Am J Transl Res 2021;13(4):3206-3213
www.ajtr.org /ISSN:1943-8141/AJTR0124056

Original Article

Therapeutic effect of Qinglong tail-wagging acupuncture method in knee osteoarthritis and its influence on inflammatory factors

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Received October 13, 2020; Accepted December 9, 2020; Epub April 15, 2021; Published April 30, 2021

Abstract: Objectives: This study explored and analyzed the healing effect of Qinglong tail-wagging acupuncture method in therapy of knee osteoarthritis and its influence on inflammatory factors. Methods: 93 elderly patients with acute onset of knee osteoarthritis that hospitalized from March 2017 to June 2019 were admitted and randomly separated into observation group (n=48) and control group (n=45) in line with the method of random data form. The control group was given conventional electro-acupuncture, and the observation group was treated with the qinglong tail-waving acupuncture method. The clinical efficacy, pre- and post-VAS score, Lequesne and WOMAC indexes, and changes in serum inflammatory factor levels pre-and-post treatment were compared between the two sets of subjects. Results: The overall response rate of clinical treatment in observation group was remarkably higher than that of the control group ($P < 0.05$). Besides, the VAS, Lequesne as well as WOMAC scores of two groups after treatment were significantly reduced than those in pre-treatment ($P < 0.05$), and the indexes in observation group were remarkably lower than those in control group ($P < 0.05$). In addition, the serum IL-6, NO and TNF-α concentration of the two sets of subjects in post-treatment reduced significantly than that in pre-treatment ($P < 0.05$), and the serum IL-6, NO and TNF-α concentration in observation group were remarkably decreased than those in control group ($P < 0.05$). Conclusion: The acupuncture method of Qinglong tail-wagging has good healing effect on remedy of elderly knee osteoarthritis. The curative method is able to improve the patients' function of knee joint and reduce the concentration of serum inflammatory factor in patients with knew osteoarthritis.

Keywords: Qinglong tail-wagging acupuncture method, the elderly, knee osteoarthritis, clinical efficacy, inflammatory factor

Introduction

Knee osteoarthritis (KOA) is a chronic joint disease that clinically featured by degenerative cartilage lesion of the knee and secondary hyperosteogeny [1]. The clinical manifestations of patients include swelling, stiffness, pain [2], as well as deformity and dysfunction of knee joint. KOA is a usual and frequently-happened disease in middle-aged and senior subjects. It has been found in clinical work that the disease mostly occurs in people after the age of 40. The incidence of female is higher than that of male, which can be as high as 78.50% for patients over 60 years. KOA incidence in recent years is increasing year by year, imposing serious impact on patients' quality of life [3]. There are currently a variety of clinical treatment options for KOA, among which non-surgical treatment is the main scheme, including options by traditional Chinese medicine, western medicine, acupuncture, and massage [4]. The clinical symptoms for the majority of patients can be conspicuously improved through effective conservative treatment [5-7]. As a traditional and conservative treatment, acupuncture has advantages of simplicity, convenience, and safety, and has been widely used in clinical treatment [8]. The acupuncture method of Qinglong tail-wagging is an important method

for promoting and guiding Qi. It can effectively dredge partial Qi and blood, stimulate and promote Qi smoothly to the affected area along the path of the meridian and collaterals, thereby to achieve the purpose of unblocking and promoting of Qi and collaterals [9, 10]. The previous researches by scholars have shown that Qinglong tail-wagging acupuncture has certain efficacy in treatment of knee osteoarthritis, but there is no relevant research on its mechanism of action. In this study, from the perspective of inflammatory factors, the therapeutic effect of Qinglong tail-wagging acupuncture therapy in treatment of senile knee osteoarthritis and its influence on inflammatory factors were explored and analyzed.

Materials and methods

Clinical data

93 elderly patients hospitalized from March 2017 to June 2019 with acute onset of knee osteoarthritis were enrolled as research subjects. They were arranged into observation group (n=48) and control group (n=45) by the method of random data form. The study was approved by the ethics committee of the hospital.

