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Meta-analysis of Acupuncture Treatment for Tension-type Headache

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Abstract: The objective of the study is to systematically evaluate the clinical efficacy of acupuncture in the treatment of tension-type headache. The method applied in this paper is searched CNKI, Chongqing VIP Database, Wanfang Database, CBM, Pubmed, Web of Science, Cochrane Library, and Embase, and the literature was included according to the inclusion criteria of this study, and the risk bias was evaluated. We use Stata17 software to combine and analyze all the data to evaluate the clinical efficacy of acupuncture treatment for tension-type headaches. As a result, a total of 20 articles were included, and the meta-analysis results showed that acupuncture has advantages in improving the total effective rate of tension-type headache treatment, reducing the degree of headaches (VAS) and frequency, shortening headache duration, and improving the psychological status of tension-type headache patients (SDS score). The curative effect of acupuncture is better than Western medicine treatment, with statistical significance ($P<0.05$). However, there was no statistically significant difference ($P>0.1$) in the improvement of anxiety in patients with tension-type headache by acupuncture compared to the Western medicine group.

1. Introduction

Tension-type headache(TTH) is the most common type of primary headache, with clinical symptoms mainly characterized by a sense of tightness and constriction in the bilateral occipital or whole head regions. The pain is compressive[1] and can be divided into occasional tension-type headache, frequent tension-type headache, and chronic tension-type headache. Its disability is lower than that of migraine [2]. Except for severe cases, the degree of headache is mostly mild to moderate, and it is not often accompanied by symptoms such as nausea, vomiting, and photophobia. Epidemiological surveys show that the global annual prevalence rate is about 26% -38%, and its lifetime prevalence rate in the population can reach 30% -78%[3]. The annual prevalence

rate in China is 10.8% [4]. With the sharp increase in social pressure, the incidence rate of tension-type headache affected by emotional and psychological factors increases year by year [5].

At present, the drugs used to treat tension-type headaches mainly include nonsteroidal anti-inflammatory drugs, muscle relaxants, antidepressants, etc. At the same time, drug abuse and drug overuse-induced headaches have also emerged. Nondrug treatment is widely accepted by more patients due to its effectiveness and nonaddictive properties. Research on pain suggests that sensitization of the pain pathway may be related to the production of nitric oxide and the activation of nitric oxide synthase[6]. Acupuncture at Fengfu[7] acupoint can reduce plasma NO and ET levels in TTH rats. As a traditional therapy, acupuncture can improve the symptoms of tension-type headache patients, according to many research results. Wang Yue[8] and others have demonstrated that aligned horizontal needling can significantly alleviate the degree and duration of headache in TTH patients. Meridian oblique needling[9] is superior to epirisone hydrochloride tablets in improving the frequency and severity of headache in patients. Floating needles[10] can improve local perfusion status and reduce headache severity through reperfusion activity.

This study aims to evaluate the clinical efficacy of acupuncture treatment for TTH through meta-analysis. Previous literature was screened and analyzed to evaluate the difference in efficacy between acupuncture and Western medicine treatment, obtain evidence-based evidence, and analyze the problems in clinical research.

2. Materials and methods

The meta-analysis of this study is based on the evaluation system evaluation tool (AMSTAR2)[11] and reported according to the preferred reporting items (PRISMA) guidelines[12] for system evaluation and meta-analysis, as well as the Cochrane Handbook[13] for intervention system evaluation. This study was registered in the International Prospective Register of Systematic Reviews (PROSPERO), ID: CRD42024523296.

2.1. Retrieval strategy

There are a total of 8 databases searched, including CNKI, Chongqing VIP Database, Wanfang Database, CBM, Pubmed, Web of Science, Cochrane Library, and Embase. The search range is from the establishment of the database to October 2023. The search strategy of CNKI is: (subject=acupuncture+acupuncture and moxibustion+body acupuncture+acupuncture and moxibustion therapy) AND (subject=tension headache+chronic tension headache+vascular tension headache+muscle tension headache+acute tension headache). The PubMed search formula is shown in Table 1.

Table 1: PubMed retrieval strategy.

PubMed retrieval strategy
#1 Acupuncture[Mesh] OR Pharmacopuncture[Title/Abstract]
#2 Tension-Type Headache[Mesh] OR Headache,Tension-Type[Title/Abstract] OR Headaches,Tension-Type[Title/Abstract] OR Tension Type Headache[Title/Abstract] OR Tension-Type Headaches[Title/Abstract] OR Idiopathic Headache[Title/Abstract]OR Headache, Idiopathic[Title/Abstract]OR Headaches,Idiopathic[Title/Abstract] OR Idiopathic Headaches[Title/Abstract]OR Stress Headache[Title/Abstract] OR Headache, Stress[Title/Abstract] OR Headaches, Stress[Title/Abstract] OR Stress Headaches[Title/Abstract] OR Tension Headache[Title/Abstract] OR Headache, Tension[Title/Abstract]OR Headaches, Tension[Title/Abstract] OR Tension Headaches[Title/Abstract] OR Psychogenic Headache[Title/Abstract] OR Headache, Psychogenic[Title/Abstract] OR Headaches, Psychogenic[Title/Abstract] OR Psychogenic Headaches[Title/Abstract] OR Tension-Vascular Headache[Title/Abstract] OR Headache, Tension-Vascular[Title/Abstract] OR Headaches, Tension-Vascular[Title/Abstract] OR Tension Vascular Headache[Title/Abstract] OR Tension-Vascular Headaches[Title/Abstract]
#3 #1 and #2

2.2. Inclusion and exclusion criteria

2.2.1. Inclusion criteria

(1)Adults diagnosed with TTH according to the diagnostic criteria published by the International Headache Association.

(2)The treatment group was treated with simple acupuncture, with no limit to the acupuncture points.

(3)The control group was treated with conventional Western medicine treatment.

(4)The main outcome measures were total effective rate and Degree of headaches (VAS), while the secondary outcome measures were headache frequency, headache duration, depression scale score (SDS), and anxiety scale score (SAS).

(5)The study includes randomized controlled trials published in Chinese and English databases.

2.2.2. Exclusion criteria

(1) Unable to obtain full text and data through effective means.

