

Current Status of Acupuncture in Relieving Pain after Joint Replacement

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Abstract

Total joint replacement (TJR) is the most economical, effective and practical orthopedic method for the treatment of end-stage joint diseases in humans. Patients still experience varying degrees of joint pain and swelling during their recovery, and severe pain increases the risk of complications. Existing pain management methods such as self-controlled analgesia, analgesia drugs, nerve block, etc. may lead to adverse gastrointestinal reactions, urinary retention, spinal nerve syndrome, etc. Acupuncture and moxibustion therapy is prominent, effective and safe in various acute and chronic pain diseases. The research on TJR mainly focuses on the intervention of pain after hip and knee arthroplasty, using a variety of methods such as ordinary acupuncture, electroacupuncture, ear acupuncture, warm acupuncture, wrist ankle acupuncture and so on. Through a variety of ways to directly dredge the human body's meridians, harmonize Yin and Yang Qi and blood, and improve the Yin and Yang operation of viscera and blood, so as to quickly achieve the purpose of pain relief. In this paper, the clinical application of acupuncture in the treatment of knee and hip joint pain after replacement is reviewed.

Keywords

Joint Replacement, Pain, Acupuncture

Knee and hip replacements are two of the most common types of knee and hip replacements. Most patients can use implants normally for more than 20 years, or even for the rest of their lives, and they are increasingly being medically proven to be the most cost-effective and practical orthopedic treatments for end-stage knee and hip problems in humans [1-2]. The vast majority of patients still have to endure some degree of pain after surgery. Severe postoperative pain has an adverse prognostic effect on clinical physiotherapy and clinical psychological regulation in some patients, greatly reducing the effect of surgery [3]. Therefore, timely and effective management of postoperative pain is very necessary. There are many reports on the application methods and models of postoperative analgesia, including oral analgesia, intravenous analgesia, patient-controlled analgesia, selective nerve block, cocktail therapy and multimodal analgesia [4-5]. However, the analgesia effect of postoperative drugs is still not satisfactory. Anesthesia and analgesia can sometimes lead to severe nausea, vomiting, urinary retention and spinal nerve syndrome. A large number of studies have reported that acupuncture, as another effective method of clinical anaesthesia-assisted surgical rehabilitation in the treatment of pain, can achieve more reasonable results, be effective and safe, reduce local soft tissue pain after surgery, and accelerate the process of rehabilitation after surgery [6]. According to the application of clinical acupuncture in recent years, the author tries to make a systematic classification and summary of the effective methods and application time of clinical acupuncture to provide reference for the

treatment of pain after joint replacement.

1. Different acupuncture methods

Acupuncture has obvious analgesia effect, mainly because it can directly affect the signaling pathway in the damaged tissue cells and cause the release of neurotransmitters. After TJR surgery, the patient exacerbates the damage to the fascia and collaterals. The qi and blood are blocked outside the veins and are hidden in local muscles and bones. Acupuncture can directly unclog the meridian, regulate yin and yang qi and blood, improve yin and yang movement of viscera qi and blood, so as to quickly achieve the purpose of pain relief. Including ordinary acupuncture, electric acupuncture, auricular acupuncture, warm acupuncture, wrist and ankle acupuncture and other methods.