Inclusive and exclusive criteria

Inclusive criteria: (1) The subjects met the diagnostic criteria in the *Guidelines for the Diagnosis and Treatment of Osteoarthritis* (2007 Edition)" [11] formulated by Chinese Orthopedic Association. (2) Patient's age ≥ 60 years old; (3) The Kellgren-Lawrence (K-L) stage of the patient was stage II~III; and (4) Patients voluntarily signed the informed consent.

Exclusive criteria: (1) Patients with joint diseases such as rheumatoid arthritis, gouty arthritis or infectious arthritis; (2) Patients with severe heart, liver, lung or renal dysfunction; (3) Patients with experience of knee surgery and joint trauma; or (4) Patients with infectious diseases and/or malignant tumors.

Methods

The control group was given routine electroacupuncture. The blood was extracted from main acupoints of Xuehai, Liangqiu, Xiyan, Dubi, and Ashi and matching acupoints of Zusanli, Yinlingquan, Yanglingquan, and Xiyangguan. The disposable acupuncture needles with a length of 1.5 inches and a thickness of 0.30 mm (Suzhou Acupuncture Supplies Co., Ltd.) and electronic acupuncture instruments of Huatuo Brand (Suzhou Acupuncture Supplies Co., LTD.) were adopted for treatment. Four main acupoints were selected, and the electroacupuncture apparatus was connected after regular skin disinfection and gas injection. The acupoints of Xuehai and Xiyan were used as a pair of electrodes for connection, and the same with acupoints of Liangqiu and Dubi. The processive wave of electroacupuncture with a frequency of 4 Hz was selected, the amount of electricity increased from small to large, and the output intensity was adjusted to the extent that the patient was able to tolerate or the muscles of limb were in rhythmic fibrillation. The electrotherapy was performed for 30 min.

The observation group was treated with Qinglong tail-wagging acupuncture method. The blood was also extracted from main acupoints Xuehai, Liangqiu, Xiyan, Dubi and Ashi and matching acupoints of Zusanli, Yinlingquan, Yanglingquan, and Xiyangguan. The disposable acupuncture needles with a length of 1.5 inches and a thickness of 0.30 mm (Suzhou Acupuncture Supplies Co., Ltd.) was adopted. The patient laid down in supine position. The needle was penetrated into the main acupoints after routine skin disinfection, and lifted to subcutaneously when pierced to a certain depth and the patient felt acid, hemp, bilge sensation with Qi acquired. The needle body was pressed down to a level of 10~30° with the tip pointing to the site, held and slowly moved forward and backward, and right and left just like rowing of the boat. Then, inserted in layers in the order of shallow, medium and deep and retracted by sequence of deep, medium and shallow. Each layer was needled for three times. The patient cooperated with breathing when acupuncture was performed. The needle was inserted when the patient exhaled. After Qi acquired, the needle handle was moved around as the patient inhaled. The method of turning the needle handle left and right was the reinforcing method. The releasing method was to inject the needle while the patient inhaled, and then moved the needle handle left and right as the patient exhaled. The needle handle should be twisted with the patient's breathing. The needle was

retained for 30 min and performed once every 10 min. The rest matching acupoints were performed by routine acupuncture after disinfection. After Qi was obtained, the reinforcing method was conducted by twirling, lifting and thrusting of the needle. The needle was kept for 30min and inserted once every 10 minutes. The acupuncture was performed once a day and by 6 times as a course of treatment. The patient rested for 1 day after each course of treatment, and then proceeded to the next course for a total of 8 courses.

