

Effect of Meridian-unblocking Herbal Friction Combined with Infrared Irradiation in Nursing Care for Elderly Patients with Knee Osteoarthritis

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Abstract: *Objective:* To explore the clinical effect of nursing intervention combining meridian-unblocking herbal friction with infrared irradiation on elderly patients with knee osteoarthritis (KOA). *Methods:* A total of 40 elderly patients with KOA admitted to our hospital from January 2024 to February 2025 were selected and divided into the conventional group and the herbal friction group by random number table, with 20 cases in each group. The conventional group received routine nursing plus infrared irradiation. On the basis of conventional nursing, the herbal friction group was given additional meridian-unblocking herbal friction. After one month of intervention, the clinical efficacy, Numerical Rating Scale (NRS) score for pain, swelling degree, Western Ontario and McMaster Universities Arthritis Index (WOMAC) for knee joint function, and the 36-Item Short Form Health Survey (SF-36) score for quality of life were compared between the two groups. *Results:* After one month of intervention, the total effective rate of the herbal friction group was significantly higher than that of the 65.00% of the conventional group ($P < 0.05$). The NRS score and swelling degree of the herbal friction group were lower than those of the conventional group ($P < 0.05$). Meanwhile, the WOMAC score of the herbal friction group was lower, while the scores of physiological function, emotional function, and social function in the SF-36 scale were higher than those of the conventional group ($P < 0.05$). *Conclusion:* The combined nursing intervention of meridian-unblocking herbal friction and infrared irradiation can improve the clinical efficacy for elderly KOA patients. It can effectively relieve knee joint pain and swelling, reduce limitations on daily activities, improve knee joint function, and enhance patients' quality of life.

Keywords: Knee osteoarthritis; Herbal friction; Infrared irradiation

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1. Introduction

Degenerative changes of knee articular cartilage and secondary osseous lesions mainly characterize knee osteoarthritis (KOA). It has a high prevalence among the elderly population, with recurrent episodes and

protracted courses, and leads to a high disability rate, which seriously impairs the physical and mental health of patients ^[1,2]. The onset of KOA is closely associated with heredity, age, occupation, and metabolic disorders. With the accelerating aging process in China in recent years, the incidence of elderly KOA has increased year by year. Relevant studies predict that KOA will become one of the major disabling diseases by 2030 ^[3,4]. After conventional Western medicine treatment, many elderly KOA patients still suffer from unsatisfactory relief of knee pain and stiffness, and the condition is prone to recurrence ^[5]. From the perspective of traditional Chinese medicine (TCM), invasion of wind, cold, and damp pathogens will obstruct blood circulation and trigger inflammatory reactions of joints. Therefore, the core principles of treatment and nursing should be dispelling cold, expelling wind, activating blood circulation, and resolving stasis ^[6]. Infrared irradiation generates thermal effects on the affected area, accelerates lymph circulation and blood flow, promotes the absorption of inflammatory exudates and metabolites, and relieves muscle spasm so as to eliminate swelling and pain ^[7,8]. Herbal friction is a typical external TCM therapy. Applying meridian-unblocking herbal medicines directly on the affected knee can alleviate swelling and pain, and accelerate the recovery of knee joint function ^[9]. However, there is no unified clinical conclusion on whether the combined application of herbal friction and infrared irradiation can further improve the curative effect and promote the recovery of knee joints in KOA patients. Relevant research is still needed for verification. Given the above background, this study explores the application effect of meridian-unblocking herbal friction combined with infrared irradiation in nursing elderly KOA patients.

2. Materials and methods

2.1. General data

A total of 40 patients diagnosed with KOA admitted to our hospital from January 2024 to February 2025 were enrolled.

2.1.1. Inclusion criteria

- (1) All patients met the diagnostic criteria for knee osteoarthritis ^[10,11];
- (2) Aged 60 years old or above;
- (3) Received no relevant treatment for arthritis within 4 weeks before enrollment;
- (4) Normal cognitive and communication abilities, and agreed to the treatment and nursing regimens in this study.

2.1.2. Exclusion criteria

- (1) Dysfunction of vital organs;
- (2) Coagulopathy;
- (3) Skin damage or infection on the affected knee joint;
- (4) Knee arthritis is caused by tumors, tuberculosis, and other diseases.

The subjects were divided into the conventional group and the herbal friction group via a random number table, with 20 cases in each group. The general data of the two groups were balanced and comparable ($P > 0.05$), with no statistically significant differences in gender, age, and disease course.

2.2. Intervention methods

2.2.1. Conventional group

Routine nursing combined with infrared irradiation was implemented.

