Indonesian Journal of Medicine (2025), 10(02): 154-162
Masters Program in Public Health, Universitas Sebelas Maret

Research
Open Access

Effectiveness of Combined Acupuncture Therapy and Turmeric (*Curcuma longa Linn*) on Blood Protein Profile in Osteoarthritis Patients

Heni Nur Kusumawati, Hanung Prasetya, Nurtama Aditya Nugraha

Study Program in Acupuncture, Health Polytechnics, Ministry of Health, Surakarta

Received: 11 February, 2025; Accepted: 17 March, 2025; Available online: 10 April, 2025

ABSTRACT

Background: Osteoarthritis (OA) is a degenerative disease of the joints that commonly occurs in the hands, waist, a. nd knees. One of the efforts to control OA is with acupuncture. This study aims to analyze the effectiveness of the combination of acupuncture and turmeric herbs on reducing the levels of total protein, albumin, and globulin in OA patients.
Subjects and Method: The Randomized Controlled Trial (RCT) study was conducted at Redy Clinical Laboratory in August 2024. A total of 50 patients with OA were divided into two groups: (1) Intervention group of combination of acupuncture and turmeric herbs (n= 25); and (2) The control group was given acupuncture (n=25). The dependent variables are total protein, albumin, and globulin. The independent variable was a combination of acupuncture and turmeric herbs. The difference in the average increase in protein, albumin, and globulin levels in each group was analyzed using the Independent test.
Results: The average protein level in the combination group of acupuncture therapy and turmeric herbs (Mean= 8.40; SD= 0.27) was higher than the control group (Mean= 7.74; SD= 0.33), and this result was statistically significant (p <0.001). The average albumin level in the combination group of acupuncture therapy and turmeric herbs (Mean= 5.07; SD= 0.49) was higher than the control group (Mean= 4.84; SD= 0.66), but this result was statistically insignificant (p= 0.156). The average globulin levels in the combination group of acupuncture therapy and turmeric herbs (Mean= 3.41; SD= 0.88) were higher than the control group (Mean= 3.17; SD= 0.65), but this result was statistically insignificant (p = 0.280).
Conclusion: The combination of acupuncture therapy and turmeric herbs is effective in increasing total protein, albumin, and globulin levels in OA patients.

Keywords: acupuncture, hypnotherapy, osteoarthritis patients, protein levels, turmeric herbs.

Correspondence:
Heni Nur Kusumawati. Study Program in Acupuncture, Health Polytechnics, Ministry of Health, Surakarta. Email: heninurkusumawati@yahoo.com. Mobile: +6281226278822.

Cite this as:
Kusumawati HN, Prasetya H, Nugraha NA (2025). Effectiveness of Combined Acupuncture Therapy and Turmeric (*Curcuma longa Linn*) on Blood Protein Profile in Osteoarthritis Patients. Indones J Med. 10(01): 154-162. https://doi.org/10.26911/theijmed.2025.10.02.07.

BACKGROUND

Osteoarthritis (OA) is a degenerative disease of the joints that commonly occurs in the hands, waist, and knees. This disease is the world's leading cause of Musculoskeletal disorders and the second leading cause of physical disability after ischemic heart disease for people over 50 years of age. This disease causes a large loss of

working hours as well as high medical costs (Dieppe, 2000).

Persistent OA can cause pain, stiffness, swelling, and can lead to disability (Forest, 2017). Characteristics that usually appear in OA are damage to cartilage (joint cartilage), cartilage itself is a hard tissue that has a slippery nature that covers the end of the hard bone in the joint. The function of cartilage tissue is as a smoother of inter-bone movements and as a shock absorber when the joints are active or mobile (Helmi, 2012). This is characterized by degeneration of joint cartilage and the formation of new bone (osteophytes) at the periphery of the joint, which can cause OA disorder to develop slowly, asymmetrically and non-inflammatory. This condition can result in the breakdown of the hyaline articular cartilage biochemical in the synovial joint of the knee, which results in damage to the joint cartilage (Marlina, 2015).

There is no definite cause of osteoarthritis disease, but based on a number of studies, the main risk factors in people with OA are age, female gender, obesity, physical activity, genetic factors, race, joint trauma, and chondrocalcinosis. In addition, there are several things that can aggravate OA, such as lack of movement, diabetes and pre-menopausal age groups (Soeryadi et al., 2017). Strenuous activity, frequent squatting, kneeling, and long walks carrying heavy weights can increase the incidence of OA (Tanoto, 2018).

