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Article

Effect of Combination of Infrared Knee Therapy with Ear Acupuncture and Local Point Electroacupuncture on Pain Scale in Knee Pain Patients at Puskesmas Baki Sukoharjo

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ABSTRACT

Joint disorders are common in the knee and result in pain and limitation of motion. Knee pain can significantly reduce people's quality of life. This disorder can be complained of starting from a productive age to the elderly. The etiology of knee pain is complex, one of which is the age factor. Acupuncture therapy can reduce several cases of musculoskeletal disorders, one of which is knee pain. This study aims to determine the effect of a combination of knee infrared therapy with ear acupuncture and local point electroacupuncture on the pain scale in knee pain patients at Puskesmas Baki Sukoharjo. This study used a type of quantitative research with a "Quasi-Experimental" research design. This study was divided into two treatment groups, namely the first group of ear acupuncture therapy combined with knee infrared, and the second group of local point electroacupuncture. This study started from February to March 2025 for 4 weeks and was conducted at Puskesmas Baki Sukoharjo. The results of the Wilcoxon test obtained a ρ value of 0.001, and the Mann-Whitney test obtained a ρ value of 0.011. These results indicate that there is an effect of a combination of knee infrared therapy with ear acupuncture and local point electroacupuncture on the pain scale in knee pain patients at Puskesmas Baki Sukoharjo. This means ear acupuncture therapy combined with knee infrared and local point electroacupuncture on knee pain cases showed significant results in reducing the pain scale (VAS) in patients at Puskesmas Baki Sukoharjo.

I. INTRODUCTION

Pain becomes one of the sensory and emotional responses that interfere with a person's ability to carry out activities. There are several factors that can cause musculoskeletal disorders related to pain, including posture, workload, work duration, and repetitive movements. Individual factors include age, gender, and work environment factors, including vibration and temperature(1). One of the pains

that often occurs is musculoskeletal disorders. Various kinds of Musculoskeletal pain can be caused by more than 150 diseases and syndromes, including spinal disorders and traumatic joint disorders [2]. Joint disorders are common in the knee and result in pain and limitation of movement. Knee pain can significantly reduce the quality of human life. This disorder can be complained of starting from a productive age to the elderly. Knee pain often causes sufferers to experience limitation of motion and basic functional impairment of the knee[3]. Knee pain is generally caused by several factors, such as trauma, degenerative factors, and knee conditions that are overused, causing inflammation. Types of knee joint pain can be acute or chronic[4].

The WHO (2021) estimates that 240 million people worldwide have symptoms of osteoarthritis. Symptoms of osteoarthritis include joint stiffness, limited range of motion, crepitus, deformity, and quadriceps atrophy[4]. The Ministry of Health of the Republic of Indonesia stated that joint pain in Indonesia reached 7.3%[5]. The prevalence of joint pain in Central Java province is 6.78%. The number of people with joint pain in Sukoharjo Regency reached 5.57%[6].

According to Traditional Chinese Medicine (TCM), knee pain (xī tòng) belongs to Bi syndrome, which is defined as something that is blocked or not flowing smoothly. This is caused by the attack of exogenous and endogenous pathogens, which it is because obstruct Qi and Xue in the body. In the long term, knee pain can cause a deficiency in Zhang's liver and kidneys, and the continuous invasion of cold wind can aggravate the disease and worsen the condition, which is characterized by muscle and joint stiffness, ROM limitation, swelling, crepitus, hot sensation, and pain[7][8].

Acupuncture therapy can produce an analgesic effect through the nervous system and local tissues, which has been proven to reduce pain symptoms[9]. The use of local and distal acupuncture points in patients with knee osteoarthritis is effective in relieving pain, improving function, and improving quality of life[10]. Several acupuncturing techniques that can be applied to cases of knee pain include manual acupuncture at local and distal points and the use of micro acupuncture methods such as auricular acupuncture. Auricular acupuncture stimulates acupuncture points in the ear area, where many nerve branches in the ear are directly connected to the human body[11]. Auricular acupuncture produces an analgesic effect, so it can increase mobility and quality of life[12]. This study aims to determine the effect of a combination of knee infrared therapy with ear acupuncture and local point electroacupuncture on the pain scale in knee pain patients at Puskesmas Baki Sukoharjo.