Evaluation of clinical efficacy

The TCM syndromes of patients before and after treatment were scored on the basis of the *Guiding Principles for Clinical Research of New Chinese Medicines* (2002 Trial Edition) [12]. The primary and secondary symptoms were classified according to the symptoms and signs of patients, and the symptoms were divided into four levels according to the severity. The scores of primary symptoms were 0, 2, 4 and 6 points respectively, including pain, swelling and limited joint function; the scores of secondary symptoms were 0, 1, 2 and 3 points respectively, including tenderness, lumbar debility, syrigmus and night sweats. In addition, normal tongue condition was 0 point and abnormal tongue image was scored for 1 point; and normal pulse condition was 0 point and abnormal pulse condition was 1 point.

In line with the Guiding Fundamental for Clinical Research of New Chinese Medicine [12], the comprehensive efficacy was evaluated by TCM syndrome score. The comprehensive curative effect index = (prior treatment points - post-treatment points)/prior treatment points × 100%. Clinically cured: patient's TCM clinical symptoms and signs disappear or basically disappear after treatment, and the comprehensive curative effect index ≥ 95%; Remarkably effective: there was significant amelioration in TCM clinical symptoms and signs after treatment, with 95% < comprehensive curative index ≤ 70%; Effective: there was improvement of TCM clinical symptoms and signs after treatment, with 70% < comprehensive curative index ≤ 30%; Invalid: the clinical symptoms and signs of traditional Chinese medicine have not been significantly improved after treatment, with comprehensive curative effect index < 30%. The overall response rate = (clinically recovery + notably effective + effective)/overall subjects × 100%.

VAS score before and after treatment

The visual analogue scoring method (VAS) was used to evaluate the pain of the two sets of sufferers pre- and post-treatment. The score ranged from 0 to10 by 0 represented painless and 10 represented severe. The higher VAS scores indicated the more severe the pain of the patient.

Lequesne scores before and after treatment

Lequesne Index, the international evaluation for bone joints, was used to evaluate the patient's joint function. The score was 1-24, and the higher scores referred to the more severe the joint dysfunction.

WOMAC scores before and after treatment

The WOMAC index was used to measure the osteoarthritis of patient before and after treatment. The scale was divided into 24 questions including pain, joint stiffness, and daily activities. Each question was scored 0-4 points and the higher WOMAC scores means the more severe the arthritis symptoms.

The serum inflammatory factors

4 ml peripheral venous fasting blood was extracted from the two sets of subjects before and after treatment, and centrifuged at 3000R/min for 10 min. The supernatant was taken and stored in a refrigerator at -70°C for detection. The concentrations of interleukin-6 (IL-6), nitric oxide (NO) and tumor necrosis factor - (TNF-) in blood serum were evaluated by enzyme-linked immunosorbent assay (ELISA). The detection kit was procured from Shanghai Abbott Biotechnology Engineering Co., LTD., and the test was in strict accordance with instructions.

Statistical analysis

Statistical analysis was conducted by SPSS 22.0. The comparison for measurement data was by *t* test and enumeration data was by comparison test. $P < 0.05$ was accepted as the difference was statistically significant.

Results

Comparison of general information

The difference of the comparison of general material between the two sets of subjects was statistical insignificant, as shown in **Table 1**.

Table 1. Comparison of general information of two sets of subjects

Group	Number of cases	Gender		Age (years old, $\bar{x} \pm s$)	Course of acute onset (d, $\bar{x} \pm s$)	Severity of the disease condition	
		Male	Female			II	III
Observation group	48	19	29	67.39±7.22	7.39±2.05	27	22
Control group	45	17	28	68.05±8.35	7.84±2.16	21	24
t/χ^2	-	0.032		0.409	1.031	0.668	
P	-	0.858		0.684	0.305	0.414	

Table 2. Comparison of clinical efficacy between two sets of patients [n (%)]

Group	Number of cases	Clinically cured	Remarkably effective	Effective	Invalid	Overall response rate (%)
Observation group	48	21 (43.75)	15 (31.25)	7 (14.58)	5 (10.42)	89.58
Control group	45	13 (28.89)	10 (22.22)	9 (20.00)	13 (28.89)	71.11
χ^2	-	-	-	-	-	5.077
P	-	-	-	-	-	0.024