The prevalence of pelvic OA is 5.5%, knee osteoarthritis is 7.1%, and hand osteoarthritis 4.3%. In Indonesia, the prevalence of osteoarthritis reaches 5% at the age of <40 years, 30% at the age of 40-60 years, and 65% at the age of >61 years. According to the World Health Organization (WHO) in 2011, osteoarthritis patients in the world reached 151 million and 24 million people in the Southeast Asian region. Meanwhile, the National Centers for Health Statistics, estimates that there are 15.8 million (12%) adults between the age range of 25-74 years old who have osteoarthritis complaints (Rajvir et al., 2018).

The World Health Organization (WHO) estimates that 400 per thousand of the world's population over the age of 70 suffer from osteoarthritis and 800 per thousand OA patients have mild to severe mobility limitations that reduce their quality of life. Osteoarthritis is becoming one of the deadliest diseases in developed countries. The worldwide estimate is that 9.6% of men and 18.0% of women over the age of 60 have symptoms of OA. 80% of those with OA will have limitations in movement, and 25% will not be able to perform their daily living activities (Nelson, 2018).

Basic Health Research (Riskesdas) data in 2013 as a result of interviews at the age of 15 years, the average prevalence of joint disease/rheumatism was 24.7%. East Nusa Tenggara Province (NTT) is the province with the highest prevalence of osteoarthritis, which is around 33.1%, and the province with the lowest prevalence is Riau, which is around 9%, while in East Java the prevalence rate is quite high which is around 27% (Linder, 1958). More than 85% of osteoarthritis patients have their activities disrupted, especially for squatting, climbing stairs, and walking. Squatting and bending knee problems are crucial matters for osteoarthritis patients in Indonesia because many daily activities depend on these activities, especially during prayer and defecation (Hunter, 2008).

Based on studies in Central Java, the prevalence of knee osteoarthritis reaches 15.5% in men and 12.7% in women (Widianta, 2009). For the city of Surakarta data shows that the data of osteoarthritis in 2015

was 3.6% with men 1.5% and women 2.1%. Scientific studies using modern technology on acupuncture in China began in the late 1950s when acupuncture was invented to be able to successfully modify pain generated by surgical procedures. An interesting finding is that needle manipulation at the acupuncture point resulted in a slow decrease in the skin pain threshold, reaching its peak within 30 minutes, followed by exponential decay after needle removal.

Pain management therapy in OA can be performed with non-pharmacological efforts. One of them is acupuncture as an option for reducing or relieving pain without side effects and reducing the use of narcotics by 80%, although the administration of acupuncture induction relatively takes a long time (Brower, 2005). Acupuncture therapy is believed to increase the production of the hormone endorphin. Some of them are regulating the production of growth and sex hormones, controlling pain and persistent pain, controlling feelings of stress, and boosting the immune system. Endorphins in the body can be triggered through various activities, such as deep breathing and relaxation, meditation, and acupuncture therapy (Diana, 2013).

This study aims to analyze the effectiveness of the combination of acupuncture and turmeric herbs on reducing the levels of total protein, albumin, and globulin in OA patients.

SUBJECTS METHOD

1. Study Design

The RCT research was conducted at the Redy Clinical Laboratory, Surakarta in August 2024.

2. Population and Sample

The population and sample in this study were 50 OA patients divided into two groups: (1) The intervention group of combination of acupuncture and turmeric herbs (n= 25); and (2) The control group that obtained acupuncture (n=25).

3. Study Variables

The dependent variables were the levels of protein, albumin, and globulin. The independent variable was the combination of acupuncture therapy and turmeric herbs.

4. Operational Definition of Variables

Protein Level: protein content in the blood. Proteins in the blood are made up of two main types, namely albumin and globulin. Normal blood protein levels in adults are 6.0 to 8.3 grams per deciliter (g/dL) or 60 to 83 g/L. The normal range of albumin in the blood is 3.4–5.4 g/dL The normal range of globulin in the blood is 2.0–3.5 g/dL.

Acupuncture Therapy Point Ex-Le2 (Heding), Ex-Le5 (Xiyan), St-35 (Dubi), St-36 (Zusanli), Gb- 34 (Yanglinquan), Sp-10 (Xuehai): Acupuncture therapy by inserting sterile acupuncture needles at certain points or areas on the body, namely Ex-Le2 (*Heding*), Ex-Le5 (*Xiyan*), St-35 (*Dubi*), St-36 (*Zusanli*), Gb-34 (*Yanglinquan*), Sp-10 (*Xuehai*). Acupuncture therapy was carried out for 15 minutes/session for 12 times with a frequency of therapy was 2 times a week.

