VIETNAM MEDICAL JOURNAL Vol. 550 No. 1/2025

UTILIZATION OF ACUPUNCTURE-MOXIBUSTION FOR KNEE OSTEOARTHRITIS: A CROSS-SECTIONAL STUDY OF 1,245 CASES AT MULTIPLE CENTERS IN HO CHI MINH CITY, VIETNAM

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ABSTRACT

Introduction: Knee osteoarthritis (KOA) is a leading cause of pain and disability worldwide. Acupuncture-moxibustion, a widely practiced traditional and complementary medicine approach, has demonstrated efficacy in KOA. This study aims to investigate the clinical application of these techniques in KOA treatment. ***Methods:*** A descriptive cross-sectional study was conducted at three traditional medicine centers in Ho Chi Minh City from January 2024 to January 2025. Patients receiving acupuncture-moxibustion for KOA were systematically sampled, with a total of 1,245 cases included in the final analysis. Data collection involved recording acupuncture-moxibustion techniques, adjunctive treatments, and patient characteristics. Descriptive statistics were used to summarize treatment patterns, and network analysis was performed to identify common technique combinations. ***Results:*** Seven acupuncture-moxibustion techniques were identified, with electroacupuncture (EA) being the most frequently used (54.9%), followed by thread-embedding acupuncture (TEA) (34.8%). Other techniques, including auricular acupuncture, filiform needle acupuncture, warm acupuncture, moxibustion, and laser acupuncture, were used less frequently (1.0–6.4%). Most acupuncture-moxibustion techniques were applied individually, with only 8.0% of cases involving combinations. Acupuncture-moxibustion was integrated with adjunctive methods in 97.3% of cases, primarily herbal medicine, physical therapy, and tuina. The most common combination was EA with herbal medicine and physical therapy (14.9%). ***Conclusion:*** Acupuncture-moxibustion methods used were not diverse, with EA and TEA being predominantly applied in KOA treatment. Acupuncture-moxibustion techniques were rarely combined, whereas most cases integrated multiple adjunctive methods. These findings highlight the need for further research on the effectiveness of acupuncture-moxibustion combinations and the factors influencing treatment selection to optimize KOA management.

Keywords: *Acupuncture, Complementary Therapies, Knee Osteoarthritis, Moxibustion, Traditional Medicine*

I. INTRODUCTION

Knee osteoarthritis (KOA) is a prevalent degenerative joint disease characterized by chronic knee pain, stiffness, and reduced mobility, significantly impairing patients' quality of life. With an incidence rate of 203 per 10,000 person-years, KOA imposes a growing global burden, as its prevalence continues to rise due to aging populations and increasing obesity rates [1]. Effective management of KOA focuses on alleviating

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Date of receipt: 24/2/2025
Date of scientific judgment: 24/3/2025
Reviewed date: 7/4/2025

pain, improving joint function, and maintaining joint integrity. While pharmacological treatments remain a primary approach, their long-term use is associated with adverse effects, driving a growing interest in non-pharmacological therapies.

Acupuncture-moxibustion methods, non-pharmacological therapies with a history spanning thousands of years, have been widely used in pain management, including KOA. Currently, it is also the most widely used traditional and complementary medicine approach, practiced in 113 out of 120 countries according to the 2019 World Health Organization report. Recognized by the Osteoarthritis Research Society International as a viable complementary and alternative treatment, acupuncture-moxibustion is valued for its safety, accessibility, and demonstrated efficacy [2].

Although numerous acupuncture-moxibustion techniques have proven effective and safe for KOA, their real-world clinical application remains largely unexplored. This study aims to investigate the usage patterns of acupuncture-moxibustion techniques for KOA in real-world clinical settings, identifying the most commonly applied methods and their combinations. Findings from this study will provide insights into current acupuncture-moxibustion practices for KOA, helping to bridge the gap between research and clinical application. Additionally, the results could help inform future research on the therapeutic effectiveness of different acupuncture-moxibustion approaches and policy decisions regarding the integration of acupuncture-moxibustion into KOA management.

II. MATERIALS AND METHODS

This descriptive cross-sectional study was conducted at three traditional medicine centers in Ho Chi Minh City: the Traditional Medicine Hospital of Ho Chi Minh City, the University Medical Center HCMC, and the Ho Chi Minh City Hospital for Rehabilitation - Professional Diseases, from January 20, 2024, to January 19, 2025. The study was conducted following the Declaration of Helsinki and the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines.