Table 3. Comparison of VAS scores in prior and post-treatment (points, $\bar{x} \pm s$)

Group	Number of cases	Before treatment	After treatment	t	*P*
Observation group	48	7.84±2.16	2.18±0.73	17.199	0.000
Control group	45	7.75±2.21	2.97±0.85	13.542	0.000
t	-	0.199	4.818	-	-
P	-	0.843	0.000	-	-

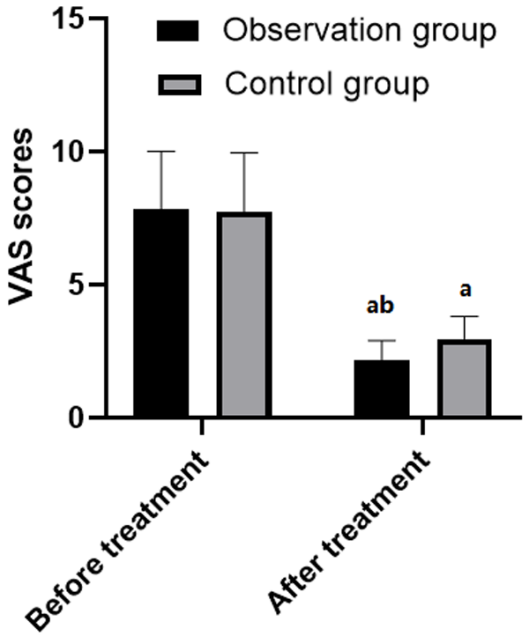

Figure 1. Comparison of VAS scores between the two groups before and after treatment. Note: Compared with before treatment, [a]*P < 0.05*; compared with the same period control group, [b]*P < 0.05*.

Comparison of clinical effect

The overall response rate of clinical therapy for the observation-group-patients was 89.58%, and that of the control-group patients was 71.11%. The overall response rate of clinical therapy for the observation-group-patients was notably higher than that of the control-group-patients (P < 0.05), as shown in **Table 2**.

Comparison of VAS score before and after prior- and post-treatment

The VAS scores of patients in both sets of subjects after treatment decreased critically than in pre-treatment (P < 0.05), and VAS scores of patients in observation group after treatment decreased apparently than which in control group (P < 0.05), as shown in **Table 3** and **Figure 1**.

Comparison of Lequesne score before and post- treatment

The Lequesne score of both sets of subjects after treatment declined remarkably than those in prior treatment (P < 0.05), and Lequesne score of patients in observation group after treatment declined remarkably than that of the control group (P < 0.05), as shown in **Table 4** and **Figure 2**.

Table 4. Comparison of Lequesne scores in prior and post-treatment (points, $\bar{x} \pm s$)

Group	Number of cases	Before treatment	After treatment	t	*P*
Observation group	48	11.27±2.63	7.10±1.76	9.129	0.000
Control group	45	11.49±2.77	8.25±1.93	6.438	0.000
t	-	0.393	3.005	-	-
P	-	0.695	0.003	-	-