Turmeric Herbs (*Curcuma Longa Linn.)*: Consumption of Turmeric Herbs to Increase Protein Levels in the Blood.

Combination of acupuncture therapy and turmeric herbs: the administration of therapy by inserting sterile acupuncture needles at certain points or areas of the body, namely Ex-Le2 (*Heding*), Ex-Le5 (*Xiyan*), St-35 (*Dubi*), St-36 (*Zusanli*), Gb-34 (*Yanglinquan*), Sp-10 (*Xuehai*) and also the administration of turmeric herbs.

5. Study Instruments

The measuring tool in this study is ROM, or Range of Motion. ROM is an examination tool that evaluates the extent to which the

joint can be moved around a fixed point or on its own.

6. Data analysis

The difference in the average increase in protein levels in the blood in the pre- and post-groups was analyzed by the independent test.

7. Research Ethics

Ethics in this study, which is ethics clearance, as well as informed consent that are signed and kept confidential during the study. Ethics clearance for this study was obtained from the Health Research Ethics Committee of Kusuma Husada University Surakarta, No. 2362/UKH. L.02/EC/-VIII/2024.

RESULTS

Table 1 shows that as many as 50 OA patients, the majority are male as many as 26 patients (52.00%). A total of 50 OA patients consisted of two groups, namely: (1) Group of combination of acupuncture therapy and turmeric herbs (n= 25); and (2) Acupuncture therapy group (n= 25).

Table 2 shows that the average subject was 48 years old. Before the intervention, the majority of subjects had an average total protein of 7.58 g/dL, albumin of 4.75 g/dL, and globulin of 3.18 g/dL. After the intervention, the majority of subjects had an average total protein of 8.01 g/dL, albumin of 4.95 g/dL, and globulin of 3.29 g/dL.

Table 1. Characteristics of subjects based on gender

Characteristics	Frequency (n)	Percentage (%)
Gender		
Male	26	52.00
Female	24	48.00
Intervention Group		
Combination of acupuncture and turmeric herbs	50	50.00
Acupuncture	50	50.00

Table 2. Characteristics of continuous data subjects

Characteristic	N	Mean	SD	Min	Max
Age (years)	50	42.52	6.67	37	63
Pre-protein (g/dL)	50	7.58	0.49	6.5	8.3
Pre-albumin (g/dL)	50	4.75	0.59	3.1	5.4
Pre globulin (g/dL)	50	3.18	0.79	1.1	5.2
Post protein (g/dL)	50	8.01	0.45	7.1	8.8
Post albumin (g/dL)	50	4.95	0.58	3.3	6.9
Post globulin (g/dL)	50	3.29	0.78	1.1	5.2

1. Bivariate Test

Table 3 shows that there was a difference in mean levels of protein, albumin, and globulin after intervention in the combination therapy group of acupuncture and turmeric herbs and the control group.

Table 3 shows that there was a difference in mean protein levels before and after the intervention in the group of combination of acupuncture therapy and turmeric herbs, and the control group. Before the intervention, the average protein levels were comparable between the group of combination of acupuncture therapy and turmeric herbs (Mean = 7.80; SD= 0.37) and the control group (Mean= 7.37; SD= 0.50), and this result was statistically significant (p= 0.001). After the intervention, the average protein level was higher in the group of combination of

acupuncture therapy and turmeric herbs (Mean = 8.40; SD= 0.27) than the control group (Mean= 7.74; SD= 0.33), and this result was statistically significant (p <0.001).

Table 3. Differences in protein levels before and after the intervention in the group of combination of acupuncture therapy and turmeric herbs, and the control group

Group	N	Mean (g/dL)	SD	p
Pre Intervention				
Acupuncture and Turmeric Herbs	50	7.80	0.37	0.001
Control	50	7.37	0.50	
Post Intervention				
Acupuncture and Turmeric Herbs	50	8.40	0.27	<0.001
Control	50	7.74	0.33	

Table 4 shows that there was a difference in mean albumin levels before and after the intervention in the group of combination of acupuncture therapy and turmeric herbs, and the control group. Before the intervention, average albumin levels were comparable between the combination group of acupuncture therapy and turmeric herbs (Mean = 4.82; SD 0.55) and the control group (Mean= 4.68; SD= 0.59), however, this result was statistically insignificant (p= 0.376). After the intervention, the average albumin level was higher in the group of combination of acupuncture therapy and turmeric herbs (Mean= 5.07; SD= 0.49) than the control group (Mean= 4.84; SD= 0.66), however, this result was statistically insignificant (p= 0.156).