1.1 Ordinary acupuncture

For the patients with knee replacement, the choice of acupoints to strengthen the liver and kidney, blood circulation to remove stasis, Tongluo detumescence [7]. Often, researchers have used acupuncture at local points in the knee to confirm that acupuncture significantly inhibits pain response during recovery and improves patient tolerance and motivation for rehabilitation [8]. However, Zhang Yonghui and others believe that due to the large surgical trauma, the incision site requires strict aseptic dressing, and acupoints should not be taken around the knee; in order to avoid causing infection, it is appropriate to choose the method of acupoint selection along the distal meridian [9]. It can be taken from Taichong, Kunlun, Taixi, Sanyinjiao, etc. on the affected side, and Chi Ze, Quchi and hand Sanli on both sides. Compared with the analgesic schemes of femoral nerve block and analgesic pump, combined with remote acupoint acupuncture can enhance the analgesic effect, make the analgesia more lasting, reduce the dosage of analgesic drugs such as pethidine, and then reduce the incidence of adverse reactions such as nausea, vomiting and dizziness. Some studies have pointed out that in the “Neijing”, the “Miao acupuncture” method can be used to treat the Liang Qiu, calf nose and Zusanli on the healthy side. At the same time, it is combined with traditional Chinese medicine penetration therapy on the affected side to echo and balance each other, so as to achieve the purpose of “overall treatment”. The early pain was improved and joint exercise was carried out as soon as possible. After follow-up, it was found that traditional Chinese medicine penetration + integral acupuncture could relax muscles and activate collaterals and improve joint swelling and mobility [10].

In terms of hip arthroplasty, clinical studies have reported that traditional acupuncture points, such as Weizhong, Yanglingquan, Zusanli, Diji and Qiuxu, can effectively improve the pain after hip arthroplasty and make patients walk on the ground early [11]. Lin Maogui said that the method of penetrating needling was adopted for patients, including taking points from Quchi to Shaohai, from Waiguan to Neiguan, from Yanglingquan to yinlingquan, etc; Cathartic method is used for pricking the sick side and tonic method is used for pricking the healthy side. After 2-3 years of follow-up, it was found that the hip function of the patient basically recovered to the pre injury state, and there was no pain when walking. The clinical effect was affirmed by the patient [12]. Traditional Chinese medicine has obvious advantages in the recovery of patients after hip arthroplasty, and the treatment of integrated traditional Chinese and Western medicine has great potential, but there is a lack of high-quality evidence-based research. At present, it is impossible to deeply explore the experimental mechanism of acupuncture and Moxibustion after hip arthroplasty.

1.2 Electroacupuncture

The high-frequency electric acupuncture can directly stimulate the nerve tissue of the human body by injecting the electric acupuncture into the meridian or the special electric acupuncture to inhibit the output of the nerve tissue. By appropriately changing the pulse frequency of human current change, electroacupuncture can quickly adjust the function of human tissue, improve blood circulation, improve the excitability of cerebral cortical nerves, increase the expansion, contraction and conduction function of cerebral muscle fibers and blood vessels, and repair damaged nerves and muscles. Chen Dexin reported that hip electroacupuncture interventional therapy can significantly and effectively inhibit the chronic pain stimulation response of patients in the process of postoperative and rehabilitation exercise in a short time, improve pain tolerance and activity enthusiasm, reduce the level of hemorheological indexes, and significantly promote the recovery of chronic hip function [13]. More clinical trials have reported that electroacupuncture is applied to compound anesthesia for hip replacement surgery, and its analgesic effect is self-evident [14]. Zheng LinBiao and others found that the analgesic effect of electroacupuncture is better than that of simple patient controlled intravenous acupuncture when the frequency of electroacupuncture is lower than 2Hz. Low frequency acupuncture can significantly alleviate postoperative resting pain, especially when the density wave

with acupuncture frequency of 2/100Hz and current intensity of only 10-15mA is used, it can reduce the dose and use time of postoperative analgesic drugs and reduce relevant clinical adverse reactions [15]. In addition to significant analgesic effect, the trial also confirmed that perioperative electroacupuncture treatment can effectively reduce the incidence of postoperative delirium and reduce the duration of delirium [16]. At present, electroacupuncture therapy has been widely used in China, and its curative effect has been affirmed [17]. It is widely favored by researchers and experts at home and abroad. However, there are few domestic literature studies on the standard scheme of electroacupuncture related auxiliary parameters in the treatment of postoperative pain after THA.