(1) Health education

Registered nurses adopted semi-structured interviews to learn about patients' physical conditions, mental status, disease cognition, and living habits according to disease severity. Brochures, PPTs, and videos were used to deliver knowledge about KOA, explain the importance of self-management, and help patients maintain a positive attitude and improve treatment compliance.

(2) Psychological counseling

Nurses communicated with patients to understand their mental state. Patients often suffered from anxiety and unease due to persistent pain and worries about treatment outcomes, which would affect therapeutic effects. Nurses relieved negative emotions and guided patients to adjust their mentality.

(3) Functional training

Patients were instructed to perform knee exercises such as sitting leg raises and supine cycling movements. The duration, intensity, and frequency of training were adjusted according to patients' tolerance to avoid overexertion and aggravation of the condition.

(4) Infrared irradiation

The YSHD-II infrared therapeutic apparatus (manufactured by Shanghai Yuejin Medical Optical Instrument Factory) was adopted. Patients took a sitting position. The therapeutic apparatus was placed 30–70 cm above the affected knee. The irradiation temperature was set at 45–55 °C, with 15 minutes per session and once a day.

2.2.2. Herbal friction group

On the basis of all routine nursing measures, additional meridian-unblocking herbal friction was applied.

Meridian-unblocking Prescription: *Arnebia euchroma* 15 g, *Radix Paeoniae Alba* 15 g, *Radix Paeoniae Rubra* 9 g, Licorice 9 g, *Salvia miltiorrhiza* 15 g, Dandelion 15 g, *Angelica Dahurica* 6 g, Talc 10 g.

One dose of the above herbs was soaked in cold water for 30 minutes, then heated and boiled for another 30 minutes. After the medicinal liquid cooled down to 40–45 °C, gauze soaked with the liquid was applied to the affected area. Each session lasted 15 minutes, once a day. Herbal friction and infrared irradiation were performed simultaneously.

Both groups received continuous intervention for one month before outcome evaluation.

2.3. Observation indicators

2.3.1. Clinical efficacy

(1) Markedly effective

Knee swelling and pain disappeared or were greatly relieved, and daily activities of the knee were completely unrestricted.

(2) Effective

Knee swelling and pain were partially alleviated, and the mild limitation of knee activities was improved compared with baseline.

(3) Ineffective

No improvement was observed in knee swelling, pain, and activity limitations.

Total effective rate = Markedly effective rate + Effective rate.

2.3.2. Pain and swelling degree

The Numerical Rating Scale (NRS) was used to assess pain before and after intervention. The NRS score ranged from 0 to 10 points: 0 = no pain; 1–3 = mild pain (no impact on sleep); 4–6 = moderate pain (slight impact on sleep); 7–10 = severe pain (severe disturbance to sleep). For swelling assessment, a tape measure was used to detect the circumference of the knee at about 2 cm above the patella to evaluate the swelling degree.

2.3.3. Knee joint function

The Western Ontario and McMaster Universities Arthritis Index (WOMAC) was adopted to evaluate joint symptoms and functions before and after intervention. The scale consisted of three dimensions: stiffness (2 items, 0–8 points), pain (5 items, 0–20 points), and daily activities (17 items, 0–68). Each item was scored by a 5-point scale: 0 = no symptoms, 1 = mild, 2 = moderate, 3 = severe, 4 = extremely severe. The total score ranged from 0 to 96. Higher scores indicated more severe symptoms and poorer joint function.

2.3.4. Quality of life

The 36-Item Short Form Health Survey (SF-36) was used, including physiological function, emotional function, and social function. Each dimension was scored from 0 to 100, and higher scores represented a better quality of life.

2.4. Statistical methods

SPSS 25.0 statistical software was used for data analysis. Measurement data were expressed as mean $\pm$ standard deviation ($\bar{x} \pm s$) and analyzed by *t*-test. Enumeration data were presented as cases and percentages and analyzed by the chi-square test. A *p* value less than 0.05 was considered statistically significant.

3. Results

3.1 Clinical efficacy

After one month of intervention, the total effective rate of the herbal friction group was 95.00%, which was higher than 65.00% of the conventional group ($P < 0.05$). In the herbal friction group: 12 markedly effective cases, 7 effective cases, 1 ineffective case. In the conventional group: 4 markedly effective cases, 9 effective cases, 7 ineffective cases.

3.2. Comparison of pain and swelling degree

After intervention, the NRS scores and swelling degree of both groups decreased, and the reduction range of the herbal friction group was larger than that of the conventional group ($P < 0.05$). See **Table 1**.