II. METHODS

The study employed a quasi-experimental design with a pretest–posttest approach. The sampling technique used was purposive sampling. This design was chosen to obtain empirical data through real experimental conditions that did not allow full control and manipulation of all relevant variables [13]. The study consisted of two experimental groups: the first group received auricular acupuncture therapy combined with knee infrared, while the second group received local point electroacupuncture therapy. Both groups were assessed using a pretest before the intervention and a posttest afterward to determine the effect of the treatments.

The research was conducted from February to April 2025 at Puskesmas Baki, Sukoharjo. The study population consisted of all patients with knee pain who visited the health center. A preliminary survey conducted from 27 November to 10 December 2024 using questionnaires and interviews identified 52 individuals who complained of knee pain. From this population, 38 participants who

met the inclusion and exclusion criteria were selected as research samples.

The dependent variable in this study was the pain scale in patients with knee pain, measured using the Visual Analogue Scale (VAS). The independent variables were local electroacupuncture point therapy and auricular acupuncture therapy combined with infrared knee treatment. Local point electroacupuncture was applied at ST34 (Liangqiu), EX-LE5 (Xiyan), ST36 (Zusanli), and ST35 (Dubi), while auricular acupuncture was applied at Shenmen, Kidney, and Knee points, combined with infrared stimulation of the knee area.

The tools and materials used in this study included a VAS form, 1-cun acupuncture needles, an electrostimulator, an infrared lamp, auricular (press) needles, 70% alcohol swabs, hand sanitizer, a kidney dish, tweezers, a needle holder, gloves, and masks. The acupuncture intervention in both groups followed the Standard Operating Procedure (SOP) and was administered six times with a frequency of two sessions per week. Before each treatment session, the therapist evaluated the patient's pain level using the VAS instrument.

III. RESULT

This study begins with preliminary research conducted in November-December 2024 to determine the number of research subjects who experience knee pain. The results of preliminary research obtained 38 research subjects who fulfilled the research criteria. The research subjects were divided into two groups, namely the treatment group and group 2, each of which numbered 19 people. Both groups received therapy for 6 sessions.

Table 1. Characteristics of Respondents

Syndrome	N	%
Gender		
Female	32	84.2
Male	6	15.8
Age (years)		
41-50	6	15.8
51-60	22	57.9
61-70	10	26.3
Occupation		
Housewife	24	63.2
PNS	4	10.5
Farmer	1	2.6
Privat Employees	1	2.6
Retireed	2	5.3
Traders	4	10.5
Entrepreneur	2	5.3
Etiology		
Old Age	22	57.9
Obesity	5	13.2
Medical History	8	21.1
Trauma	3	7.9

Table 1 shows that the gender of respondents who feel the most knee pain is female, as many as 32 (84.2%), the most common age is the age of 51-60, as many as 17 (57.9%), for the most work is housewives, as many as 23 (63.2%). the most etiology is old age with 22 respondents (57.9%).

Table 2. Frequency Distribution of Research Subjects Based on VAS Before Therapy

Scale	Group I		Group II	
	N	%	N	%
4	1	5.3	3	15.8
5	8	42.1	4	21.1
6	7	36.8	8	42.1
7	3	15.8	4	21.1

Based on Table 2, it can be explained that from each treatment group, totalling 19 people divided into 2 groups, namely, group I shows that the pain scale score before the most action is score 5 (moderate pain), as many as 8 people (42.1%). Then group II shows that the pain scale score before the most action is score 6 (moderate pain), as many as 8

people (42.1%).

Table 3. Frequency Distribution of Research Subjects Based on VAS After Therapy

Scale	Group I		Group II	
	N	%	N	%
0	4	26.7	0	0.0
1	2	13.3	1	6.70
2	5	33.3	6	40.0
3	3	20.0	6	40.0
4	1	6.70	2	13.3

Based on Table 3, it can be explained that from each treatment group, totalling 19 people divided into 2 groups, namely, group I shows that the pain scale score after the most action is score 3 and 4 (mild pain), as many as 7 people (36.8%). Then group II shows that the pain scale score before the most action is score 2 (mild pain), as many as 10 people (52.6%).