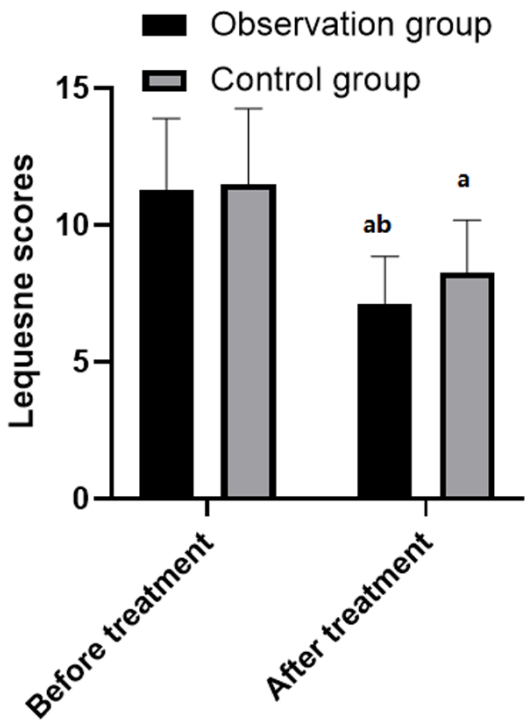

Figure 2. Comparison of Lequesne score between the two groups before and after treatment. Note: Compared with before treatment, [a]*P < 0.05*; compared with the same period control group, [b]*P < 0.05*.

Comparison of WOMAC score before and after treatment

The WOMAC score of patients after treatment was remarkably lower than which in prior treatment (P < 0.05), and the WOMAC score of the observation group in post-treatment reduced notably than that of the control group (P < 0.05), as shown in **Table 5** and **Figure 3**.

Comparison of inflammatory factors between two sets of subjects

The serum IL-6, NO and TNF-α concentrations of the two sets of subjects after treatment declined critically than in prior treatment (P < 0.05), and the serum IL-6, NO and TNF-α concentrations in observation group declined notably than those of the control after treatment (P < 0.05), as shown in **Table 6**.

Discussion

KOA is an articular chondropathy caused by a combination of multiple factors and has a higher incidence in middle-aged and senior subjects [13]. The early pathologic changes in patients are the cartilage damage of joints, and the occurrence can further accelerate the progression of the osteoarthritis course [14]. Currently, the primary clinical methods for treating KOA are drug therapy and surgical treatment. However, the long-term use of drugs can cause adverse gastrointestinal reactions, which in turn affects patients' compliance and therapeutic effects; and the surgical treatment has defects such as trauma, high risk, high hospitalization cost and long hospital stay, which bring heavy economic and mental burden to patients [15-17].

KOA is classified in the category of "arthralgia" in traditional Chinese medicine. Most patients suffer from the disease due to the obstruction of Qi and blood, and the blockage of meridians, which induced by liver and kidney deficiency, excessive strain, dystrophy of muscles and bones, wind and cold invasion, etc. The clinical observations have shown that acupuncture has good clinical effect in the treatment of KOA, which has drawn extensive attention from scholars [19, 20]. As a kind of acupuncture technique, Qinglong tail-wagging acupuncture method was originally derived from the "Acupuncture and Moxibustion Encyclopedia on Golden Needle" in the Ming Dynasty. Moreover, there were doctors constantly put forward their opinions, and made innovations from the depth and direction of the needles as well as the techniques of reinforcing and releasing, to enhance the therapeutic effect [21, 22]. By summarizing the reports of scholars over the years, our hospital adopted the Qinglong tail-wagging acupuncture method to treat elderly KOA, and achieved good clinical effects.

The results of this study illustrated that the overall response rate of clinical treatment in the observation group increased remarkably

Table 5. Comparison of WOMAC scores in prior and post-treatment (points, $\bar{x} \pm s$)

Group	Number of cases	Prior treatment	After treatment	t	*P*
Observation group	48	34.27±9.73	19.84±5.30	9.023	0.000
Control group	45	33.95±8.51	24.75±4.94	6.321	0.000
t	-	0.168	4.614	-	-
P	-	0.867	0.000	-	-