(2) Non-randomized controlled trials, semi-randomized controlled trials, efficacy observations, animal experiments, case reports, reviews, and other types of literature.

(3) Other types of acupuncture or acupuncture combined with other treatment methods.

(4) No diagnostic criteria, experimental group, or control group intervention details were provided.

(5) The outcome indicators are unclear.

(6) Publication overlap.

2.3. Data extraction

2.3.1. Literature screening

Two researchers conducted a back-to-back literature screening process, and the results were summarized after comparison. The two researchers discussed the differences to determine the final included literature.

2.3.2. Information extraction

The literature information extraction table includes the following contents: literature name, first author, publication year, diagnostic criteria, characteristics of the research subjects, research design, intervention measures and number of cases in the experimental and control groups, baseline data situation, outcome measurement, and measurement methods. If there are any objections throughout the process, two researchers will discuss and ultimately design a literature information extraction table.

2.4. Risk of bias assessment

The risk of bias assessment is conducted using the Cochrane offset risk assessment tool[14], which divides bias risk into three categories: “high risk,” “low risk,” and “unclear risk.” The risk of bias assessment includes six aspects: random sequence generation methods, allocation concealment, researcher or subject blinding, result data integrity, selective reporting, and other biases. Two researchers conducted this evaluation.

2.5. Data analysis

2.5.1. Data merging

Stata17 software was used for data merging analysis. The odds ratio (OR) of 95% confidence interval (CI) was selected as the scale index for binary variables, and the mean difference (MD) of 95% confidence interval (CI) was selected as the indicator for continuous variables. Perform heterogeneity testing during the analysis process using I2 statistic[15]. When the heterogeneity test results are $P \geq 0.1$ and $I2 \leq 50\%$, it indicates no significant heterogeneity between the merged studies, and a fixed effects model can be used. $P \leq 0.1$ and $I2 \geq 50\%$ indicate significant differences between merged studies, and a random effects model is used.

2.5.2. Subgroup analysis

By reclassifying the types of TTH included in the study, intervention Western medicine types in the control group, acupuncture treatment courses, and merging the data, the differences between different subgroups were compared.

2.5.3. Publication bias

Using Begg's and Egger's tests, evaluate the publication bias of the meta-analysis model for outcome measures with more than ten articles included. When $P>0.05$, it is considered that there is a small publication bias in the included literature, and the reliability of the results is high. When

P<0.05, it is considered that there is publication bias in the included literature and objectively analyzed the results.

3. Outcomes

After searching the database, 1657 articles were included in the screening. After screening out 778 duplicate publications, 884 articles remained. A total of 809 articles were excluded by reading the title and abstract. After reading the full text of the remaining 35 articles, 20 articles met the inclusion criteria[16-33]. Finally, a total of 20 articles were included in the study from 2004 to 2022. The specific flowchart is shown in Figure 1.

3.1. Inclusion of research features

The information, characteristics of the research subjects, detailed information about the experimental and control groups, outcome indicators, and adverse information are presented in the information summary table (Table 2). A total of 20 articles were included, published from 2004 to 2022, all in Chinese, with sample sizes ranging from 52 to 250.

Table 2: Information summary table.

First author	Number of cases(n)	TTH type	Experimental group	Control group	Treatment course	Outcome indicators	Adverse event
Yina Wang 2018	55 EG:28 CG:27	Occasional and frequent TTH	“LaoShi” Needles	Epirisone	48day	①②③④	Unreported
Ming Liu 2014	66 EG:33 CG:33	Chronic TTH	Local cluster needling + distal acupoint	amitriptyline	20day	①	Unreported
Wenbin Nie 2019	82 EG:41 CG:41	Frequent and Chronic TTH	Diagonal puncture of the tendon lesion point	Epirisone +ibuprofen	4week	②③+Headache Impact Test Scale(HIT-6)	CG:nausea(n=1)
Yue Wang 2022	250 EG:150 CG:100	Frequent and Chronic TTH	Aligned Horizontal Needling	Epirisone +Celecoxib	3week	①②④+Pericranial tenderness score	Unreported
Xue Zhang 2020	56 EG:28 CG:28	Frequent and Chronic TTH	Shugan Tiaoshen Acupuncture	amitriptyline	4week	①②③④⑤⑥	Unreported

Jingjing Deng 2013	50 EG:25 CG:25	TTH	Acupuncture	Acetaminophen +amitriptyline	10day	①③④+Improvement rate of quality of life(NRS)	Unreported
Xunhao Zhang 2011	60 EG:30 CG:30	Frequent and Chronic TTH	Acupuncture	amitriptyline	7day	①	Unreported
Guojian Wang 2020	100 EG:50 CG:50	Chronic TTH	Acupuncture of the sphenopalatine ganglion	ibuprofen	3week	①②③④+Comprehensive Quality of Life Assessment Questionnaire(GQOLI－74)	Unreported
Xin Wu 2016	60 EG:30 CG:30	TTH	Tiaoshen Acupuncture	Epirisone	2week	①③④⑤⑥	Unreported
Jinxiong Lao 2004	200 EG:107 CG:93	TTH	Acupuncture	Rutondine	40day	①	Unreported
Xinchang Chen 2017	140 EG:70 CG:70	Episodic TTH	Acupuncture	amitriptyline+ aspirin+oryzanol	24day	①	Unreported
Shan Duan 2014	96 EG:48 CG:48	TTH	Acupuncture	Epirisone	3week	②④	Unreported
Mei Fu 2013	52 EG:26 CG:26	Chronic TTH	Acupuncture	Votalin	1month	①	Unreported
XiaoLei Zhu 2013	60 EG:30 CG:30	TTH	Acupuncture	amitriptyline+ aspirin+oryzanol	4week	①	EG:Emotional tension, palpitations, and cold sweats(n=1)
Lingxi Gu 2017	95 EG:47 CG:48	TTH	Acupuncture	Epirisone	3week	①②+Improvement rate of quality of	Unreported

						life(NRS)	
Jianmin Peng 2009	126 EG:63 CG:63	TTH	Acupuncture	Compound Chlorzoxazone Tablets+ amitriptyline	2week	①+Pericranial tenderness score	Unreported
Lihua Zhou 2015	60 EG:30 CG:30	TTH	Acupuncture	amitriptyline	4week	①③④⑤⑥	Unreported
Qicai Chen 2008	135 EG:69 CG:66	TTH	Acupuncture	Epirisone	10day	⑤⑥	EG: dizziness with acupuncture(n=3) CG:Reduced appetite and nausea(n=13)
Yi Chen 2022	80 EG:40 CG:40	TTH	Acupuncture	ibuprofen	2week	①	Unreported
Yang You 2017	60 EG:30 CG:30	Chronic TTH	Acupuncture	Sibelium/ibuprofen/ Zhengtian Pill/estazolam/etc	4week	①②+Improvement rate of quality of life(NRS)	Unreported