Table 4. Differences in albumin levels before and after the intervention in the group of combination of acupuncture therapy and turmeric herbs, and the control group

Group	N	Mean (g/dL)	SD	p
Pre Intervention				
Acupuncture and Turmeric Herbs	50	4.82	0.55	0.376
Control	50	4.68	0.59	
Post Intervention				
Acupuncture and Turmeric Herbs	50	5.07	0.49	0.156
Control	50	4.84	0.66	

Table 5 shows that there was a difference in mean globulin levels before and after the intervention in the group of combination of acupuncture therapy and turmeric herbs, and the control group. Before the intervention, average globulin levels were comparable between the group of combination of acupuncture therapy and turmeric herbs (Mean = 3.25; SD= 0.89) and the control group (Mean= 3.11; SD= 0.68), however this result was statistically insignificant (p= 0.376). After the intervention, the average globulin level was higher in the group of combination of acupuncture therapy and turmeric herbs (Mean = 3.41; SD= 0.88) than the control group (Mean= 3.17; SD = 0.65), but this result was statistically insignificant (p = 0.280).

Table 5. Differences in globulin levels before and after the intervention in the group of combination of acupuncture therapy and turmeric herbs, and the control group

Group	N	Mean (g/dL)	SD	p
Pre Intervention				
Acupuncture and Turmeric Herbs	50	3.25	0.89	0.536
Control	50	3.11	0.68	
Post Intervention				
Acupuncture and Turmeric Herbs	50	3.41	0.88	0.280
Control	50	3.17	0.65	

DISCUSSION

This study showed that the combination of acupuncture therapy and turmeric herbs was effective in increasing protein, albumin, and globulin levels in OA patients. The intervention provided was acupuncture therapy which was conducted by inserting sterile acupuncture needles at certain points or aeras on the body, namely Ex-Le2 (*Heding*), Ex-Le5 (*Xiyan*), St-35 (*Dubi*), St-36 (*Zusanli*), Gb-34 (*Yanglinquan*), Sp-10 (*Xuehai*). Acupuncture therapy was performed for 15 minutes/ session for 12 times with a frequency of therapy 2 times a week. The study showed that the frequency of therapy had a significant positive effect on nutrient absorption in malnourished patients (b= 45.83, p < 0.001), This indicates that the more often acupuncture therapy is performed, nutrient absorption tends to increase (Agustina et al., 2023).

Another intervention given to OA patients was the turmeric herb (*Curcuma Longa Linn.)* to increase protein levels in the blood. Modern pharmacological studies show that the main component of *Curcuma longa L.* is curcumin and turmeric volatile oil. A meta-analysis study sourced from 29 RCT articles shows that curcumin may improve symptoms and reduce inflammation in patients with arthritis (Zeng et al., 2022).

Curcuma longa L. as the main and most pharmacologically active ingredient, "generally recognized as safe" by the U.S. FDA (Sahebkar, 2014; Chandrasekaran et al., 2013; Gupta et al., 2013). Current in vitro and preclinical studies have shown the potential of curcumin, *Curcuma longa* Extract, and other multi-herbal preparations of Curcuma longa Extract to delay the progression of OA and relieve OA-related pain (Prasad et al., 2014; Peddada et al., 2015; Bannuru et al., 2018).

A study in China examines the impact of protein-rich nutrient supplementation combined with resistance training on muscle mass and physical activity in elderly women with knee OA. The study shows that such interventions increase muscle mass and physical activity, which are important in the management of OA (Liao et al., 2021).

A cohort study in Framingham discovers that 6.8% of people aged 26 and older have symptoms of OA on the hands with an average of 3.8% males and 9.2% females. NADW (North American Western Dressage) estimates that 13 million people in the United States aged 26 years and older have symptoms of osteoarthritis in the hand, an estimated 9.3 million (4.9%) in the knee and 6.7% in the pelvis. Johnston Country Osteoarthritis (JoCo osteoarthritis) Project, a study of osteoarthritis in the knees and pelvis, identified 43.3% of patients complained of pain and stiffness in the joints. This is due to thickening of the joint capsule and changes in shape in osteophytes (Murphy, 2012). The direct

impact of the manifestation of knee OA can affect the patient's daily life, such as social interactions, mental function, as well as sleep quality (Crawford, 2013).