1.3 Warm acupuncture

“True evil of Lingshu thorn Festival” contains: “fire and Qi have been cleared, and blood vessels are flowing”, suggesting that appropriate warm stimulation acts on specific parts of the human body, aiming at the pathological links and disease nature of poor Qi and blood and lack of Qi and blood. Wormwood leaves have the functions of regulating qi and blood, expelling cold and dampness, warming meridians and so on. From the perspective of biological heat transfer, the warm stimulation produced by moxibustion is actually heat transfer. The warm conduction effect produced by warm stimulation of different moxibustion methods is actually different in heat transfer. The warming effect can promote the dynamic distribution of temperature field in biological tissue to balance, stimulate heat sensitive acupoints, produce infrared spectrum and appear resonance [18]. Some studies have combined warm acupuncture and functional exercise in the treatment of patients after knee arthroplasty, mainly including Yanglingquan, Liangqiu, Xuehai and other points around the knee, to replenish qi and activate blood circulation, remove blood stasis and relieve pain, and strengthen muscles and bones. The results show that warm acupuncture and moxibustion can effectively improve the levels of CRP and NO, control inflammatory response, relieve pain and improve knee function [19]. Zhao Mingming used flurbiprofen and aescin combined with warm acupuncture and moxibustion (bilateral blood sea, Diji, Zhongdu and Taichong), compared with drug treatment alone, and confirmed that warm acupuncture and moxibustion had a definite effect on improving swelling and pain of affected limbs [20]. After hip replacement, the method of warm acupuncture and moxibustion combined with hot burning bag has better effect on hip function recovery, analgesia and detumescence than conventional postoperative treatment. The incidence of deep venous thrombosis between groups was observed. Considering that warm acupuncture and moxibustion + hot burning bag may reduce the thrombosis rate [21]. Previously, many studies have reported that oral Chinese medicine, scalding therapy and electroacupuncture can improve the blood hypercoagulability and effectively prevent the formation of lower extremity venous thrombosis [22-25]. Similarly, moxibustion can also warm the meridians, smooth Qi and blood, activate blood circulation and remove blood stasis. Therefore, warm acupuncture and moxibustion may also prevent thrombosis, but its curative effect and mechanism need to be further studied and discussed.

1.4 Auricular Acupuncture

Auricular acupuncture is an ancient method of traditional Chinese medicine. Ancient doctors directly stimulated patients' ear points through acupuncture or pressing to regulate sub-health or treat many diseases. The ear is an important capital of the meridians of the human body. Most of the twelve viscera and meridians of the human body are concentrated on the ear. The literature research on auricular acupuncture at home and abroad includes many different schools of auricular acupuncture theory. For example, the traditional meridian and viscera theory of traditional Chinese medicine, modern neurology, neurohumoral theory, embryology theory, holographic theory, biological cybernetics theory and chronobiology theory. The eight theories have their own advantages [26]. “Lingshu meridians” records: “the pulse of the sun in the hand of the small intestine... Its branch goes into the ear; the pulse of the sun in the bladder and foot... Its branch goes from the top to the corner of the ear...” [27] Lingshu Jing; “Lingshu maidu” contains “the kidney qi passes through the ear, and the kidney and the ear can smell the five tones”. “Lingshu oral question” said: “the ear is the gathering of ancestral veins.” In other words, the main branches and veins of the whole body meridians are concentrated in the upper and lower ears, so the ear points have a close cross connection with the whole body organs, tissues and organs in other parts of the body. From the perspective of human anatomy recognized in modern China, the auricle is a rich, complex and diverse branch structure of intracranial large vessels and the distribution of cranial plexus. The systems such as somatic nerve, sympathetic nerve and vagus nerve root bundle intersect, coincide and overlap with the auricle system to form the cranial plexus. There are significant pain information exchange and nerve reflex between auricle nerve and other normal body organs. When there is an abnormally strong pain reflex in the local body, the analgesic information nerve reflex signal is transmitted to the patient's external ear area through the nerve reflex, resulting in the positive nerve reaction of local

analgesia.