EG Experimental group; CG Control group; ①Total effective rate; ②Degree of headaches (VAS); ③Headache frequency; ④headache duration; ⑤Anxiety Scale Score(SAS); ⑥Depression Scale Score(SDS)

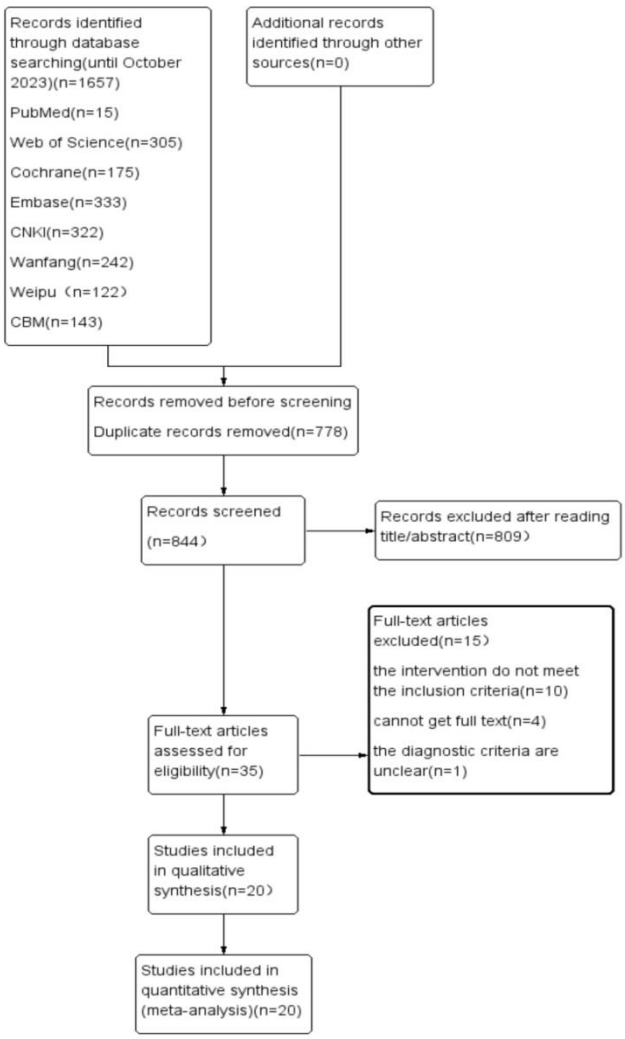

Figure 1: Literature Screening Process.

3.1.1. Population

A total of 1884 patients with tension-type headache were included in the study, including 976 patients in the acupuncture group and 908 patients in the control group, all conducted in China. Among them, four studies were chronic tension-type headache patients, four studies were frequent tension-type headache and chronic tension-type headache, one study was occasional and frequent tension-type headache, and nine studies were tension-type headache.

3.1.2. Intervention

In the treatment group, 13 studies used conventional acupuncture; one study used the “Laoshi” Needles; one study used local cluster needling combined with distal acupoint selection; one study used puncture of the tendon lesion point, one study used aligned horizontal needling method, two studies used “Tiaoshen” acupuncture, and another study used acupuncture at

the Sphenopalatine ganglion, with a course of treatment ranging from one week to seven weeks. In the control group, seven studies were treated with epinephrine, with one study in combination with amitriptyline, eight studies using antidepressants, and six studies using Antipyretic analgesic, with one study in combination with antidepressants.

3.1.3. Outcomes

In 18 studies, the total effective rate of treatment was used to evaluate the therapeutic effect of TTH. Eight studies calculated the effect of acupuncture on the degree of headache using VAS scores. The inclusion study includes primary and secondary outcome measures in the inclusion criteria. Seven studies reported changes in headache frequency, seven included evaluations of headache duration, and four studies involved SAS and SDS scores to evaluate the effect of acupuncture on anxiety and depression symptoms in tension type-headache patients.

3.1.4. Adverse event

Three studies reported the occurrence of adverse reactions, of which two were reported in the treatment group, all of which were palpitations, cold sweats, and dizziness caused by emotional tension during the first acupuncture but did not recur after that.

3.2. Risk of bias assessment

All 20 studies were randomized controlled trials. Three studies[16,19,21] used the order of visits as the allocation method and were assessed as "high-risk". Two studies were randomized by drawing lots, and 15 were assigned using a random number table method. Their random sequence generation was rated as "low risk". All included studies did not mention allocation concealment and were evaluated as "unclear risk". Wenbin Nie's [9] report did not fully report the outcome indicators of the methodology section and selectively reported one item rated as "high-risk". The evaluation details are shown in Figure 2.