Prescriptions for patients aged 18 years or older who had been diagnosed with KOA and prescribed any acupuncture-moxibustion technique for KOA were included in the study. Prescriptions were excluded if they lacked treatment indication information. To ensure protocol adherence, 15 investigators completed a two-week training program led by the principal investigator before data collection began. A systematic random sampling method was applied, with a fixed sampling interval maintained throughout the study period. Since the total number of eligible cases was unknown, every second eligible case was selected for data collection at each center. To ensure unbiased data collection, only one prescription per patient was collected at their initial cross-sectional time point, regardless of whether they received multiple prescriptions at different times. Duplicate cases were identified based on patient identification numbers and removed from the dataset. Data collection continued for a full year, resulting in 1,245 cases included in the final analysis. This sample size exceeded the minimum required

385 cases, which was determined based on an estimated proportion of 0.5, a type I error of 0.05, and a margin of error of 0.05.

Acupuncture-moxibustion techniques and adjunctive treatments prescribed by attending physicians for KOA were recorded as binary variables. Additionally, patient characteristics, including gender, age, and occupational group, were documented.

The data were entered into Microsoft Excel 365 and underwent double-checking to ensure accuracy. All outcomes, including treatment methods and their combinations, were summarized using frequencies, percentages (%), and 95% confidence intervals. Additionally, network analysis was employed to identify patterns of co-prescription, with data analysis and visualization performed using R software version 4.3.1.

III. RESULTS

A total of 3,512 cases were screened from January 20, 2024, to January 19, 2025. The random selection process resulted in 1,731 cases. After excluding 486 duplicate cases, a final total of 1,245 cases were included in the analysis.

3.1. Patient Characteristics

The majority of patients were female (76.6%), aged from middle-aged to elderly, with most having manual labor occupations (56.5%) (**Table 1**).

Table 1. **Characteristics of patients with knee osteoarthritis treated with acupuncture-moxibustion (N = 1,245)**

Characteristics	Value (N = 1,245)	95% confidence intervals
Sex, female, n (%)	954 (76.6%)	74.2 - 79.0%
Age (years), mean (standard deviation)	61.2 (11.4)	60.6 - 61.8
Occupation		
- Manual labor, n (%)	704 (56.5%)	53.7 - 59.3%
- Mental labor, n (%)	353 (28.3%)	25.9 - 30.9%
- No labor, n (%)	188 (15.1%)	13.2 - 17.2%

3.2. Utilization of Acupuncture-Moxibustion Techniques

Seven acupuncture-moxibustion techniques were clinically used to treat KOA, including electroacupuncture (EA), thread-embedding acupuncture (TEA), auricular acupuncture (AA), filiform needle acupuncture (FNA), warm acupuncture (WA), moxibustion, and laser acupuncture (LA). Among them, EA was the most commonly used, applied in more than half of the cases, followed by TEA, which was used in over one-third of the cases. While other acupuncture-moxibustion techniques had a much lower frequency of use (ranging from 1.0 to 6.4%) (**Figure 1-A**).