Foreign experimental studies have reported that auricular acupuncture is effective in the treatment of various pain symptoms, but there is no randomized controlled study on the treatment of postoperative acute pain. Therefore, the researchers tested whether auricular acupuncture at specific points was better than sham acupuncture for adjuvant analgesia after total hip arthroplasty. Patients were randomly assigned to real auricular acupuncture (lung, Shenmen, thalamus and hip points) or sham acupuncture (four non acupoints on the ear wheel). The results showed that auricular acupuncture had better analgesic effect, so as to reduce the dosage of fentanyl [28-29]. There are experimental studies in China to treat patients with joint replacement by pressing beans at ear points combined with body acupuncture. Bilateral subcortical, Shenmen, sympathetic, hip and pain relief points are selected at ear points, combined with acupuncture at Zusanli, internal Ma point and Hegu, which can further control postoperative pain. The dosage of patient-controlled analgesia and additional analgesics was less than that of the control group, which reflected the better advantage of auricular acupuncture combined with body acupuncture. At the same time, it was also found that the effect of calming the nerves was good, and the sleep quality of patients was improved [30]. Yu Shuping selected subcortical, sympathetic, Shenmen, kidney, liver and heart points for ear acupoint bean pressing, which confirmed that auricular acupuncture therapy can improve the social, cognitive, emotional and physical functions of patients and reduce their anxiety symptoms [31].

1.5 Wrist-ankle acupuncture

Wrist-ankle acupuncture is a new acupuncture therapy which is inspired by traditional meridian theory, auricular acupuncture, acupoint and acupuncture. It is the practice and development of traditional acupuncture moxibustion therapeutics, inspired by Professor Zhang Xinshu's experience in the treatment of neurosis based on electrical stimulation therapy [32]. Wrist-ankle acupuncture is a kind of subcutaneous shallow needling method, which needles needles under the specific points or stimulation points of the wrist and ankle, and does not need to go deep into the local muscle layer. The needle pierced the deep subcutaneous part of the arriving part, that is, the scattered part of the whole body Qi, blood, and meridian. Puncturing the needle root through the acupoint can regulate the operation direction of the viscera and the corresponding meridians and collaterals, and coordinate the functions of the viscera, Qi and blood channels and the blood system of the human body.

Researchers believe that Wrist-ankle acupuncture can improve pain threshold in patients with pain, but the ability to influence pain threshold in healthy adults is unclear. From 40 min before the injection to 70 min after the injection, the pain threshold of wrist and ankle for the corresponding area and non corresponding area of the acupuncture point of healthy adults shows a continuous upward trend. The immediate analgesic effect is not obvious 5 min after the injection, but the curative effect is statistically significant 30 min and 70 min after the injection. The conclusion is that wrist and ankle have analgesic effect for pressure pain in different parts [33]. The multimodal analgesia program of Wrist-ankle acupuncture intervention (including pain health education, COX2 inhibitor, ice compress, etc.) may also be more effective and better to control the pain caused by surgery, passive pain rehabilitation, pain caused by continuous severe joint injury in sports and sports training, increase the dose of antipyretic and analgesic drugs for postoperative patients, and significantly reduce the rate of adverse nerve stimulation. Qiaoling Chen and other clinical research team members found that Wrist-ankle acupuncture and oral morphine sulfate controlled-release tablets had better analgesic effect on patients undergoing knee replacement than oral morphine sulfate controlled release tablets. The onset time was shorter than 7min, and the duration of analgesia lasted for 25h [34]. Wrist-ankle acupuncture is superior to drug therapy in terms of quick onset and long duration of remission. Lu Meijing and other [35] also believe that Wrist-ankle acupuncture can help patients to reduce postoperative pain level, and has the characteristics of quick onset, painless, safe, simple, convenient and practical operation. However, because most of its basic clinical research projects are not comprehensive and rigorous in the design and demonstration of the overall clinical plan, randomized clinical controlled trials are few and high-quality basic clinical research projects are few.