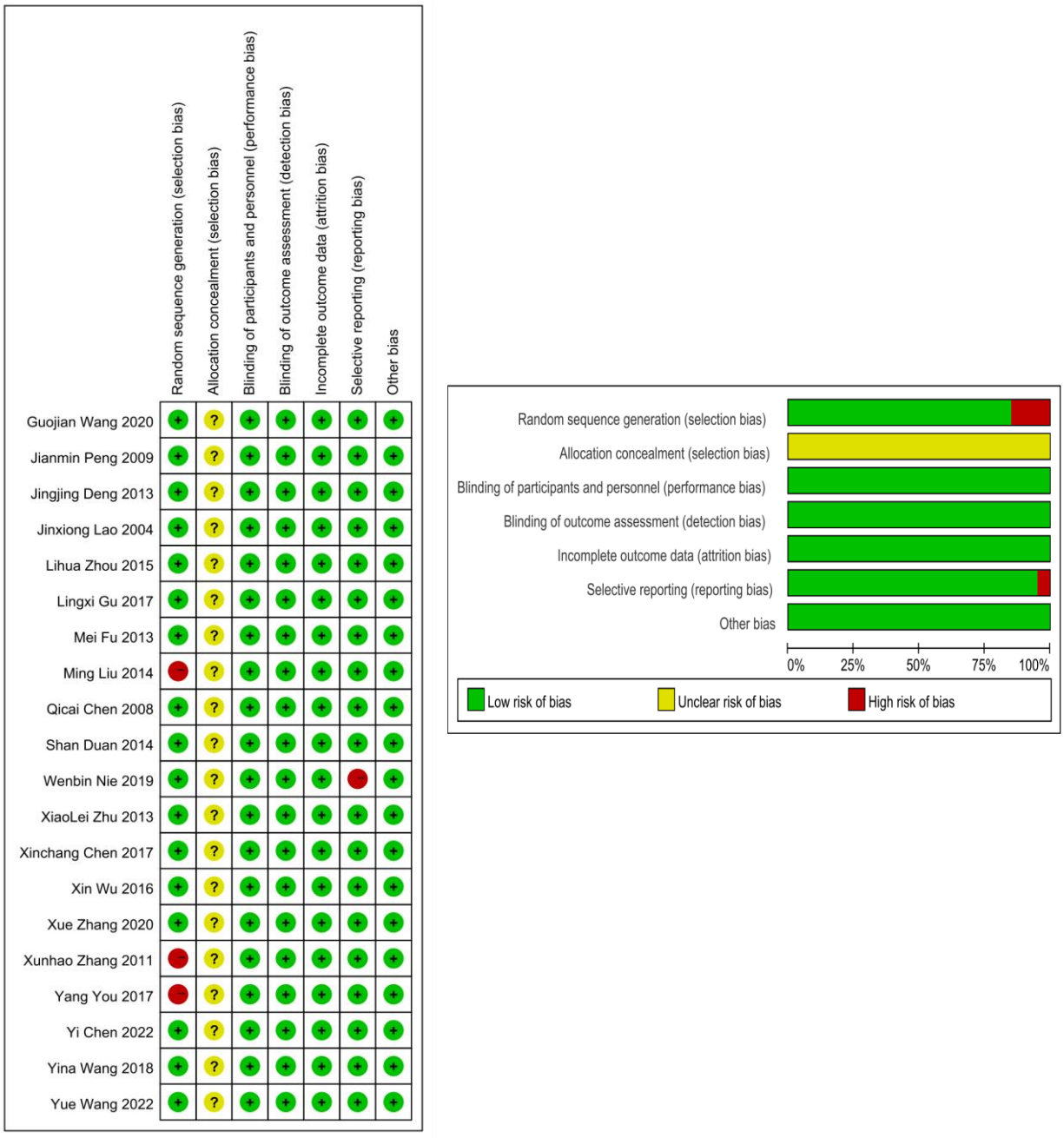

Figure 2: Summary of Risk of bias Assessment.

3.3. Meta-analysis results

3.3.1.Total effective rate

Seventeen literature reports reported the total effective rate of acupuncture treatment for tension-type headache, with a combined data result of OR=4.78,95%Cl(3.46,6.60), P=0.000, I2=0.0%. The acupuncture group had a better total effective rate in treating tension-type headache than the control group, with statistical differences. Sensitivity analysis showed that the effect model was relatively stable, and there were no studies that had a significant impact on the results (Figure 3). The publication bias detection results show that there is no publication bias: Begg, s(P=0.934),

egger, s(P=0.404).

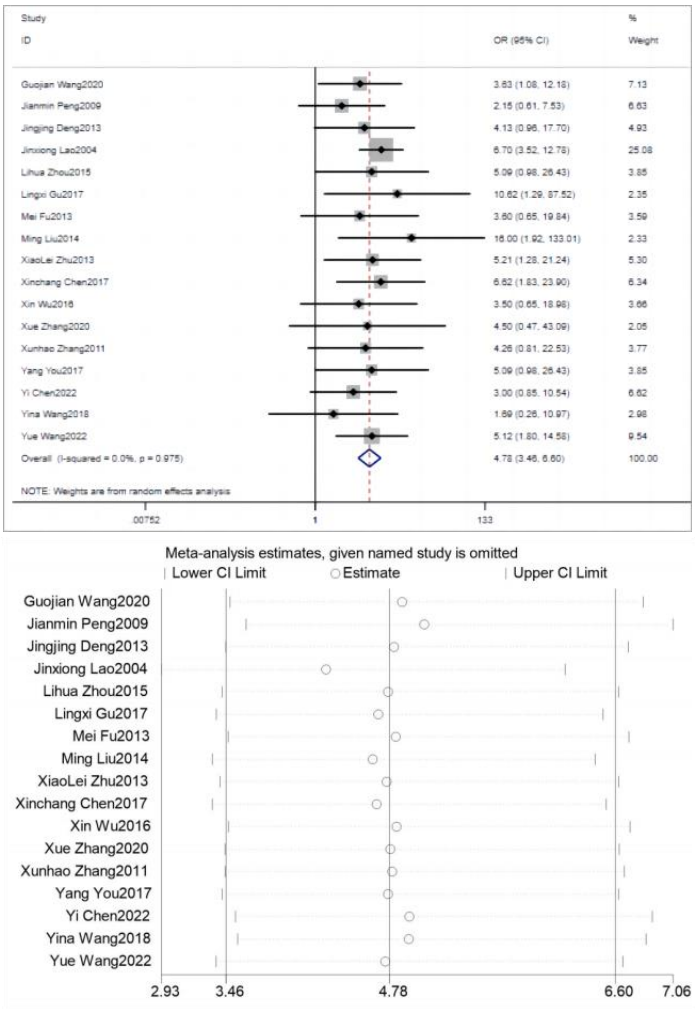

Figure 3: Meta-analysis results and sensitivity analysis results of total effective rate.

3.3.2. Degree of headaches (VAS)

Eight studies reported headache severity scores, with a combined result of SMD=-1.50,95%Cl(-2.30,-0.69), P=0.000,I2=95.8% . The results showed that the acupuncture group was superior to the control group in improving the degree of tension-type headache, and the difference was statistically significant. Sensitivity analysis showed that the effect model was relatively stable (Figure 4).