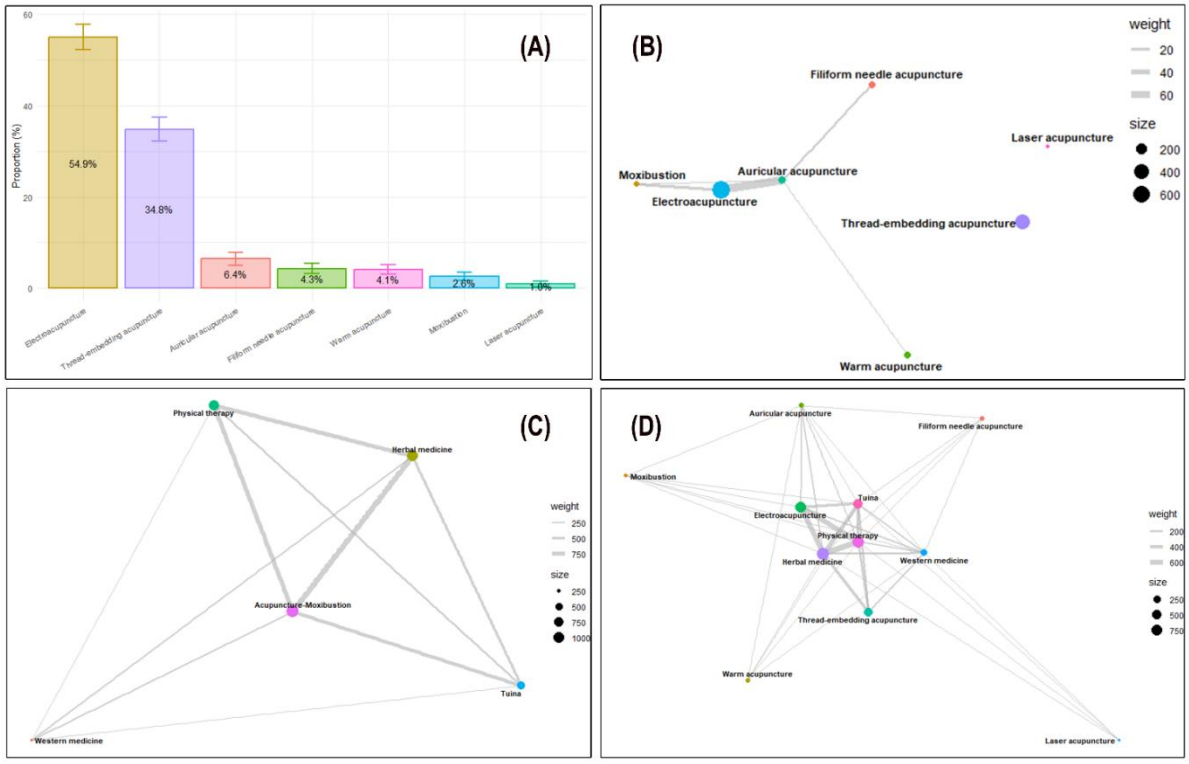

Figure 1. **Distribution and combination of acupuncture-moxibustion techniques in knee osteoarthritis treatment (N=1,245)**

(A) Utilization proportion of acupuncture-moxibustion techniques; (B) Network of acupuncture-moxibustion technique combinations; (C) Network of combinations acupuncture-moxibustion with adjunctive methods; (D) Network of combinations acupuncture-moxibustion techniques with adjunctive methods. In the bar chart, the whiskers represent the 95% confidence intervals. In the network diagram, the nodes represent individual treatment methods, with larger nodes indicating more frequent usage of that method, and the edges representing the combinations of treatment methods, with thicker edges indicating a higher frequency of combination.

Most acupuncture-moxibustion techniques were used individually, with only 8.0% of cases involving a combination (**Table 2**). **Figure 1-B** visualizes the network of acupuncture-moxibustion technique combinations, where AA played a central role, while LA and TEA were used exclusively. The most common combination was AA with EA (5.2%) (**Table 2**).

Table 2. **Single and combined use of acupuncture-moxibustion techniques (N = 1,245)**

Techniques	Frequency (%) N = 1,245	95% confidence intervals
Single-use	**1,145 (92.0%)**	**90.5 - 93.5%**
- Electroacupuncture	599 (48.1%)	45.3 - 50.9%
- Thread-embedding acupuncture	433 (34.8%)	32.1 - 37.4%
- Warm acupuncture	49 (3.9%)	2.9 - 5.0%
- Filiform needle acupuncture	45 (3.6%)	2.6 - 4.7%
- Laser acupuncture	12 (1.0%)	0.4 - 1.5%
- Moxibustion	7 (0.6%)	0.1 - 1.0%

Techniques	Frequency (%) N = 1,245	95% confidence intervals
Combination	**100 (8.0%)**	**6.5 - 9.5%**
- Electroacupuncture + Auricular acupuncture	65 (5.2%)	4.0 - 6.5%
- Electroacupuncture + Moxibustion	20 (1.6%)	0.9 - 2.3%
- Auricular acupuncture + Filiform needle acupuncture	8 (0.6%)	0.2 - 1.1%
- Auricular acupuncture + Moxibustion	5 (0.4%)	0.0 - 0.8%
- Auricular acupuncture + Warm acupuncture	2 (0.2%)	0.0 - 0.4%

3.3. Combination of Acupuncture-Moxibustion with Adjunctive Methods

Acupuncture-moxibustion was mostly used in combination with other methods (97.3%), including herbal medicine, physical therapy, tuina, and Western medicine (**Table 3**). **Figure 1-C** illustrates that herbal medicine, physical therapy, and tuina were the most commonly combined methods with acupuncture-moxibustion, and they were also frequently used together. The most common combination was acupuncture-moxibustion with herbal medicine and physical therapy (30.4%) (**Table 3**).

