Article

Effectiveness of Local Point Acupuncture and Auricular Acupuncture Therapy on Basic Functional Ability of Knee in Knee Pain Patients in Kedungwringin Village, Banyumas Regency

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ABSTRACT

Knee pain is a disorder of the knee joints felt by most people in the world where a person feels pain and movement limitations while doing activities. Several factors cause knee pain, one is degenerative factors. Acupuncture therapy can provide a relaxing effect, improve circulation, repair damaged tissue, and reduce pain in the knee. This study aimed to determine the effectiveness of local point acupuncture therapy and auricular acupuncture on the basic functional abilities of the knee in patients with knee pain in Kedungwringin Village, Banyumas Regency. This study used quantitative research with a "Quasi-Experimental" research design. The sample of the research study was 45 people divided into three treatment groups, namely group I auricular acupuncture therapy, group II local point acupuncture therapy, and group III auricular acupuncture therapy and local point acupuncture. This study started from February to April 2024 and was conducted in Kedungwringin Village, Banyumas Regency. The One Way Anova test analysis of each group has a significant value $\rho<0.05$ ($\rho=0,007$) which means Ha is accepted and H0 is rejected so that it can be interpreted that local point acupuncture therapy and auricular acupuncture are effective on the basic functional abilities of the knee in patients with knee pain.

I. INTRODUCTION

Knee pain is a musculoskeletal disorder experienced by most people in the world. The person can feel pain in the knee area while doing activities, walking, or when quiescent[1]. Knee pain can cause inflammation due to several factors such as trauma factors, degenerative factors, and overuse knee conditions[2][3]. Knee pain is also one of the main causes of disability in adults and those over 60 years of age with a prevalence of 60-70%[4].

The number of people with osteoarthritis has increased since 1990 until now. In 2019, approximately 528 million people worldwide suffered from osteoarthritis (OA). Approximately 73% of people with osteoarthritis (OA) are over 55 years old and 60% are women[5].

According to the Riskesdas database, the incidence of joint pain in Indonesia is up to 7.3%. The prevalence of joint pain in Central Java Province was 6.78%[6]. The Banyumas Regency Health Office report in 2022 reported that the total elderly population was 251,204 people, consisting of 120,003 people who were male and 131,201 people who were female, and knee pain was included in the top 10 disease categories experienced by the elderly[7]. Based on the prevalence of the incidence, knee pain can be treated medically by administering non-steroidal anti-inflammatory and analgesic drugs. In addition, it can be treated by using warm compresses and doing physical therapy such as gymnastics, physiotherapy, and acupuncture[2][8].

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 obstructs 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, crepitation, hot sensation and pain [9][10].

Acupuncture therapy can produce an analgesic effect through the nervous system and local tissues, which has been proven to reduce pain symptoms[11]. The use of local and distal acupuncture points in patients with knee osteoarthritis is effective in relieving pain, improving function, and quality of life[8]. Several acupuncture 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[12]. Auricular acupuncture produces an analgesic effect so it can increase mobility and quality of life[13].

II. METHODS

This research uses Quasy Experimental Design with the research design used is pretest-postest design. The sampling technique used in this research was purposive sampling. This study aims to collect information obtained through real experiments under conditions that don't allow control and manipulation of all relevant variables [14].

In this study, there was a division of 3 experimental groups, namely the first group using auricular acupuncture therapy, the second group using local point acupuncture therapy, and the third group using a combination of local point acupuncture therapy and auricular acupuncture. This study was conducted to determine the effectiveness between intervention groups. Both groups were given a pretest before getting an intervention, after getting an intervention both groups were given a post-test.

This research was conducted from February to April 2024 at Desa Kedungwringin, Kecamatan Patikraja, Kabupaten Banyumas. The population in this research were residents in Kedungwringin Village, Patikraja District, Banyumas Regency who complained of knee pain. A preliminary study was conducted on November 27-December 10, 2023 using questionnaires and interviews to obtain data on 58 people who complained of knee pain. The sample in this study were Kedungwringin villagers who met the researcher's inclusion and exclusion criteria, namely 45 samples.