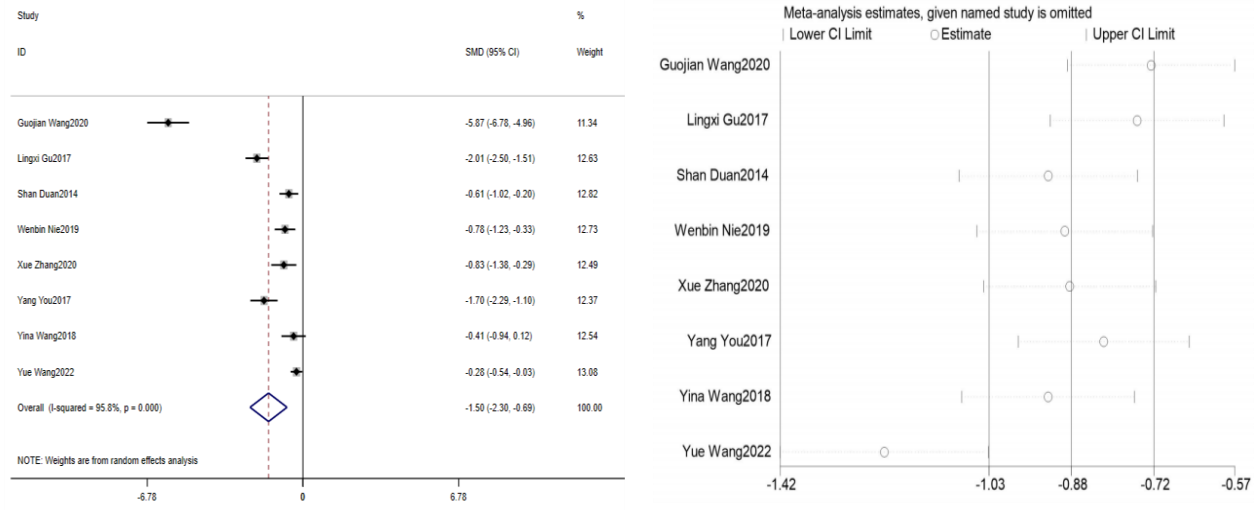

Figure 4: Meta-analysis results and sensitivity analysis results of VAS scores.

3.3.3. Headache frequency

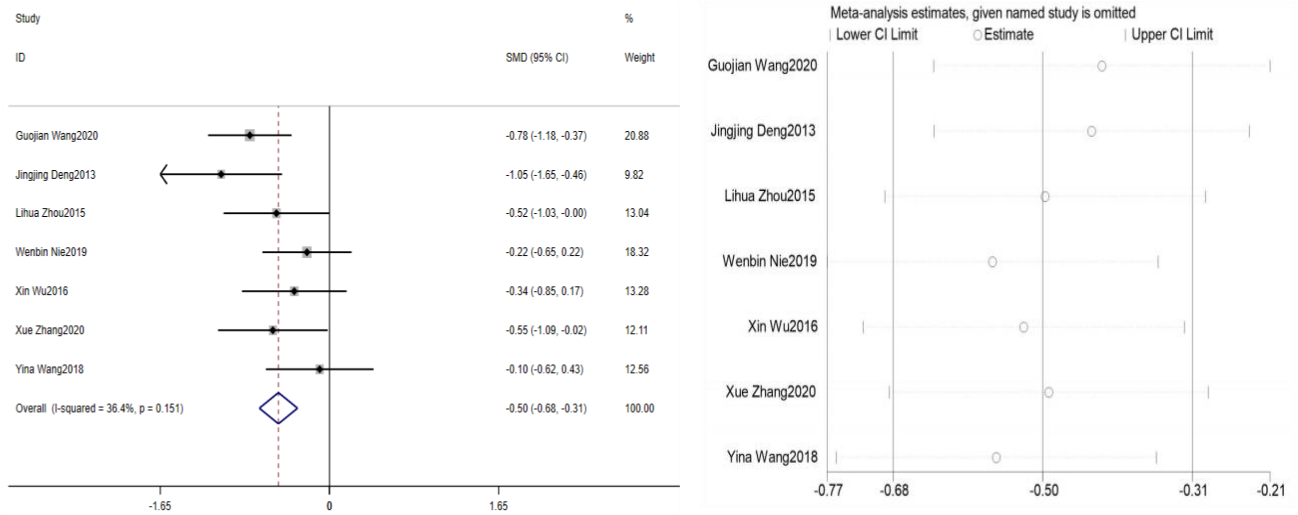

Figure 5: Meta-analysis results and sensitivity analysis results of headache frequency.

Seven articles reported the results of changes in headache frequency, with a combined result of SMD=-0.5,95%Cl(-0.68,-0.31), P=0.000, I2=36.4%. The results showed that the acupuncture group was superior to the control group in improving the frequency of tension-type headache attacks, and the difference was statistically significant. Sensitivity analysis proved that the effect model was relatively stable, and no studies had a significant impact on the results. The results of meta-analysis and sensitivity analysis are shown in Figure 5.

3.3.4. Headache duration

Eight literature reports changes in the duration of tension-type headache, with a combined result of SMD=-0.76,95%Cl(-1.39,-0.13), P=0.018, and I2=93.3%. The results showed that the acupuncture group was superior to the control group in improving the duration of tension-type headache, and the difference was statistically significant. Sensitivity analysis showed that the effect model was relatively stable, and there were no studies that had a significant impact on the

results. The results of meta-analysis and sensitivity analysis are shown in Figure 6.