Table 4. Overview of VAS Before And After Treatment

Group	Intervention	Mean
Group I	Before	5.63
	After	3.10
Group II	Before	5.68
	After	2.36

Table 4 shows that the decrease in pain scale (VAS) scores was greatest in group II, namely the group with local point Electroacupuncture treatment, with a rate of 80%. The results of the normality test in this study on the knee pain scale in the treatment group have a significance value (sig.) p>0.050, so the data are normally distributed. Homogeneity test on the data of the research subjects above using the Levene Statistic Test. The results of the homogeneity test on the pain scale in the 2 treatment groups also have a significance value (sig.) p>0.050, so the data are homogeneous.

Table 5. The Result of the Wilcoxon Test

Group		N	p
I	Pretest	19	<0.001
	Posttest	19	
II	Pretest	19	<0.001
	Posttest	19	

Table 5 shows that the sig. (significance) in both groups is p < 0.001, so Ho is rejected and Ha is accepted. The results of this test indicate that there is a significant difference between the two groups on the pain scale in cases of knee pain. The results of this test can be known the effect of each treatment group by conducting further tests with the Mann-Whitney test to see the effect between treatments.

Table 6. The Result of Mann-Whitney Test

Group	Mean Rank	p
I	23.82	0.011
II	15.18	

Table 6 shows the significance of the pain scale in group I and group II, which has a significance value of p=0.011. There is a mean rank value of group I of 23.82 and group II of 15.18, which means that group II is more effective than group I. So in this study, there is an effect of a combination of therapy for pain in group I and group II.

So that in this study, there is an effect of a combination of knee infrared therapy with ear acupuncture and local point electroacupuncture on the pain scale in knee pain patients at the Baki Sukoharjo Health Centre.

IV. DISCUSSION

Data analysis Table 1 explains the distribution of the gender, most data found to be female, namely 32 people (84.2%), and the age table range 40-70 years was found to be 51-60 years old, namely 22 people (57.9%). This follows the results of research, which explains that women aged >45 years experience

more knee pain due to changes in the musculoskeletal system, resulting in the knee joint being more susceptible to damage[14]. Table 1 explains that the most researched subjects based on occupation were housewives (IRT), amounting to 24 people (63.2%). This result follows research that explains that housewives are the occupation that suffers the most knee pain compared to other occupations. Housewives spend most of their time doing household chores that tend to use a lot of strength, resting on the knees and waist, such as sweeping, mopping, cleaning the house, and taking care of children[15]. That prolonged physical activity can increase the risk of meniscal or ligament damage to the knee, as well as degradation of the cartilage so that pain in the joints, muscle weakness, and stiff joints appear[15]. In addition, the imbalance of estrogen and cortisol due to the isolation and monotony of the situation tends to lead to stressors for housewives, making women prone to fatigue and pain[15].

Table 1 shows that the most common sub-study based on etiology was the elderly, namely 22 people (57.9%). As we age, the body experiences inherent weaknesses so that the amount and quality of vital substances begin to decline. This condition causes depletion of liver and kidney juices and impacts tendons, bones, and joints that are not properly nourished. This makes the body vulnerable to pathogens and attacks that cause knee pain and weakness[16]. Physical limitations due to pain that occur in people with knee pain can affect daily activities, so that it can reduce the quality of life in both the physical and mental components. In addition, psychological disorders such as stress and unstable emotional disorders These are common conditions that occur in patients with knee pain[16].

Table 4 shows that 38 research subjects experienced changes in the value of the knee pain scale. Table 4 shows that the mean values of the knee pain scale before and after therapy in group I were 5.63 and 3.10. In group II, the mean values of the knee pain scale before and after treatment were 5.68 and 2.36. This explains that there is a decrease in pain scale scores, which is interpreted as an increase in the value of the pain scale after therapy. This is in accordance with research that explains local point acupuncture therapy has an analgesic effect, improves functional ability in activities, and helps improve quality of life[17]. In addition, ear acupuncture point therapy combination knee infrared has also been shown to play a role in reducing pain in patients with knee pain[18].