The dependent variable of this study is the basic functional ability of the knee in patients with knee pain. The independent variables of this study are local point acupuncture therapy and auricular acupuncture with the points used, namely EX-LE2 Heding, EX-LE5 Xiyan, ST36 Zusanli,

and knee and kidney auricular acupuncture points.

In this study, there was a division of 3 experimental groups, namely the first group using auricular acupuncture therapy at the Shenmen and kidney points, the second group using local point acupuncture therapy at the EX-LE2 Heding, EX-LE5 Xiyan, ST 36 Zusanli points, and the third group using a combination of local point acupuncture therapy and auricular acupuncture.

The tools and materials used in this research were a sphygmomanometer, 1 cun acupuncture needle, auricular acupuncture needle (press needle), 70% alcohol swab, hand sanitizer, nierbeken, tweezers, needle holder, handscoon, and mask.

Acupuncture action in the three groups was given by Standard Operating Procedures (SOP) for 6 times therapy with a frequency of treatment twice a week. Before the action, the therapist examined the knee pain scale using VAS (Visual Analogue Scale) and measured the basic functional ability of the knee using the Jette Scale).

III. RESULT

This study began with preliminary research conducted in November-December 2023 to determine the number of research subjects who experienced knee pain. The results of the preliminary research obtained 45 research subjects who met the research criteria. The study subjects were divided into three groups, and both of them had 15 persons respondents. Both groups received therapy for 6 times therapy.

Table 1. Distribution of characteristics respondents

Characteristics	N	%
Age (years)		
46-50	17	37.8
51-55	12	26.7
56-60	16	35.6
Occupation		
Housewife	18	40.0
Teacher	11	24.4
Entrepreneur	12	26.7
PNS	2	4.4
Private Employees	2	4.4
Differentiation syndrome		
Invation of Cold Wind and Damp	7	15.6
Stagnation of Qi and Xue	4	8.9
Qi and Xue Deficiency	13	28.9
Heart and Kidney Deficiency	21	46.7

Table 1 shows that most age of the respondents who feel knee pain are ages 46-50 as many as 17 (37.8%), for occupation most respondents are housewives who have 18 (40.0%) respondents. The most differentiation syndrome is heart and kidney deficiency, with as many as 21 respondents (46.7%).

Table 2. Frequency distribution of research subjects based on score Jette scale score before therapy action

Jette Scale	Group I		Group II		Group III	
	N	%	N	%	N	%
10-18	12	80.0	3	20.0	5	33.4
19-27	3	20.0	10	66.7	10	66.6
>28	-	-	2	13.3	-	-

Based on Table 2 it can be explained that from each treatment group of 15 people who were divided into 3 groups, namely, the group I showed that the Jette Scale score before the most action was a score between 10-18 (mild complaints) as many as 12 people (80.0%). Then group II showed the Jette Scale score before the most action was a score between 19-27 (moderate complaints) as many as 10 people (66.7%), and group III showed the Jette Scale score before the most action was a score

between 19-27 (moderate complaints) as many as 10 people (66.6%).

Table 3. Frequency distribution of research subjects based on score Jette scale score after therapy action

Jette Scale	Group I		Group II		Group III	
	N	%	N	%	N	%
9	2	13.3	4	26.7	6	40.0
10-18	13	86.7	11	73.3	9	60.0

Based on Table 3 it can be explained that from each treatment group of 15 people who were divided into 3 groups, namely, the group I showed that the Jette Scale score after the most action was a score between 10-18 (mild complaints) as many as 13 people (86.7%). Then group II showed the Jette Scale score after the most action was a score between 10-18 (mild complaints) as many as 11 people (73.3%), and group III showed the Jette Scale score after the most action was a score between 10-18 (mild complaints) as many as 9 people (60.0%).

Table 4. Overview of Jette scale before and after treatment and its decrease

Intervention Group		*Mean*	SD
Group I	Before	16.73	3.01
	After	12.00	1.89
Group II	Before	22.73	3.95
	After	10.60	1.40
Group III	Before	21.00	3.91
	After	9.93	0.96

Table 4 shows that the decrease in Jette scale scores from T0-T6 was greatest in group II, namely the group with local point acupuncture treatment with a rate of 53.36%.