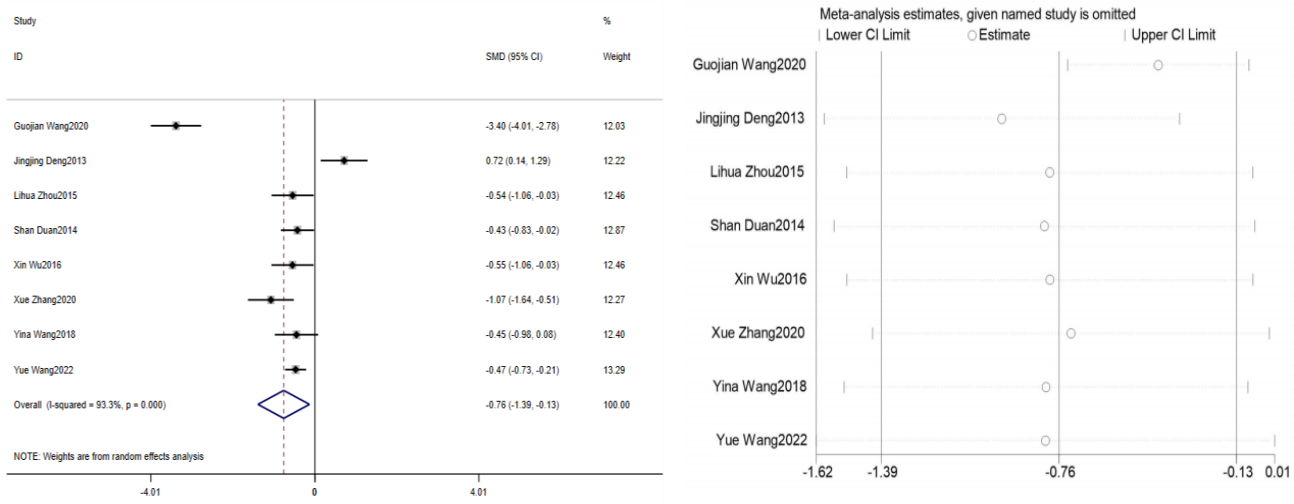

Figure 6: Meta-analysis results and sensitivity analysis results of headache duration.

3.3.5. Depression Scale Score(SDS)

Only four articles reported the depression scale score, with a combined result of SMD=-0.6,95%Cl(-1.2,-0.01),P=0.047, and I2=83.7% . The results showed that the acupuncture group was slightly better than the control group in improving the depression score of tension-type headache, and the difference was statistically significant. Sensitivity analysis showed that the effect model was relatively stable. The results of meta-analysis and sensitivity analysis are shown in Figure 7.

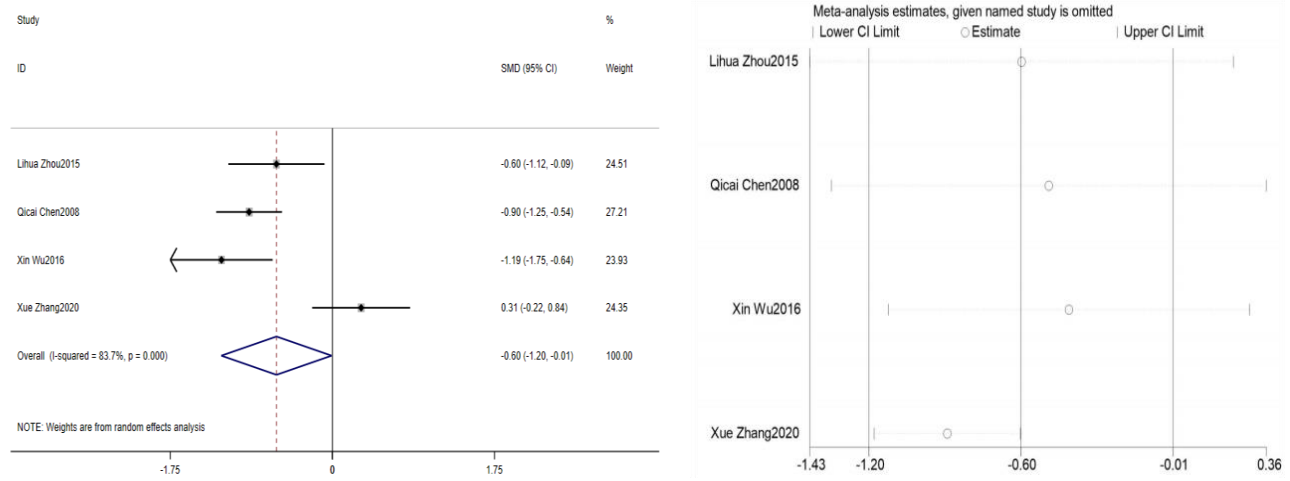

Figure 7: Meta-analysis results and sensitivity analysis results of SDS score.

3.3.6. Anxiety Scale Score (SAS)

At the same time, these four literatures also reported anxiety scale scores, with a combined result of SMD=-0.44,95%Cl(-1.17,0.3),P=0.243,and I2=89.4% . The results showed that there was no statistically significant difference between the acupuncture group and the control group in improving anxiety scores for tension-type headaches. Sensitivity analysis showed that the effect model was relatively stable. The results of meta-analysis and sensitivity analysis are shown in

Figure 8.

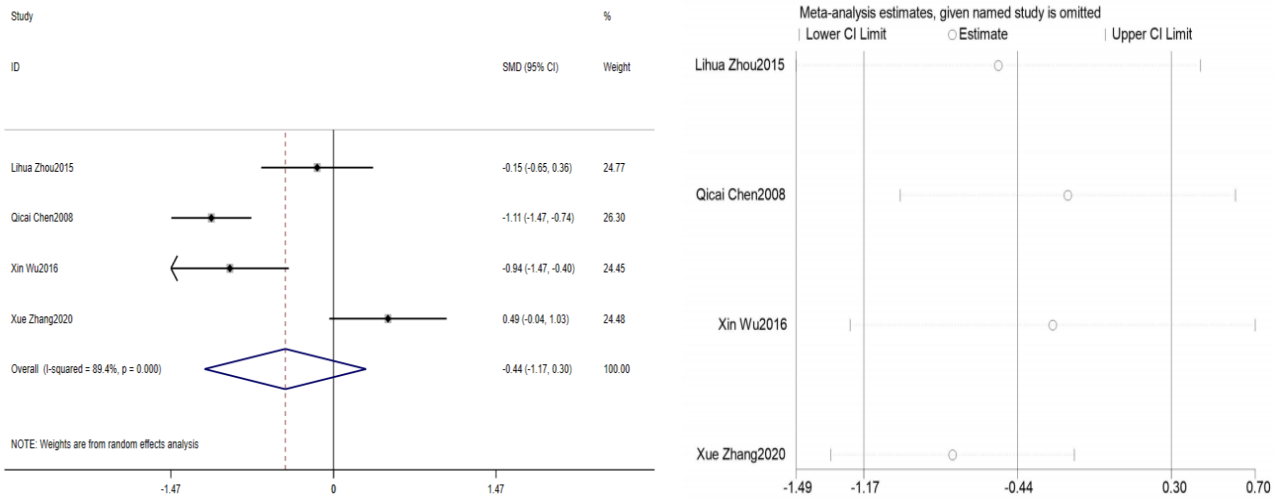

Figure 8: Meta-analysis results and sensitivity analysis results of SAS score.