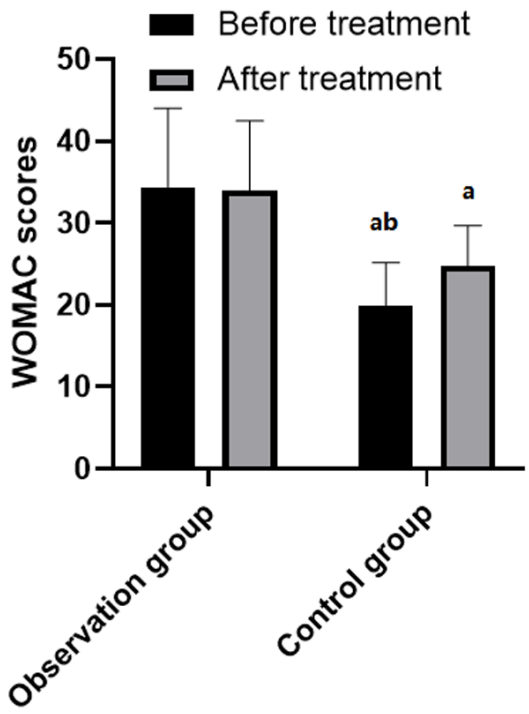

Figure 3. Comparison of WOMAC scores between the two groups before and after treatment. Note: Compared with before treatment, [a]*P < 0.05*; compared with the same period control group, [b]*P < 0.05.*

than that in the control group. VAS, Lequesne and WOMAC scores of the two sets of subjects in post-treatment declined critically than before, and these indexes in observation group dropped remarkably than those in the control group. Similar to the results reported by scholars [23, 24], Qinglong tail-wagging acupuncture method has significant clinical efficacy in the treatment of KOA, and can significantly improve the clinical symptoms and knee joint function of patients with KOA. Studies have concluded that the high concentration of NO can cause strong oxidative stress damage inside and outside the cells, inhibit the proliferation of chondrocytes and the synthesis of extracellular matrix, thus leading to the destruction of the cartilage matrix, and aggravating the development process of osteoarthritis [25]. Based upon the study findings, the concentrations of serum IL-6, NO and TNF-α in two sets of subjects in post-treatment declined remarkably than those in prior treatment, and in post-treatment, the concentrations of serum IL-6, NO and TNF-α in the observation group dropped significantly than those in the control group. This indicated that Qinglong tail-wagging acupuncture can effectively reduce the concentrations of IL-6, NO and TNF - α serum inflammatory factors, thereby effectively reducing the oxidative stress level and inflammatory response in sufferers with KOA, blocking the course of the disease and improving the joint function of patients. These results are similar to those researches reported [26], the traditional electro-acupuncture imposes the therapeutic effects only through the acupoint stimulation, while Qinglong tail-wagging acupuncture has been innovated in depth and direction of needles, as well as the supplementing and relieving techniques, etc., which has effect of promoting Qi to disease. This acupuncture method is suitable for treating the obstruction of Qi and blood in meridian, and its mechanism may correlate with the inhibition of NO level of serum and inflammatory factor levels of IL-6 and TNF-α. However, it still needs further study and analysis for its specific mechanism of action.

Due to the limited number of subjects enrolled in the study, further researches and analysis will be carried out in the future, to compare with other therapeutic methods. And to further explore the mechanism of Qinglong tail-wagging technique on KOA.

In conclusion, Qinglong tail-wagging acupuncture has good curative effect in the treatment of elderly KOA. It can effectively improve the joint function of patients, and reduce the concentration of serum inflammatory factors in patients efficiently.

Disclosure of conflict of interest

None.

Table 6. Comparison of serum inflammatory factors between the two sets of subjects ($\bar{x} \pm s$)

Group	Phase	IL-6 (pg/ml)	NO (μmol/L)	TNF-α (pg/ml)
Observation group (n=48)	Before treatment	78.62±25.60	83.12±25.33	33.49±4.92
	After treatment	33.28±6.31*	58.52±15.66*	17.96±2.01*
	t	11.914	5.723	20.245
	P	0.000	0.000	0.000
Control group (n=45)	Before treatment	75.21±27.34	81.95±21.64	34.06±5.26
	After treatment	40.73±7.86	69.74±13.97	23.27±4.08
	t	8.131	3.180	10.873
	P	0.000	0.002	0.000

Note: *P < 0.05 compared with the control group in post-treatment.

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