pm 2.6^{a,b}$	$19.5 \pm 4.3$	$12.9 \pm 3.6^{a}$
Total score	38.0 ± 6.9	$9.9 \pm 3.8^{a,b}$	$37.0 \pm 7.8$	$17.1 \pm 3.9^{a}$

<sup>a</sup>Indicates statistical significance (P < .05)

<sup>b</sup>Indicates statistical significance (P < .05) when comparing with the control group post-therapy.

**Abbreviations**: WOMAC, Western Ontario and McMaster Universities Arthritis Index; n, Number of participants; Total score, Total WOMAC score encompassing pain, stiffness, and joint function.

**Table 2.** Serum IL-1 $\beta$  and TNF- $\alpha$  of the Control and Treatment Groups

	Treatment (n = 32)		<b>Control</b> ( <b>n</b> = 33)	
Items	Pre-therapy	Post-therapy	Pre-therapy	Pre-therapy
TNF-α	$7.52 \pm 1.68$	$5.75 \pm 1.23^{a,b}$	$7.70 \pm 1.77$	7.11±1.68ª
IL-1β	$1.18\pm0.54$	0.70±0.39 <sup>a,b</sup>	$1.21 \pm 0.52$	$0.71 \pm 0.42^{a}$

<sup>a</sup>Indicates statistical significance (P < .05); <sup>b</sup>Indicates statistical significance (P < .05) when comparing with the control group post therapy.

**Abbreviations**: IL-1 $\beta$ , Interleukin-1 beta; TNF- $\alpha$ , Tumor Necrosis Factor-alpha; n, Number of participants.

osteoblasts, and macrophages in the affected joints of KOA produce these two inflammatory cytokines, also found in major tissues such as the knee joint synovium, synovial fluid, and cartilage.<sup>7</sup>

In a study conducted by Sakao et al.,<sup>8</sup> it was reported that patients with severe cartilage damage exhibited higher expressions of TNF- $\alpha$  and IL-1 $\beta$  compared to those with mild cartilage damage. Hence, TNF- $\alpha$  and IL-1 $\beta$  can serve as clinical evaluation criteria for determining the degree of cartilage damage. However, despite the availability of antiinflammatory and analgesic treatments in modern medicine, an effective treatment plan for KOA still lacks. In contrast, traditional Chinese medicine offers diverse treatment methods that have shown relatively good therapeutic effects on this condition, particularly in addressing pain and limited mobility.

The suppressive effect of holographic meridian scraping on pro-inflammatory mediators was demonstrated to positively impact alleviating the clinical symptoms of KOA. The combination of celecoxib and meridian scraping resulted in a significant reduction in both the VAS and the WOMAC scores. The VAS score is widely utilized to assess the pain level in patients with OA,<sup>9</sup> while the WOMAC score was originally designed to evaluate symptoms and physical disability in OA patients and to track changes in KOA symptoms during treatment.<sup>10</sup> Due to its clinical utility, the WOMAC scale is recommended in guidelines for evaluating the overall pain experienced by OA patients.<sup>4</sup> These findings suggest that holographic meridian scraping holds promise in enhancing joint functionality for patients afflicted with KOA.

Scraping is one of ancient Chinese medicine's six methods of treating diseases. Traditional scraping is an external treatment that relies on the theory of meridians and acupoints. It involves using specific instruments and techniques to scrape the surface of the human body, promoting blood circulation, and removing blood stasis.<sup>6-8</sup> This study mainly applied scraping to the anterior parietotemporal oblique line, commonly used to address limb weakness and joint pain. It aligns with the flaccid lower limb symptoms experienced by patients with KOA.

Additionally, the corresponding areas of the lumbar spine and lower limbs on the back were scraped to have a positive impact on lower limb activities and produce an immediate therapeutic effect. Moreover, selecting acupoints such as Liangqiu, Zusanli, and Xuehai on the lower extremities aimed to exert therapeutic effects on the knee joint through the near-treatment effect of meridian acupoints.<sup>11</sup> These chosen acupoints are frequently utilized in clinical practice for treating KOA, offering improvements in clinical symptoms and pain relief for patients. Furthermore, scraping has the capacity to regulate the immune response in both directions. It can alleviate the inflammatory reaction in the knee joint during KOA onset, leading to a shortened disease course and improved quality of life for patients.

The WOMAC scoring system has few restrictions specifically; there is an unclear delineation between the constructs of pain and function within this scoring system,<sup>12</sup> Moreover, in addition to measuring blood pro-inflammatory mediators, incorporating imaging modalities can provide a deeper understanding of the underlying mechanism of action of scraping therapy.<sup>13</sup> Overall, the study suggests that holographic meridian scraping shows promise as a potential adjunctive therapy for knee osteoarthritis.

#### **Study Limitations and Future Implications**

While offering valuable insights into the suppressive effect of holographic meridian scraping on pro-inflammatory mediators and its positive impact on alleviating KOA symptoms, the present study has certain limitations that warrant consideration. One of the primary limitations is the relatively small size of the patient cohort, which may affect the generalizability of the findings. Future studies should aim to validate these results on larger and more diverse KOA populations involving multiple centers, to strengthen the robustness and reliability of the conclusions. Additionally, this study utilized the WOMAC score to evaluate OA symptoms and physical disability. While widely accepted, the WOMAC scoring system may not provide a clear delineation between pain and function, potentially impacting the accuracy of the assessments. Future investigations could explore integrating other assessment tools or imaging modalities to comprehensively capture the distinct aspects of pain and functionality, enhancing the precision of outcome measurements.

#### CONCLUSION

In conclusion, the findings of this study highlight the potential efficacy of holographic meridian scraping as an adjunctive therapy for KOA. The combination of holographic meridian scraping with celecoxib demonstrated superior outcomes in reducing the expression of pro-inflammatory mediators, IL-1 $\beta$  and TNF- $\alpha$ , in the serum of KOA patients compared to using celecoxib alone. As a result, the treatment group exhibited more significant improvements in both the VAS and the WOMAC scores, indicating enhanced pain management and overall joint functionality. These chosen acupoints not only improved the condition but also offered pain relief, showcasing the holistic approach of this therapeutic modality. It is suggested that by targeting inflammatory pathways, this treatment approach presents a potential alternative or complementary option to conventional therapies, potentially reducing the dependence on nonsteroidal anti-inflammatory drugs.

#### DATA AVAILABILITY

The data used to support this study are available from the corresponding author upon request.

## CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

#### AUTHORS' CONTRIBUTIONS

All authors made equal contributions, read and approved the final manuscript.

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