Table 3. **Single and combined use of acupuncture-moxibustion with adjunctive methods (N = 1,245)**

Approaches	Frequency (%) N = 1,245	95% confidence intervals
Acupuncture-moxibustion single use	**34 (2.7%)**	**1.8 - 3.6%**
Acupuncture-moxibustion combined use with	**1,211 (97.3%)**	**96.4 - 98.2%**
- Herbal medicine + Physical therapy	379 (30.4%)	27.9 - 33.0%
- Herbal medicine + Physical therapy + Tuina	201 (16.1%)	14.1 - 18.2%
- Herbal medicine + Tuina	153 (12.3%)	10.5 - 14.1%
- Physical therapy	96 (7.7%)	6.2 - 9.2%
- Physical therapy + Tuina	73 (5.9%)	4.6 - 7.2%
- Western medicine + Herbal medicine + Physical therapy	68 (5.5%)	4.2 - 6.7%
- Herbal medicine	57 (4.6%)	3.4 - 5.7%
- Western medicine + Herbal medicine + Tuina	52 (4.2%)	3.1 - 5.3%
- Western medicine + Herbal medicine	49 (3.9%)	2.9 - 5.0%
- Tuina	33 (2.7%)	1.8 - 3.5%
- Western medicine + Herbal medicine + Physical therapy + Tuina	20 (1.6%)	0.9 - 2.3%
- Western medicine + Physical therapy	15 (1.2%)	0.6 - 1.8%
- Western medicine + Physical therapy + Tuina	11 (0.9%)	0.4 - 1.4%
- Western medicine	4 (0.3%)	0.0 - 0.6%

Figure 1-D demonstrates that EA and TEA, in combination with herbal medicine, physical therapy, tuina, and Western medicine, were the most commonly used therapies for KOA in clinical practice. Among them, the most frequent combination was EA with herbal medicine and physical therapy (14.9%) (**Table 4**).

Table 4. **Top 10 most commonly used combinations (N = 1,245)**

Approaches	Frequency (%) N = 1,245	95% confidence intervals
Electroacupuncture + Herbal medicine + Physical therapy	186 (14.9%)	13.0 - 16.9%
Thread-embedding acupuncture + Herbal medicine + Physical therapy	132 (10.6%)	8.9 - 12.3%
Electroacupuncture + Herbal medicine + Physical therapy + Tuina	106 (8.5%)	7.0 - 10.1%
Thread-embedding acupuncture + Herbal medicine + Tuina	79 (6.3%)	5.0 - 7.7%
Electroacupuncture + Physical therapy	66 (5.3%)	4.1 - 6.5%
Electroacupuncture + Herbal medicine + Tuina	54 (4.3%)	3.2 - 5.5%
Electroacupuncture + Western medicine + Herbal medicine + Physical therapy	39 (3.1%)	2.2 - 4.1%
Thread-embedding acupuncture + Herbal medicine + Physical therapy + Tuina	38 (3.1%)	2.1 - 4.0%
Electroacupuncture + Physical therapy + Tuina	35 (2.8%)	1.9 - 3.7%
Thread-embedding acupuncture + Physical therapy + Tuina	27 (2.2%)	1.4 - 3.0%

IV. DISCUSSION

Although this study identified several acupuncture-moxibustion techniques used in the treatment of KOA, the overall diversity of these approaches remains limited. Specifically, seven acupuncture-moxibustion techniques were clinically applied, including EA, TEA, AA, FNA, WA, moxibustion, and LA. Meanwhile, other techniques, such as floating needle, fire needle, needle knife, and silver needle, have also demonstrated good efficacy in KOA treatment [3].

Among these, EA was the most commonly used technique, accounting for more than half of the treatment cases. The widespread use of EA may be attributed to the substantial body of evidence supporting its effectiveness in reducing pain and improving physical function in KOA patients. Additionally, EA has been associated with better treatment outcomes compared to manual acupuncture [4]. EA is believed to combine the benefits of acupoint stimulation with the effects of electrical currents, allowing for continuous stimulation of acupoints, which is often more convenient than manual acupuncture. It is known to promote pain relief by stimulating the release of multiple opioid peptides, including enkephalin, beta-endorphin, endomorphin, and dynorphin, which work synergistically to enhance its analgesic effect [5].