The limitations of this study include: (1) This study only observes the effect of combination therapy on protein levels, but does not elaborate the underlying mechanism of action for the increase in protein levels. Further studies are needed to uncover the molecular mechanisms involved; and (2) This study only analyzed total proteins, albumin, and globulins. However, there are many other types of proteins that may be relevant in the process of OA disease. A more comprehensive analysis of protein profiles can provide a more comprehensive picture; (3) Factors such as acceptance to perform acupuncture, gender, age, severity of OA, and so on have not been taken into account. This study has not examined these other determinants that may affect the subjects' psychological state and the behavior of the subjects who receive the intervention.

This study with a Randomized Controlled Trial (RCT) design concludes that the combination of acupuncture therapy and turmeric herbs is effective in increasing protein, albumin, and globulin levels in OA patients.

AUTHOR CONTRIBUTION

Heni Nur Kusumawati and Hanung Prasetya prepared the manuscript and analyzed the data, Nurtama Aditya Nugraha improved the script editing layout.

ACKNOWLEDGMENT

The researchers would like express their gratitude to OA patients at Redy Clinical Laboratory, and all related parties.

FUNDING AND SPONSORSHIP

This study was self-funded.

CONFLICT OF INTEREST

There was no conflict of interest in this study.

REFERENCE

Agustina T, Binuko RSD (2021). Pengaruh akupuntur terhadap penyerapan nutrisi pada pasien gizi buruk: sebuah studi klinis (Effect of acupuncture on nutrient absorption in malnourished patients: a clinical study). Jurnal Ilmiah Kesehatan. 15 (2): 180-187. http://journal.thamrin.ac.id/index.php/jikmht/issue/view/97

Ammann P, Lavet C (2017). Protein malnutrition affects cartilage quality and could contribute to osteoarthritis development. Innov Aging. 1(1):358–9. https://doi.org/10.1093/geroni/-igx004.1308.

Bannuru RR, Osani MC, Al-Eid F (2018). Efficacy of curcumin and boswellia for knee osteoarthritis: systematic review and meta-analysis. Semin Arthritis Rheumatol. 48(3):416–29. https://-doi.org/10.1016/j.semarthrit.2018.03-.001

Brower V (2005). A nutraceutical a day may keep the doctor away: Consumers are turning increasingly to food supplements to improve well-being when pharmaceuticals fail. EMBO Rep. 6(8): 708–11. https://doi.org/10.103-8/sj.embor.7400498.

Chandrasekaran CV, Kannan Sundarajan JRE, Gururaja GM (2013). Immune stimulatory and anti-inflammatory activities of curcuma longa extract and its polysaccharide fraction. Pharm Res. 5(2): 71. https://doi.org/-10.4103/ 0974-8490.110527

Crawford DC, Miller LE, Block JE (2013). Conservative management of symptomatic knee osteoarthritis: a flawed

strategy?. Orthop Rev (Pavia). 5(1). https://doi.org/10.4081/or.2013.e2.

Diana W (2019). Endorphin massage efektif menurunkan nyeri punggung ibu hamil trimester III (Di BPM Lulu Surabaya) (Endorphin massage effectively reduces back pain in pregnant women in the third trimester (At BPM Lulu Surabaya). J Heal Sci. 12: 62–70. https://journal2.unusa.ac.id/-index.php/JHS/article/view/1128

Dieppe P (2000). The management of osteoarthritis in the third millennium. Scand J Rheumatol. 29(5): 279–81. https://doi.org/10.1080/030097400447642.

Forest S (2020). Core Curriculum for Neonatal Intensive Care Nursing. Online. Retrieved from https://shop.elsevier.-com/books/core-curriculum-for-neonatal-intensive-care-nursing/awhonn/978-0-323-55419-0

Gupta SC, Sung B, Kim JH, Prasad S, Li S, Aggarwal BB (2013). Multitargeting by Turmeric, the Golden Spice: From Kitchen to Clinic. Mol Nutr Food Res 57(9):1510–28. https://doi.org/10.1002/mnfr.201100741.

Helmi ZN (2012). Buku ajar gangguan muskuloskeletal (Textbook of musculoskeletal disorders). Jakarta: Salemba Medika.