3.4. Subgroup analysis

To further subdivide the differences, groups were divided based on the type of TTH, the type of Western medicine in the control group, and the duration of acupuncture treatment. Subgroup analysis was performed on the three subgroups, using the main outcome indicators of total effective rate and degree of headache (VAS) as measurement criteria. The following results were obtained, as shown in Table 3.

3.4.1. Type of TTH

According to the different types of tension-type headaches, the included literature will be divided into chronic tension-type headaches and frequent tension-type headaches, and the grouped studies will be merged with data on the main outcome indicators of total effective rate and degree of headache(VAS). The combined results of total effective rate are as follows: four studies have reported frequent tension-type headache, with combined results of OR=4.06,95%Cl(1.91,8.63), P=0.000, I2=0.0%; Seven studies on chronic tension-type headache were reported, with combined results of OR=4.81,95%Cl(2.72,8.49), P=0.000, I2=0.0%. The VAS score for degree of headache was reported in four studies on frequent tension-type headache, with combined results of SMD=-0.53,95%Cl(-0.82,-0.24), P=0.000, I2=46.9%, and five studies have been reported on chronic tension-type headache, with combined results of SMD=-1.83,95%Cl(-3.12,-0.55), P=0.000, I2=97.2%. According to the results, it can be concluded that the treatment effectiveness and relief of headache severity of acupuncture for frequent and chronic tension-type headaches are better than those of the control group, and the results are statistically significant (P<0.05).

3.4.2. Type of Western medicine

According to the different types of Western medicine in the control group, the literature included will be divided into muscle relaxants, antidepressants, antipyretics, and analgesics. The grouped studies will be combined with data on the main outcome indicators of total effective rate and degree

of headache (VAS). The combined results of the total effective rate data are: three studies on muscle relaxants have been reported, with a combined result of OR=3.67,95% Cl (1.25,10.79), P=0.018, I2=0.0%; four studies on antidepressants were reported, with a combined result of OR=5.89,95% Cl(2.32,14.97), P=0.000, I2=0.0%; four studies on antipyretic and analgesic drugs were reported, with a combined result of OR=5.06,95% Cl(3.08,8.31), P=0.000, I2=0.0%. Three studies on combining antidepressants and antipyretic analgesics were reported, with combined results of OR=5.33,95% Cl(2.41,11.79), P=0.000, I2=0.0%. The results of the degree of headache(VAS score) were reported in three studies on muscle relaxants, with a combined result of SMD=-0.98,95% Cl(-1.25,-0.71), P=0.000, I2=91.7%; two studies were reported on the combination of muscle relaxants and antipyretic analgesics, with a combined result of SMD=-0.40, 95% Cl(-0.63,-0.18), P=0.000, I2=72.0%. According to the results, it can be concluded that acupuncture has a better therapeutic effect on tension-type headache and improves the degree of headache compared to conventional Western medicine treatment. The results are statistically significant (P<0.05).

3.4.3. Duration of acupuncture treatment

According to the different durations of acupuncture treatment, the included literature will be divided into a two-week group, a three-week group, and a four-week group, and the grouped studies will be merged with data on the main outcome indicators of total effective rate and degree of headache (VAS). The total effective rate was as follows: there were three studies reported in the two-week treatment group, with a combined result of OR=2.72,95% Cl(1.24,5.97), P=0.013, I2=0.0%; Three studies were reported in the three-week treatment group, with combined results of OR=4.92,95% Cl(2.35,10.33), P=0.000, I2=0.0%; There were five studies reported in the four-week treatment group, with combined results of OR=4.73,95%Cl(2.24,10.00), P=0.000, I2=0.0%. The VAS score for the degree of headache showed that there were four studies reported in the three-week treatment group, with a combined result of SMD=-2.13,95% Cl(-3.72, -0.54), P=0.000, I2=98.1%; Three studies were reported in the four-week treatment group, with a combined result of SMD=-1.08,95% Cl(-1.63,-0.53), P=0.000, I2=96.4%. The results show that each acupuncture treatment group is superior to the control group in treating tension-type headache and improving the degree of headache, with statistical significance (P<0.05).

Table 3: Subgroup analysis results.

Subgroup	Number of studies	sample size EG	CG	OR/SMD	95%Cl	P
Type of TTH						
Total effective rate						
Frequent TTH	4	237	185	4.06	(1.91,8.63)	0.000
Chronic TTH	7	347	297	4.81	(2.72,8.49)	0.000
VAS score						
Frequent TTH	4	248	196	-0.53	(-0.82,-0.24)	0.000

Chronic TTH	5	299	249	-1.83	(-3.12,-0.55)	0.000
Type of Western medicine						
Total effective rate						
Muscle relaxants	3	106	105	3.67	(1.25,10.79)	0.018
Antidepressants	4	121	121	5.89	(2.32,14.97)	0.000
Antipyretics and analgesics	4	223	209	5.06	(3.08,8.31)	0.000
Antidepressants+Antipyretics and analgesics	3	125	125	5.33	(2.41,11.79)	0.000
VAS score						
Muscle relaxants	3	124	123	-0.98	(-1.25,-0.71)	0.000
Muscle relaxants+antipyretics and analgesics	2	191	141	-0.40	(-0.63,-0.18)	0.000
Duration of acupuncture treatment						
Total effective rate						
Two week	3	133	133	2.72	(1.24,5.97)	0.013
Three week	3	247	198	4.92	(2.35,10.33)	0.000
Four week	5	144	144	4.73	(2.24,10.00)	0.000
VAS score						
Three week	4	295	246	-2.13	(-3.72,-0.54)	0.000
Four week	3	99	99	-1.08	(-1.63,-0.53)	0.000

3.5. Analysis of research results

This article includes a total of 20 studies. In order to ensure consistency and analyzability of the studies, all intervention measures included in the study were consistently treated with single acupuncture, and all patients were diagnosed with tension-type headache. In selecting outcome measures, the commonly used total effective rate and degree of headache (VAS) in clinical studies were selected as the primary outcome measures, with headache frequency and duration as secondary outcome measures. Because patients with tension-type headache often have varying degrees of psychological disorders [34], SAS and SDS scores were added as secondary outcome indicators to increase the diversity of research results. In risk assessment, most of the included literature has a relatively small risk of bias, which ensures the randomness characteristics of clinical randomized controlled trials.