The results of the normality test in this research on the basic functional abilities of the knee in the 3 treatment groups have a significance value (sig.) $\rho > 0.05$, so the data is normally distributed the homogeneity test on the research subject data above uses the Levene Statistics Test. The results of the homogeneity test on the basic functional abilities of the knee in the 3 treatment groups also have a significance value of $\rho > 0.05$, so the data is homogeneous.

Table 5. Result of One Way Anova Test

Interventoion	Mean	SD	p	F
Auricular Acupuncture	12.00	1.89		
Local Acupuncture	10.73	1.33	0.007	5.639
Acupuncture Combination	10.27	1.03		

Table 5 shows that the F value is 5.63 and the sig. (significance) in the three groups is $\rho = 0.007$, meaning $\rho < 0.05$, so Ho is rejected and Ha is accepted. The results of this test indicate that there is a significant difference between the three groups on the basic functional ability of the knee in cases of knee pain. The results of this test can be known to affect each treatment group by conducting further tests with the Post Hoc test to see the effect between treatments.

Table 6. The result of post hoc

Intervention	Mean Difference	CI 95%		ρ
		Lower limit	Upper Limit	
Auricular Acupuncture vs Local Acupuncture	1.27	0.19	2.34	0.022
Auricular Acupuncture vs Combination Acupuncture	1.73	0.66	2.81	0.002
Local Acupuncture vs Combination Acupuncture	0.46	-0.61	1.54	0.387

Table 6 is about Post Hoc test results showing that the significance value between the auricular acupuncture and local point acupuncture groups is 0.022 ($\rho < 0.005$), meaning that there is a difference in influence (significant). In the auricular acupuncture group and the combined acupuncture group, the significance value between the groups was

0.002 (ρ < 0.005), meaning that there was a different effect between the groups. Meanwhile, the local point acupuncture and combined acupuncture groups have a significance value of 0.387 where the value of ρ>0.005 which means there is no difference in effect between the auricular acupuncture group and the combined acupuncture group.

The significance value between groups indicates that local point acupuncture therapy combined with auricular acupuncture is more effective than auricular acupuncture therapy alone but not more effective when compared with local point acupuncture therapy. However, there was a significant decrease in the mean value between groups, so it can be concluded that there was a decrease in the Jette scale score but, there was no significant difference in the variance between the data groups compared.

IV. DISCUSSION

Data analysis table 1 explains the distribution of the age table that the most data in the age range 46-60 years was found to be 46-50 years old, namely 17 people (37.8%). This is following the results of research which explains that women aged >45 years experience more knee pain due to changes in the musculo-skeletal system resulting in the knee joint being more susceptible to damage[15].

Table 1 explains that the most research subjects based on occupation were housewives (IRT) amounting to 18 people (40.0%). 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[16]. 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[17]. 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[18].

Table 1 explains that the study subjects based on the differentiation of the most syndromes were liver and kidney deficiency syndrome in as many as 21 people (46.7%). With age, the body experiences congenital weakness so the amount and quality of vital substances begin to decline. This condition causes the depletion of liver and kidney essence and has an impact on tendons, bones, and joints that are not adequately nourished. This makes the body vulnerable to exogenous pathogens and attacks that cause knee pain and weakness[19]. Physical limitations due to pain that occurs in people with knee pain can affect daily activities so 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 are common conditions that occur in people with chronic pain[18].

Table 4 showed that 45 research subjects experienced changes in the value of basic knee functional abilities. Table 4 shows that the mean value of basic functional knee ability before and after therapy in group I is 16.73 and 12.00. In group II, the mean value of basic functional knee ability before and after treatment was 22.73 and 10.60. Meanwhile, in group III, the mean value of basic functional knee ability before and after therapy was 21.00 and 9.93. This explains that there is a decrease in the Jette scale score which is interpreted as an increase in the value of the basic functional ability of the knee after therapy. This is following research that describes local point acupuncture therapy has an analgesic effect, improving functional ability in activities, and helping improve quality of life[20]. In addition, ear acupuncture therapy has also been shown to

play a role in reducing pain in patients with knee pain[21].

Tables 5 and 6 explain the results of data analysis in the normality test using the Shapiro-Wilk Test in the three groups on basic functional knee ability showing a sig value. (significance) $\rho > 0.05$ so it can be concluded that the data is normally distributed. Furthermore, the homogeneity test using Levene's Test obtained a sig value. (significance) $\rho > 0.05$ so that the data is homogeneous.