The results of data analysis using the Wilcoxon test in Table 5 show that the significance in both groups is $p<0.001$, The results of this test indicate that there is a significant difference between the two groups on the pain scale in cases of knee pain. This study is in line with previous research, which explained that acupuncture therapy in osteoarthritis cases with local points is effective for relieving pain, improving functional ability, and improving quality of life. quality of life. In this study, it was proven that there was there is a decrease in VAS score and Jette Scale which is in line with previous research where there is a decrease in previous research where there was a decrease in WOMAC score. The average value before therapy was 63.8 to 53.72 in functional ability. functional ability with the WOMAC measuring instrument. with the WOMAC measuring instrument[10].

Pricking at acupuncture points will activate impulses starting from nociceptors that can stimulate modulation pathways through the release of neurotransmitters, such as beta-endorphins, dynorphins, serotonin, noradrenaline, and enkephalins, which have anti-inflammatory effects, immune modulation, and improvement of the central nervous system[8]. This study is in line with a previous study, which explained that auricular acupuncture therapy in cases of

knee pain was shown to be significant in improving basic functional abilities of the knee, reducing pain, and improving quality[19]. Ear acupuncture can stimulate enkephalin in the cerebrospinal fluid (CSF). This can reduce pain associated with the restoration of damaged nerve receptors, improve joint ROM, and improve sleep quality in patients with knee pain[20].

Table 6 explains that the Mann-Whitney test was used as a follow-up test to determine the difference in the effectiveness between the two groups on the pain scale in the knee pain scale. The results of the electroacupuncture treatment group showed that the treatment group is more effective than the knee infrared combination ear acupuncture treatment group. However, in the group average value between groups, there is a significant decrease in decrease value, so that it can be concluded that there was a decrease in the pain scale score (VAS), but there is no significant difference in the variance between groups. in the variance between the data groups being compared. the data groups being compared, in other words, the variance of the data is the same. in other words, the variance of the data is the same.

Many factors affect the knee infrared combined ear acupuncture method to show lower effect results than the local point electroacupuncture group, one of which is the number of treatments given. one is the number of treatments given, which is 6 treatments. In previous research, the number of 6 treatments was used for cases of shoulder pain. In addition, different research characteristics. The characteristics of the study were different from the previous study[20]. According to the previous study, ear acupuncture therapy was performed in 4 sessions for 4 weeks, performed 3 times a week, so that there was a significant decrease in pain[18]. However, however, local point electroacupuncture therapy has a significant influence significant effect on knee pain scale ($p<0.050$), and there is a significant decrease in knee pain scale ($p<0.050$) and there is a significant decrease in knee pain scale. significant effect on the knee pain scale ($p<0.050$), and there was a significant change in mean scores from pre-test to post-test in each treatment group.

V. CONCLUSION

This study demonstrates that both knee infrared therapy combined with auricular acupuncture and local electroacupuncture significantly reduce knee pain intensity. However, local electroacupuncture produces a greater reduction in pain scale scores, suggesting stronger therapeutic efficacy for managing knee pain. Further research with a larger sample size and longer treatment duration is recommended to confirm these findings and explore the long-term benefits of combined acupuncture modalities.

REFERENCES

1. Sugiharto H, Chandra NR, Legiran L. Prevalensi nyeri muskuloskeletal pada pengemudi becak kayuh di Palembang. Sriwij J Med [Internet]. 2020 Jan 31;3(1):15–23.
2. Haryanto JT, Widya Ningtyas LA. Efektivitas penggunaan terapi akupunktur metode Korean Hand Therapy pada lansia dengan nyeri muskuloskeletal di Posyandu Lansia Poltekkes Kemenkes Surakarta. Interes J Ilmu Kesehat [Internet]. 2020 May 28;9(1):96–103.
3. Korostyshevskiy V. Possible improvements of acupuncture for knee-pain treatment outcomes through local point palpation. Med Acupunct [Internet]. 2020 Oct 1;32(5):320–4. Available from: https://doi.org/10.1089/acu.2020.1429