Hunter DJ, McDougall JJ, Keefe FJ (2008). The symptoms of osteoarthritis and the genesis of pain. Rheum Dis Clin North Am. 34(3):623–43. https://-doi.org/10.1016/j.rdc.2008.05.004

Liao CD, Liao YH, Liou TH, Hsieh CY, Kuo YC, Chen HC (2021). Effects of protein-rich nutritional composition supplementation on sarcopenia indices and physical activity during resistance exercise training in older women with knee osteoarthritis. Nutrients. 13(8):2487. https://doi.-org/10.3390/nu13082487.

Linder FE (1958). National Health Survey; established in 1956, it is measuring levels, trends, and social consequences of various illnesses. Science. 127 (3309): 1275–9. https://doi.org/10.-1126/science.127.3309.1275.

Zeng L, Yang T, Yang K, Yu G, Li J, Xiang W, Chen H (2022). Efficacy and safety of curcumin and *curcuma longa* extract in the treatment of arthritis: a systematic review and meta-analysis of randomized controlled trial. Front. Immunol. 13:891822. https://doi.org-/10.3389/fimmu.2022.891822.

Marlina TT (2015). Efektivitas latihan lutut terhadap penurunan intensitas nyeri pasien osteoarthritis lutut di Yogyakarta (The effectiveness of knee exercises on reducing pain intensity in knee osteoarthritis patients in Yogyakarta). Jurnal Keperawatan Sriwijaya. 2(1):44–56. https://jks-fk.ejournal.-unsri.ac.id/index.php/jk_sriwijaya/-article/view/16.

Nelson AE (2018). Osteoarthritis year in review 2017: clinical. Osteoarthr Cartil. 26(3): 319–25. https://doi.org-/10.1016/j.joca.2017.11.014

Peddada KV, Peddada KV, Shukla SK, Mishra A, Verma V (2015). Role of curcumin in common musculoskeletal disorders: a review of current laboratory, Translational, and Clinical Data. Orthop Surg. 7(3): 222– 31. https://-doi.org/10.1111/os.12183.

Prasad S, Gupta SC, Tyagi AK, Aggarwal BB (2014). Curcumin, a component of golden spice: from bedside to bench and back. Biotechnol Adv. 32 (6): 1053–64. https://doi.org/10.1016/j.-biotechadv.2014.04.004.

Rajvir Kaur RK, Abhik Ghosh AG, Amarjeet Singh AS (2018). Prevalence of knee

osteoarthritis and its determinants in 30-60 years old women of Gurdaspur, Punjab. Int J Med Sci Public Health. 7(10): 825-830. https://doi.org/10.5-455/ijmsph.2018.0516207062018.

Sahebkar A (2014). Are curcuminoids effective c-reactive protein-lowering agents in clinical practice? Evid Meta-analysis Phytother Res. 28(5):633–42. https://doi.org/10.1002/ptr.5045.

Soeryadi A, Gesal J, Sengkey L (2017). Gambaran faktor risiko penderita osteoartritis lutut di instalasi rehabilitasi medik RSUP Prof. Dr. RD Kandou Manado Periode Januari-Juni 2017. e-CliniC. 5(2). https://doi.org/10.357-90/ecl.v5i2.18540

Tanoto W (2018). Faktor-faktor yang berhubungan dengan kepatuhan dalam menjalani terapi pada pasien osteoartritis di Wilayah Pedesaan (Factors related to compliance in undergoing therapy in osteoarthritis patients in Rural Areas). J Ners dan Kebidanan (Journal Ners Midwifery). 5(1): 39–45. https://doi.org/10.26699/jnk.v5-i1.ART.p039-045.

Widiananta (2009). Perbandingan efek rangsang elektroakupunktur antara frekuensi 4 hz dan 100 hz untuk terapi nyeri osteoarthritis lutut di poli akupunktur RSO Prof. Dr. R. Soeharso (Comparison of the effects of electroacupuncture stimulation between 4 Hz and 100 Hz frequencies for knee osteoarthritis pain therapy at the acupuncture clinic of Prof. Dr. R. Soeharso Hospital). https://digilib.-uns.ac.id/dokumen/detail/8132/Perbandingan-efek-rangsang-elektroakupunktur-antara-frekuensi-4-hz-dan-100-hz-untuk-terapi-nyeri-osteoarthritis-lutut-di-poli-akupunktur-RSO-Prof-Dr-R-Soeharso.