The results of data analysis using the One Way Anova test in Table 5 showed that the F value was 5.639 and the sig value was. (significance) in the three groups $p = 0.007$ ($\rho < 0.05$) there is a significant difference between the three groups on the basic functional ability of the knee in cases of knee pain. This study is in line with previous research which explains that acupuncture therapy in osteoarthritis cases with local points is effective for relieving pain, improving functional abilities, and improving quality of life. In this study, it is evident that there is a decrease in VAS and Jette Scale scores, which is in line with previous research where there is a decrease in WOMAC scores. The average value before therapy was 63.8 to 53.72 in functional ability with the WOMAC measuring instrument[8].

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[22]. Auricular acupuncture needle sticking can stimulate enkephalin in the cerebral spinal fluid (CSF). This can reduce pain associated with the restoration of damaged nerve receptors, and improve joint ROM, and sleep quality in patients with knee pain[23].

Table 6 explained that the Post Hoc test as a follow-up test was used to determine the effectiveness between the three groups on the basic functional ability of the knee, the results of the acupuncture treatment group of the combination of local points and auricular acupuncture were more effective than the auricular acupuncture treatment group but not more effective when compared to the local point acupuncture treatment group. However, in the mean value between groups, there is a significant decrease value so it can be concluded that there is a decrease in the Jette scale score but there is no significant difference in the variance between the data groups being compared in other words the data variance is the same.

Many factors influence the combination method of local point acupuncture and auricular acupuncture therapy to show lower effectiveness results than the local point acupuncture group, one of which is the number of treatments given, namely 6 treatments. In previous studies, the number of 6 treatments was used for shoulder pain cases. In addition, the focus of the research conducted was on changes in the pain scale, in contrast to this study which is on changes in the basic functional abilities of the knee so that it has different characteristics of research results[23]. According to previous research, auricular acupuncture therapy was carried out in 4 sessions for 4 weeks, carried out 3 times a week so that there was a significant decrease in pain[21]. However, local point acupuncture therapy and auricular acupuncture have a significant effect on the basic functional ability of the knee ($\rho < 0.05$), and there is a significant change in mean values from pre-test to post-test in each treatment group.

V. CONCLUSION

The research subjects as a whole amounted to 45 people with complaints of knee pain. The characteristics of the research subjects included female gender with the most frequency experienced in the age range of 46-50 years as many as 17 people (37.8%), 18 housewives (40.0%), and differentiation of liver and kidney deficiency syndrome as many as 21 people (46.7%). Based on the basic functional ability of the knee (Jette scale) in group I (auricular acupuncture therapy) has been shown to affect the decrease in Jette scale scores with an average (mean) value of 16.73 to 12.00. Group II (local point acupuncture therapy) was shown to affect the decrease in the Jette scale score with an average value (mean) of 22.73 to 10.60. Group III (auricular acupuncture therapy and local point acupuncture) was shown to affect the decrease in Jette scale scores with an average value (mean) of 21.00 to 9.93. The One Way Anova test results of the three groups before and after therapy had an F value of 5.639 and a significance value of ρ <0.05 (ρ=0.007). This means that there is a significant of the effectiveness of local point acupuncture therapy and auricular acupuncture on the basic functional ability of the knee.

Meanwhile, to determine the level of effectiveness between each group, the Post Hoc further test was conducted and the results showed that the combined local point acupuncture and auricular acupuncture treatment group was more effective than the auricular acupuncture treatment group but not more effective when compared to the local point acupuncture treatment group. This can be seen by comparing the mean value of 4.73 for the auricular acupuncture group, 11.07 for the combination group of local point acupuncture and auricular acupuncture, and 12.13 for the local point acupuncture group. However, there was a significant decrease in the mean value between groups, so it can be concluded that there was a decrease in the Jette scale score but, there was no significant difference in the variance between the compared data groups.