4. Rasyid D, Rante A. Nyeri sendi pada lansia dan cara mengatasinya. Sahabat Sos J Pengabdi Masy [Internet]. 2022 Oct 15;1(1):21–6.
5. Badan Kebijakan Pembangunan Kesehatan. Survei Kesehatan Indonesia: Kota Sukoharjo [Internet]. Jakarta: Kemenkes RI; 2023.
6. Kurnia LF, Rahman F, Sulistyowati E. Edukasi dan penerapan latihan metode closed kinetic chain pada kondisi osteoarthritis genu di wilayah Puskesmas Mojolaban Sukoharjo. Kolaborasi J Has Kegiat Kolaborasi Pengabdi Masy [Internet]. 2024 Sep 25;2(3):93–103.
7. Maciocia G. The foundations of Chinese medicine: a comprehensive text [Internet]. 3rd ed. London: Elsevier Health Sciences; 2015.
8. Wang Y. Micro-acupuncture in practice [Internet]. London: Elsevier Health Sciences; 2008.
9. Shi GX, Tu JF, Wang TQ, Yang JW, Wang LQ, Lin LL, et al. Effect of electro-acupuncture and manual acupuncture on markers of inflammation in knee osteoarthritis. J Pain Res [Internet]. 2020 Aug;13:2171–9. Available from: https://doi.org/10.2147/JPR.S260262
10. Atalay SG. The effect of acupuncture and physiotherapy on patients with knee osteoarthritis: a randomized controlled study. Pain Physician [Internet]. 2021 May 1;24(3):E269–78.
11. Rubach A. Principles of ear acupuncture: microsystem of the auricle [Internet]. Stuttgart: Thieme; 2020.
12. Costa-Cavalcanti RG, de Sá-Caputo D da C, Moreira-Marconi E, Küter CR, Brandão-Sobrinho-Neto S, Paineiras-Domingos LL, et al. Effect of auriculotherapy on the plasma concentration of biomarkers in individuals with knee osteoarthritis. J Acupunct Meridian Stud [Internet]. 2020 Aug;11(4):145–52. Available from: https://doi.org/10.1016/j.jams.2017.11.001
13. Yusuf AM. Metode penelitian kuantitatif, kualitatif, dan penelitian gabungan. Jakarta: Prenada Media; 2020.
14. Rahmanto S, Aisyah K. Hubungan riwayat cidera lutut terhadap pasien yang berpotensi osteoarthritis lutut di Puskesmas Dinoyo Kota Malang. J Fisioter Rehabil. 2019;3(1):20–9.
15. Adani AF, Hadipoetro F, Triturawati E. Gambaran faktor risiko pasien osteoartritis genu di Pelayanan Rehabilitasi Medik RSIJ Pondok Kopi Januari–Desember 2019. Pros Semnaslit LPPM UMJ [Internet]. 2021;1–6.
16. Liu Y, Wu H. Effect of electroacupuncture on knee osteoarthritis and relevant inflammatory factors: a randomized clinical trial. World J Acupunct Moxibustion [Internet]. 2022 Oct;32(4):329–35. Available from: https://doi.org/10.1016/j.-wjam.2022.07.002
17. Tian H, Huang L, Sun M, Xu G, He J, Zhou Z, et al. [Retracted] Acupuncture for knee osteoarthritis: a systematic review of randomized clinical trials with meta-analyses and trial sequential analyses. Biomed Res Int. 2023;9824061. https://doi.org/10.1155/2023/9824061
18. Zhang X, He B, Wang H, Sun X. Auricular acupressure for treating early stage of knee osteoarthritis: a randomized, sham-controlled prospective study. QJM [Internet]. 2022 Aug;115(8):525–9. Available from: https://doi.org/10.1093/q-jmed/hcac069
19. Hendawy HA, Abuelnaga ME. Postoperative analgesic efficacy of ear acupuncture in patients undergoing abdominal hysterectomy: a randomized controlled trial. BMC Anesthesiol [Internet]. 2020 Dec 9;20(1):279. Available from: https://doi.org/10.1186/s12871-020-01187-4

20. Akbarnezhad N, Shahboulaghi FM, Khankeh H, Sokhangouie Y, Biglarian A, Modanloo S. The effect of acupressure therapy on pain, stiffness and physical functioning of knees among older adults diagnosed with osteoarthritis: a pilot randomized control trial. Eur J Integr Med [Internet]. 2019 Apr;28:68–75. Available from: https://doi.org/10.1016/j.eujim.2019.04.007.