TEA was another widely applied technique, utilized in over one-third of the treatment cases. This method follows similar acupoint selection principles as traditional acupuncture techniques but offers the advantage of prolonged therapeutic effects. By reducing the frequency of required treatments, TEA can help alleviate the burden on healthcare systems and improve treatment adherence. It has been widely used and supported by scientific evidence in various disorders, demonstrating both safety and efficacy. Preliminary evidence suggests that TEA demonstrates efficacy as a safe and effective intervention for pain relief in KOA [6]. Furthermore, this technique may be particularly suitable for KOA patients who experience mobility limitations that make frequent visits for conventional acupuncture treatment challenging.

Other acupuncture-moxibustion techniques were used at significantly lower frequencies. This limited usage may be due to the relatively weaker evidence base supporting these methods, as well as prevailing clinical practice habits.

This study also found that combining multiple acupuncture-moxibustion techniques in the clinical management of KOA was uncommon, occurring in only 8.0% of cases. This may primarily be due to constraints imposed by health insurance policies, which often limit the use of multiple acupuncture-moxibustion techniques for a single condition. Additionally, the effectiveness of combinations remains insufficiently studied, contributing to their limited adoption in clinical practice. Notably, AA appeared to play a central role in the combination. As a microsystem acupuncture approach, AA involves stimulating specific points on the external ear using needles or seeds. Unlike traditional body acupuncture, which selects acupoints along meridians, AA targets auricular acupoints, and its mechanisms of action differ substantially from those of body acupuncture [7]. Due to these differences, AA is frequently combined with others to enhance therapeutic efficacy.

A key finding of this study is that 97.3% of KOA patients received acupuncture-moxibustion as part of a multimodal treatment approach, integrating both traditional medicine and Western medicine. This underscores the fact that acupuncture-moxibustion is rarely used as a monotherapy in clinical practice. The integration of multiple therapeutic approaches may enhance treatment efficacy by leveraging the strengths of each modality to achieve comprehensive symptom control and functional improvement. The widespread use of herbal medicine, physical therapy, and tuina therapy in KOA management reflects the growing trend of integrating traditional medicine and Western medicine, aiming to reduce reliance on conventional pharmacological treatments, which often have limitations when used long-term. Among the various combined treatment approaches, acupuncture-moxibustion was most frequently used alongside herbal medicine and physical therapy (30.4%). A systematic review and meta-analysis by Yang et al. (2021) indicated that compared to acupuncture alone or monotherapy with either herbal or Western medicines, the combination of acupuncture and herbal medicine significantly reduced knee pain, improved knee function, and enhanced quality of life [8]. This suggests that such integrative approaches may serve as viable conservative treatment options for KOA.

This study has several limitations. First, it lacks a detailed analysis of factors influencing acupuncture-moxibustion selection, such as disease severity, patient history, financial constraints, or practitioner expertise. Second, the sample was limited to three centers in Ho Chi Minh City, which may not fully reflect acupuncture-moxibustion practices in other regions. Variations in regional traditions, practitioner preferences, and healthcare policies could impact acupuncture-moxibustion utilization. Future studies with a broader scope and deeper analysis of these factors are needed for a more comprehensive understanding of acupuncture-moxibustion use in knee osteoarthritis management.

V. CONCLUSIONS

This study highlights the predominant use of EA and TEA in KOA treatment, while the overall diversity of acupuncture-moxibustion techniques remains limited. Acupuncture-moxibustion is rarely used alone, with most cases integrating herbal medicine and physical therapy. The low prevalence of combined acupuncture-moxibustion techniques suggests potential policy

constraints and the need for further research on their efficacy. Future studies should explore factors influencing acupuncture-moxibustion selection and the effectiveness of multimodal approaches to optimize KOA management.

ACKNOWLEDGEMENTS

The authors would like to thank the staff and physicians of the Traditional Medicine Hospital of Ho Chi Minh City, the University Medical Center HCMC, and the Ho Chi Minh City Hospital for Rehabilitation - Professional Diseases for their support in screening, data collection, and verification for this study.

AUTHORS' CONTRIBUTIONS

An Hoa Tran: Conceptualization, Methodology, Validation, Resource, Data curation, Investigation, Formal analysis, Writing - original draft, Writing - review & editing, Visualization, Supervision, Project administration. **All authors**: Investigation, Writing - review & editing.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

ETHICAL STATEMENT

The study was approved by the Ethics Committee of the University of Medicine and Pharmacy at Ho Chi Minh City (No. 11/HĐĐĐ-ĐHYD, dated January 02, 2024).

FUNDING STATEMENT

None.

DATA AVAILABILITY

The data that support the findings of this study are available from the corresponding authors, upon reasonable request.

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