Table 1. Comparison of NRS scores and swelling degree ($\bar{x} \pm s$)

Group	Cases	NRS score		Knee circumference	
		Before	After	Before	After
Herbal friction group	20	6.4±1.16	2.24±0.64*	40.8±2.38	37.76±2.14*
Conventional group	20	6.39±1.08	3.18±0.71*	41.25±2.27	35.42±2.06*
<i>t</i> value	-	0.172	4.429	0.530	3.523
<i>P</i> value	-	0.865	< 0.001	0.599	0.001

Note: vs. pre-intervention, **P* < 0.05.

3.3. Comparison of knee joint function

After intervention, the scores of stiffness, pain, and daily activities in the WOMAC scale of both groups declined, and the herbal friction group had a more significant decrease (*P* < 0.05). See Table 2.

Table 2. Comparison of each dimension score of the WOMAC scale ($\bar{x} \pm s$)

Group	Cases	Stiffness		Pain		Daily activities	
		Before	After	Before	After	Before	After
Herbal friction group	20	4.93±1.03	1.23±0.47*	13.87±2.54	3.56±1.24*	40.82±6.52	7.32±2.58*
Conventional group	20	5.06±0.89	2.62±0.68*	14.13±2.36	5.83±1.45*	41.37±6.41	11.62±3.14*
<i>t</i> value	-	0.427	7.520	0.335	5.321	0.269	4.732
<i>P</i> value	-	0.672	< 0.001	0.739	< 0.001	0.789	< 0.001

Note: vs. pre-intervention, **P* < 0.05.

3.4. Comparison of quality of life

After intervention, the scores of physiological function, emotional function, and social function in the SF-36 scale of both groups increased, and the herbal friction group had higher scores in all dimensions (*P* < 0.05). See Table 3.

Table 3. Comparison of each dimension score of the SF-36 scale ($\bar{x} \pm s$)

Group	Cases	Physiological function		Emotional function		Social function	
		Before	After	Before	After	Before	After
Herbal friction group	20	53.86±7.53	83.62±8.47*	51.47±6.86	75.43±7.92*	62.83±7.74	77.56±8.13*
Conventional group	20	54.31±6.89	71.42±7.85*	52.13±6.73	65.32±7.51	63.46±7.62	72.44±7.78*
<i>t</i> value	-	0.197	4.725	0.315	4.143	0.259	4.262
<i>P</i> value	-	0.845	< 0.001	0.754	< 0.001	0.797	< 0.001

Note: vs. pre-intervention, **P* < 0.05.

4. Discussion

The pathogenesis of KOA is complex, which is related to chronic strain, obesity, physical constitution, and calcium loss. Long-term clinical practice has proved that TCM characteristic therapies show prominent

advantages in the treatment and nursing of KOA. In TCM theory, KOA is categorized as Bi Syndrome or Knee Bi Syndrome. Invasion of wind, cold, and damp pathogens leads to blood stasis: cold causes contraction of joint tissues and results in joint pain and stiffness; accumulated dampness blocks Qi and blood circulation, leading to heavy distending pain of joints ^[12,13].

In this study, meridian-unblocking herbal friction combined with infrared irradiation was applied to elderly KOA patients. The results showed that the total effective rate of the combined intervention group was significantly higher. Its NRS score, swelling degree, and WOMAC score were lower, while SF-36 scores were higher than those of the conventional group. It indicates that this combined regimen can effectively relieve knee pain and swelling, improve joint function and quality of life, and enhance overall clinical efficacy.

The herbal prescription used in this study has multiple therapeutic effects: *Arnebia euchroma* and *Radix Paeoniae Rubra* clear heat, detoxify, reduce swelling, and activate blood circulation; *Radix Paeoniae Alba* relieves pain; *Salvia miltiorrhiza* exerts anti-inflammatory, analgesic, and blood-activating effects; Dandelion works for detoxification and detumescence; *Angelica Dahurica* dispels cold and alleviates pain; Licorice has detoxification and analgesic effects. After decoction, the medicinal liquid acts directly on the lesions via friction and hot compress, so the active ingredients take effect rapidly to relieve pain, eliminate inflammation, activate blood, and resolve stasis ^[14]. Meanwhile, infrared irradiation raises local skin temperature, accelerates drug absorption, improves blood circulation of the knee, and reduces the level of local inflammatory factors. The two therapies complement each other. Besides, improved local physical conditions also facilitate early functional training of patients ^[15]. The combination produces synergistic effects and further improves clinical outcomes, relieving patients' physical discomfort and improving their overall quality of life.

5. Conclusion

In conclusion, nursing intervention combining meridian-unblocking herbal friction with infrared irradiation has a good clinical effect on elderly KOA patients. It can effectively alleviate joint symptoms, restore knee function, and improve patients' quality of life, which is worthy of clinical promotion.

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Disclosure statement

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