The meta-analysis results showed that acupuncture was superior to the Western medicine group in improving the total effective rate and degree of TTH patients, reducing headache frequency, and shortening headache duration. Acupuncture can improve the depressive state of tension-type headache patients and their quality of life.

In terms of adverse events, data analysis showed that both the acupuncture group and the Western medicine group had adverse reactions, among which the acupuncture group had adverse reactions such as palpitations, cold sweats, and needle dizziness.The adverse reactions in the Western medicine group were nausea and reduced appetite after taking Eperisone.

In terms of subgroup analysis, different types of TTH, Western medicine, and different treatment courses were grouped, and data were combined to explore the advantages of acupuncture treatment for TTH. By interpreting the results of two types of TTH (frequent TTH and CTTH), acupuncture treatment has more advantages in treating frequent TTH and CTTH, and both outcome indicators (total effective rate, degree of headache) are significantly better than the control group (P=0.000). By interpreting the results of different control group drug types, it can be seen that acupuncture is significantly better than conventional Western medicine in improving TTH and reducing headache severity (P<0.05). In the selection of acupuncture treatment courses, different treatment courses have good therapeutic effects (P<0.05), and the four-week and three-week groups have better total treatment efficacy than the two-week group (P=0.000). However, the two-week study did not report the degree of headache, so it is impossible to further compare the differences in headache relief between different treatment courses.

4. Discussion

4.1. Quality analysis of literature in this study

The inclusion of literature has issues such as randomization according to the order of visits, unclear allocation and blinding, and some reports a part of outcome indicators, which increases the risk of “selection bias,” “implementation bias,” and “reporting bias” and reduces the quality of literature evidence. The research design has the following defects:

(1) Unclear randomization method: Four of the included literature only mentioned random allocation, without specific description of randomization method.

(2) Unclear intervention measures and plans: Two articles[25, 32]showed unclear treatment courses in the control group, while one article[33] showed different treatment courses in the acupuncture group compared to the control group.

(3) Lack of uniformity in the evaluation criteria for outcome indicators: The included literature often uses total effective rate as the outcome indicator, but the evaluation methods for treatment effectiveness vary. Some literature considers an efficacy index ≥ 20% as effective, some literature considers an efficacy index ≥ 30% as effective, and others use the degree of improvement of headache symptoms as the evaluation criteria. There are two forms of VAS scores in evaluating the degree of headache: a ten-point scale and a five-point scale. The lack of unified standards for literature efficacy evaluation has led to a decrease in the effectiveness of data consolidation.

(4) The research design lacks completeness: most articles do not mention treatment adverse reactions and follow-up information, and there is a lack of reports on the efficacy time limit and safety of acupuncture treatment for TTH. In the future, clinical research design should have clear thinking, complete structure, clear core outcome indicators, and adopt objective evaluation methods as much as possible.

4.2. Analysis of the therapeutic advantages of acupuncture in the treatment of TTH

Tension-type headache belongs to the category of "Toutong" and "Toufeng" in traditional Chinese medicine and is responsible for external sensations and internal injuries. The "Shanghan Lun" states that "headaches are caused by the wind," and the onset of the disease is often related to factors such as wind, fire, phlegm, blood stasis, and deficiency. Insufficient innate endowment, acquired weakness of the spleen and stomach, deficiency of yin and blood, and lack of nourishment of muscles and meridians are the fundamental causes of tension-type headache[35]. It is a combination of deficiency and excess, mainly caused by liver, spleen, and kidney deficiency. Treatment should focus on regulating qi and liver, spleen, and kidney functions[36]. Acupuncture exerts analgesic effects by dispelling wind and evil, soothing meridians, and promoting blood circulation[37].

The pathogenesis of TTH in modern medicine mainly consists of three aspects: peripheral mechanism, central mechanism, and genetic mechanism[3]. Research has shown that acupuncture can exert analgesic effects by inhibiting pain signal transmission, thereby inhibiting peripheral and central sensitization, regulating neurotransmitters, and activating central analgesic mechanisms[4]. Acupuncture can also inhibit the inflammatory response mediated by chemokines[38] and inflammatory factors, exerting anti-inflammatory and analgesic effects. Acupuncture treatment for TTH not only has significant therapeutic effects but also has no side effects, making it safer and more effective than Western medicine treatment. Acupuncture combined with Western medicine can reduce the use of Western medicine and reduce drug dependence in the treatment of TTH.

4.3. Analysis of the current situation of acupuncture treatment for TTH

At present, acupuncture is seldom used to treat TTH. The reasons are as follows:(1)the acupuncture indications are not well publicized and educated, and the public has no knowledge or doubts about whether acupuncture can treat TTH;(2) Lack of high-quality randomized controlled studies and evidence-based evidence, and the medical community has not formed a consensus on acupuncture treatment for TTH;(3) The construction of specialized diagnosis and treatment for headache is not in place, and the direction of patient visits is unclear. Therefore, we should vigorously promote the knowledge about TTH and acupuncture indications, carry out more high-quality clinical research, and build a clear quantitative system of acupuncture manipulation. The hospital should establish and improve the diagnosis and treatment system for headache-specific diseases, carry out diagnosis and treatment jointly with the Department of Neurology and the Department of Acupuncture, provide targeted medical services, and popularize headache-related knowledge to increase the use rate of acupuncture in treating TTH.

5. Conclusion

Compared with conventional Western medicine, acupuncture treatment of tension-type headache has significant therapeutic advantages in improving the symptoms of tension-type headache patients and improving the quality of life of patients. It can be popularized and applied in the outpatient department of acupuncture and neurology. Higher quality randomized controlled trials need to be carried out for verification.

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