2. Acupuncture occasion

For perioperative pain in several experimental research projects, the research data of Li Liangwen and others [36] show that warm acupuncture treatment can be started one week before and after operation, and the control and improvement of patients' pain state will be more obvious. Combined with these studies, it is found that perioperative acupuncture treatment can quickly alleviate the postoperative pain of some patients.

2.1 Preoperative

A report on the preoperative treatment of the effects of auricular acupuncture on postoperative pain after TJR has been conducted. It is found that most of the patients receiving treatment should start acupuncture before and after operation, which is helpful to reduce early postoperative pain and improve the curative effect of 1D. Acupuncture pain treatment at 30 minutes before anesthesia can significantly reduce the biological sensitivity of acupuncture patients after TJR anesthesia, enhance the analgesic effect of fentanyl after operation, and reduce the amount of anesthesia effectively and significantly. According to the clinical reports in China, most of the literatures on the preoperative mechanism of acupuncture assisted therapy for TJR patients are focused on this period. However, there are few studies on the mechanism of acupuncture behavior intervention about 1 days or more than 1 weeks before operation and 24 hours before operation [37].

2.2 Postoperative

Relevant research and data also show that if patients receive medium frequency electrical stimulation every 24 hours after operation, it can significantly reduce postoperative hip pain and promote the rapid and stable recovery of the whole hip function. Xiaoxue Hu [38] and others also found that patients with hip replacement received percutaneous acupoint electrical stimulation from the second day after operation, which can prolong the first start-up time of analgesic pump. Many trials began electroacupuncture treatment from the first day after operation, which can quickly and significantly alleviate patients' local muscle tension, pain and joint injury, especially in the early stage after operation. Early exercise is conducive to the early recovery of patients' joint function and improves patients' satisfaction.

3. Summary

At present, the research on the mechanism of acupuncture intervention in TJR postoperative pain mainly focuses on postoperative pain intervention. There are few studies on drugs that only need acupuncture analgesia before and within 24 hours after operation to achieve the curative effect of preventive acupuncture analgesia, and there is also a lack of large enough samples and high-quality studies. At the same time, we also need to analyze and summarize the research on the post acupuncture pain transmission mechanism of various complex and diverse diseases, and then deeply explore the potential relationship between the timing of acupuncture and the clinical analgesic treatment effect after acupuncture. Acupuncture and moxibustion is used to prevent and treat TJR postoperative pain, mainly focusing on electroacupuncture and ear acupuncture. In recent years, it has been widely and deeply carried out at home and abroad. There is relatively little progress in clinical research on surgical acupuncture technology and surgical acupuncture operation timing of other types of diseases at home and abroad. Whether different acupuncture methods and appropriate acupuncture timing can really significantly affect the relief and curative effect of postoperative pain, and then directly affect the physical rehabilitation of patients, which needs further investigation and research.

References

- [1] Puliero, Benjamin, et al. (2019). "Total knee arthroplasty in patients with varus deformities greater than ten degrees: survival analysis at a mean ten year follow-up." *International orthopaedics*, vol. 43, 2(2019): 333-341.
- [2] Kim, Chang-Wan, et al. (2020). "The Effects of Surgical Technique in Total Knee Arthroplasty for Varus Osteoarthritic Knee on the Rotational Alignment of Femoral Component: Gap Balancing Technique versus Measured Resection Technique." *The journal of knee surgery*, vol. 33, 2(2020): 144-151.
- [3] Kelly, Robert B. and Joel Willis. (2019). "Acupuncture for Pain." *American family physician*, vol. 100, 2(2019): 89-96.
- [4] Ifrim Chen, Feng, et al. (2019). "Acupuncture and the retrospect of its modern research." *Romanian journal of morphology and embryology = Revue roumaine de morphologie et embryologie*, vol. 60, 2(2019): 411-418.
- [5] Li, Yu-Xi, et al. (2020). "Effectiveness and Safety of Acupuncture for Migraine: An Overview of Systematic Reviews." *Pain research & management*, vol. 2020, 3825617. 23 Mar. 2020.
- [6] Wen, Jingyi, et al. (2021). "Acupuncture Medical Therapy and its Underlying Mechanisms: A Systematic Review." *The American journal of Chinese medicine*, vol. 49, 1(2021): 1-23.
- [7] Yang Yong, Zhao Lianghu, and Huang Jin. (2016). "Clinical effect of knee arthroplasty combined with traditional Chinese medicine on knee osteoarthritis." *Chinese Journal of osteoporosis*, 22.7(2016): 5.
- [8] Chen Gang, Gu Ruixin, Xu Dandan. (2012). "Application of electroacupuncture in rehabilitation after total knee arthroplasty." *Chinese acupuncture*, 32.4(2012): 4.