REFERENCES

1. Natilla S, Syahrani O. Analisis Faktor Penyebab Terjadinya Nyeri Lutut pada Remaja Penderita Obesitas. Prodi Pendidikan Dokter, Fakultas Kedokteran, Universitas Sebelas Maret, Surakarta, Indonesia. 2019.
2. Haryanto JT, Pradina YG, Estuningsih E. Pengaruh Terapi Akupunktur Jin's 3 Needle terhadap Penurunan Skala Nyeri pada Pasien Nyeri Lutut di Dusun Sidorejo Desa Ngargorejo Kecamatan Ngemplak Boyolali. J Keterapian Fis. 2017;2(1):54–61.
3. Sembiring S. Diagnosis Deferensial Nyeri Lutut. Yogyakarta: Leutikaprio; 2018.
4. Rahmi R. Faktor-Faktor yang Berhubungan dengan Kejadian Abortus. J Media Kesehat. 2018;6(2):169–79.
5. WHO. Osteoarthritis [Internet]. World Health Organization. 2023.
6. Kementerian Kesehatan Republik Indonesia. Penyakit Jantung Penyebab Kematian Terbanyak ke-2 di Indonesia [Internet]..Kementerian Kesehatan Republik Indonesia. 2018
7. Dinas Kesehatan Kabupaten Banyumas. Profil Kesehatan Tahun 2022. Banyumas: Dinas Kesehatan Kabupaten Banyumas; 2022.
8. Atalay SG, Durmuş A, Gezginaslan Ö. The effect of acupuncture and physiotherapy on patients with knee osteoarthritis: A randomized controlled study. Pain Physician. 2021;24(3):E269–78.
9. Maciocia G. The Foundations of Chinese Medicine: A Comprehensive Text [Internet]. Elsevier Health Sciences; 2015.

10. Wang Y. Micro-Acupuncture in Practice [Internet]. Elsevier Health Sciences; 2008
11. Shi GX, Tu JF, Wang TQ, Yang JW, Wang LQ, Lin LL, et al. Effect of electro-acupuncture (EA) and manual acupuncture (MA) on markers of inflammation in knee osteoarthritis. J Pain Res. 2020;13:2171–9.
12. Rubach A. Principles of Ear Acupuncture: Microsystem of the Auricle [Internet]. Thieme; 2016.
13. Costa-Cavalcanti RG, de Sá-Caputo Dda 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. 2018;11(4):145–52.
14. Yusuf AM. Metode Penelitian Kuantitatif, Kualitatif & Penelitian Gabungan [Internet]. Prenada Media; 2016
15. Rahmanto S, Aisyah K. Hubungan Riwayat Cidera Lutut terhadap Pasien yang Berpotensi Osteoartritis Lutut di Puskesmas Dinoyo Kota Malang. J Fisioter dan Rehabil. 2019;3(1):20–9.
16. 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. 2021;1–6.
17. Dhaifullah MR, Meregawa PF, Aryana IGNW, Subawa IW. Hubungan usia, jenis kelamin, dan pekerjaan terhadap derajat keparahan penderita osteoartritis lutut berdasarkan Kellgren-Lawrence di RSUP Sanglah Denpasar. E-Jurnal Med Udayana. 2023;12(1):107.
18. Afina SN, Yuniarti L, Masria S, Rathomi HS, Dharmmika S. Hubungan derajat nyeri dan klasifikasi radiologik dengan kualitas hidup pasien osteoartritis lutut. J Integr Kesehat Sains. 2019;1(2):91–6.
19. Liu Y, Wu H. Effect of electroacupuncture on knee osteoarthritis and relevant inflammatory factors: A randomized clinical trial. World J Acupunct Moxibustion. 2022;32(4):329–35.
20. Tian H, Huang L, Sun M, Xu G, He J, Zhou Z, et al. Acupuncture for knee osteoarthritis: A systematic review of randomized clinical trials with meta-analyses and trial sequential analyses. Biomed Res Int. 2022;2022:6561633.
21. Zhang X, He B, Wang H, Sun X. Auricular acupressure for treating early stage of knee osteoarthritis: A randomized, sham-controlled prospective study. QJM. 2022;115(8):525–9.
22. Hendawy HA, Abuelnaga ME. Postoperative analgesic efficacy of ear acupuncture in patients undergoing abdominal hysterectomy: A randomized controlled trial. BMC Anesthesiol. 2020;20(1):1–8.
23. 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. 2019;28:68–75.