- [9] Zhang Yonghui, Zhang Lin, Lu min. (2018). "Meridian acupuncture combined with femoral nerve block in the intervention of analgesia and functional rehabilitation after knee arthroplasty: a randomized controlled study." *China acupuncture*, 38.3(2018): 5.
- [10] Zheng Weikun, et al. (2021). "Application of traditional Chinese medicine penetration combined with integral acupuncture in the perioperative period of total knee arthroplasty under the concept of eras." *Guangzhou Pharmaceutical*, 52.1 (2021): 4.
- [11] Ran Lei, Chen Lu. (2018). "60 cases of pain after total hip arthroplasty treated with combined acupuncture and moxibustion." *Journal of general Stomatology (Electronic)*, 1(2018): 116.
- [12] Lin Maogui, Leng Chongguang, and Li Zhongqiang. (2010). "Hip arthroplasty combined with acupuncture and moxibustion for the treatment of femoral neck fracture in the elderly with hemiplegia." *Journal of Liaoning University of traditional Chinese medicine*, 12.3 (2010): 2.
- [13] Chen Dexin, Zhu Jinming, Kong Peiling. (2020). "Effect of electroacupuncture stimulation combined with finger pressing Yangming Meridian on lower limb function recovery and quality of life after total hip arthroplasty." *China Medical Innovation*, 17.30 (2020): 6.
- [14] Liu Peirong, Zhang Yu, Diao Shu. (2015). "Combined acupuncture and drug anesthesia for hip arthroplasty in elderly patients: a case report." *Journal of practical medicine*, 5(2015): 858-858.
- [15] Zheng LinBiao. (2021). "Differences in short-term clinical efficacy of electroacupuncture combined with massage at different frequencies in the treatment of chronic low back pain." *Massage and rehabilitation medicine*, 12.13 (2021): 4.
- [16] Yang Luzong, Zhang ChenLin, Zhu Hongsheng. (2017). "Clinical study on perioperative electroacupuncture intervention in delirium after hip arthroplasty." *Shanghai Journal of acupuncture and moxibustion*, 36.3 (2017): 3.
- [17] Liu Zhuo, Chen Ouying. (2020). "Clinical study of ear point pressing bean combined with electroacupuncture on nausea and vomiting in patients with malignant tumor undergoing chemotherapy." *Journal of Hunan Normal University: Medical Edition*, 6 (2020): 3.
- [18] Li Ying, et al. (2018). "Experimental Study on heat transfer characteristics of biological tissues during moxibustion." *Journal of Engineering Thermophysics*, 39.1 (2018): 5.
- [19] Sun Xiaohui, et al. (2021). "Effects of warm acupuncture combined with functional exercise on joint pain, range of motion and inflammatory factor levels in patients with knee osteoarthritis after total knee arthroplasty." *New traditional Chinese medicine*, 4(2021): 152-155.
- [20] Zhao Mingming, et al. (2018). "Warm acupuncture combined with western medicine in the treatment of 32 cases of lower extremity swelling and pain after total knee arthroplasty." *TCM research*, 31.2 (2018): 3.
- [21] Fu Mingli. (2019). "Observation on the application effect of warm acupuncture and moxibustion combined with hot burning bag in early rehabilitation nursing after THA." *Sichuan Traditional Chinese medicine*, 37.3 (2019): 3.
- [22] Han Xiaoqiang, et al. (2015). Observation on the efficacy of integrated traditional Chinese and Western medicine in preventing deep venous thrombosis after hip arthroplasty. *Introduction to traditional Chinese medicine*, 21.20 (2015): 3.
- [23] Wang Xiaojun, et al. (2009). "Clinical study on the prevention of lower extremity deep venous thrombosis after total hip arthroplasty with integrated traditional Chinese and Western medicine." *New traditional Chinese medicine*, 41.1 (2009): 2.
- [24] Tu Weiwei, et al. (2017). "Meta analysis of the effectiveness of integrated traditional Chinese and Western medicine in preventing lower extremity deep venous thrombosis after knee and hip arthroplasty." *Chinese modern doctor*, 55.02 (2017): 70-75 + 78.
- [25] Qin xueliu, et al. (2008). "Prevention of deep venous embolism after total hip arthroplasty with integrated traditional Chinese and Western medicine." *Journal of modern integrated traditional Chinese and Western medicine*, 30 (2008): 4734-4735.
- [26] Liu Jingxuan, et al. (2021). "Research status and thinking of ear acupuncture theory." *Acupuncture research*, 46.10 (2021): 893-900.
- [27] *Lingshu Sutra*. (2012). Beijing: People's Health Publishing House, 2012.
- [28] Usichenko, T. I., et al. (2005). "Auricular acupuncture for pain relief after total hip arthroplasty—a randomized controlled study." *Pain*, vol. 114, 3 (2005): 320-327.
- [29] Usichenko, Taras I., et al. (2006). "Auricular acupuncture reduces intraoperative fentanyl requirement during hip arthroplasty—a randomized double-blinded study." *Acupuncture & electro-therapeutics research*, vol. 31, 3-4 (2006): 213-21.
- [30] Chen Kai. (2019). "The effect of auricular bean pressing and acupuncture combined with patient-controlled epidural analgesia on postoperative pain after hip arthroplasty." *New traditional Chinese medicine*, 51.09 (2019): 266-269.
- [31] Yu Shuping. "The application effect of ear acupoint bean embedding method in patients with artificial hip arthroplasty." *Journal of clinical rational drug use*, 13.33 (2020): 3.
- [32] Wang Qiong, Zhou Qinghui. (2017). "Analysis on the theoretical root and clinical application of wrist ankle acupuncture." *Chinese acupuncture*, 37.5 (2017): 4.
- [33] Bi, Hai-Jin, et al. (2017). "Wrist-ankle Acupuncture Increases Pain Thresholds in Healthy Adults." *Alternative therapies in*

health and medicine, vol. 23, 1(2017): 20-25.

- [34] Chen Qiaoling, Huang Shuangying. (2012). "Effect of wrist ankle acupuncture on pain after knee arthroplasty." *Shanghai Journal of acupuncture and moxibustion*, 31.5 (2012): 2.
- [35] Lu Meijing, et al. (2021). "Effects of wrist ankle acupuncture combined with patient-controlled intravenous analgesia on pain degree, inflammatory pain mediators and stress hormone expression after hip arthroplasty." *Chinese journal of traditional Chinese medicine*, 39.10 (2021): 4.
- [36] Li Liangwen, et al. (2019). "Application of warm acupuncture combined with functional exercise in rehabilitation treatment after total knee arthroplasty." *Traditional Chinese medicine bone setting*, 31.2 (2019): 3.
- [37] Derogatis, Michael J., et al. (2019). "Pain Management Strategies to Reduce Opioid Use Following Total Knee Arthroplasty." *Surgical technology international*, vol. 35 (2019): 301-310.
- [38] Hu Xiaoxue, et al. "Clinical study on preemptive analgesia effect of percutaneous acupoint electrical stimulation in anesthesia for primary total knee arthroplasty in elderly osteoarthritis." *Shandong Journal of traditional Chinese medicine*, 40.7 (2021): 5.