



Review Article

## A Review of Acupuncture Treatment for Primary Headache Disorders in Korea



Doo-ree Hwang<sup>1</sup>, Ju-hyun Lee<sup>1</sup>, Seung-hyo Hong<sup>1</sup>, Hyun-min Choi<sup>2</sup>, Hyun-ae Park<sup>1,\*</sup>

<sup>1</sup> Department of Acupuncture and Moxibustion Medicine, Dongseo Oriental Hospital, Seoul, Korea

<sup>2</sup> Department of Korean Medicine Rehabilitation, Dongseo Oriental Hospital, Seoul, Korea

### ABSTRACT

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This study was performed to review clinical research studies involving acupuncture treatment for primary headache disorders to provide a basic reference for future studies.

Clinical studies of primary headache disorders treated with acupuncture were retrieved from 3 Korean electronic databases (NDSL, OASIS, and RISS). The studies were classified by year of publication, type of study, type of acupuncture, outlined acupoints, methods used for filiform needles, pharmacopuncture, auricular acupuncture, and thread-embedding acupuncture.

Thirty-eight trials were reviewed, of which 33 used filiform needles, 6 pharmacopuncture, 1 auricular acupuncture, and 1 used thread-embedding. Most of the studies reported that acupuncture treatment was effective in treating primary headache disorders.

Some studies reported statistically significant effects, but the results overall were inconsistent. Therefore, there is insufficient evidence to support the treatment of acupuncture to resolve headaches. On the basis of these results, further studies should be performed to qualitatively and quantitatively determine the efficacy of acupuncture treatment for primary headache disorders.

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### Introduction

Headache refers to any pain or discomfort originating from pain-sensitive regions covering the orbit to the larynx [1], and is a very common condition. According to the International Classification of Headache Disorders, 3rd edition (ICHD-III) published in 2018 by the Headache Classification Committee of the International Headache Society (IHS), headaches are classified into 3 categories: primary headaches, secondary headaches, and neuropathies and facial pains [2]. Most headaches fall into the primary headache category and are caused by the headache itself, rather than secondary headaches, which are caused by physical problems or underlying diseases. Therefore, it is important to diagnose headaches appropriately under the headache classification system based on medical history and physical and neurological exams [3].

Although acetaminophen, aspirin, nonsteroidal anti-inflammatory drugs, triptans, narcotics, and barbiturates can be used to treat headaches, this could result in the paradoxical problem of turning transient headaches into chronic daily

headaches [4]. Accordingly, drugs with minimized side effects or non-pharmacological treatment methods are becoming increasingly necessary to reduce pain and improve patient quality of life. Furthermore, it has been reported that acupuncture treatment can be effective for the treatment of frequent headaches or when headaches progress to chronic pain that does not respond very well to analgesics [5].

In this context, the present study analyzed the types of acupuncture treatment used in clinical research for primary headaches in Korea to provide a basic reference for future studies.

### Materials and Methods

#### Research subject and search methods

To examine acupuncture trends in the treatment of primary headaches in Korea, research articles from 2000 onwards were retrieved from the National Discovery for Science Leaders (NSDL), Research Information Sharing Service (RISS), and Oriental

\*Corresponding author.

Department of Acupuncture and Moxibustion Medicine, Dongseo Oriental Hospital, Seoul, Korea

E-mail: [acorria@naver.com](mailto:acorria@naver.com)

ORCID: Doo-ree Hwang <https://orcid.org/0000-0002-3438-7755>, Hyun-ae Park <https://orcid.org/0000-0003-1329-4813>

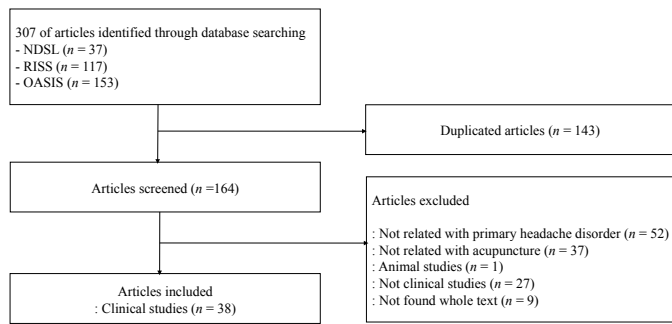


Fig. 1. Article selection flow chart.

NDSL, National Discovery for Science Leaders; OASIS, Oriental Medicine Advanced Searching Integrated System; RISS, Research Information Sharing Service.

Medicine Advanced Searching Integrated System (OASIS). “Headache”, “primary headache” and “acupuncture” were used as keywords. The retrieval was conducted on June 20, 2019 and reviewed on July 8, 2019.

Studies excluded were research articles and literature reviews

whose full text had restricted access, did not mention acupuncture treatment, were animal studies, and research that reported on headaches resulting from underlying causes.

Based on these criteria, a total of 38 studies were selected and analyzed (Fig. 1).

These were classified by published year, type of study, and type of acupuncture. Acupoints, methods used for filiform needles, pharmacopuncture, auricular acupuncture, and thread-embedding acupuncture were also outlined.

## Results

### Classification by year

Except for 2002, 2014, 2015, and 2016, studies had been conducted consistently. Out of the 41 studies, there were 18 case reports [6-23], 9 case series [24-32], 9 randomized controlled trials [33-41], and 2 non-randomized controlled trials [42,43] (Tables 1-5).

### Classification by type of needle used for treatment

Of the 38 studies included in this review, 30 used filiform

Table 1. The Search Results of Headache and Acupuncture Treatment.

| y     | Case report | Case series | RCT | nRCT | Total |
|-------|-------------|-------------|-----|------|-------|
| 2000  | 1           | 3           |     |      | 4     |
| 2001  | 1           | 2           | 1   |      | 4     |
| 2002  |             |             |     |      |       |
| 2003  |             | 1           |     | 1    | 2     |
| 2004  | 2           |             | 1   |      | 3     |
| 2005  |             | 1           | 1   |      | 2     |
| 2006  | 1           |             | 1   |      | 2     |
| 2007  |             |             | 1   |      | 1     |
| 2008  | 2           |             | 1   |      | 3     |
| 2009  |             |             |     | 1    | 1     |
| 2010  | 2           | 1           |     |      | 3     |
| 2011  |             |             |     |      |       |
| 2012  |             |             | 2   |      | 2     |
| 2013  | 4           | 1           |     |      | 5     |
| 2014  |             |             |     |      |       |
| 2015  |             |             |     |      |       |
| 2016  |             |             |     |      |       |
| 2017  | 2           |             |     |      | 2     |
| 2018  | 3           |             |     |      | 3     |
| 2019  |             |             | 1   |      | 1     |
| Total | 18          | 9           | 9   | 2    | 38    |

nRCT, non-randomized controlled trial; RCT, randomized controlled trial.

Table 2. Summary of 18 Case Reports.

| Authors (y)       | N  | Types of acupuncture  | Acupoints   | Outcome measures                     | Result   |
|-------------------|----|---|---|--------------------------------------|--|
| Kim (2008) [6]    | 1  | Filiform needle (Saamchimbeop)                                | Spleen jungkyuk PC9 draining LR2 supplementation  | VAS                                  | VAS 10→0   |
| Lee (2006) [7]    | 1  | Filiform needle (Saamchimbeop)                                | Lung jungkyuk PC9 draining LR8 supplementation ST36 PC6 SP4 etc.  | Clinical results                     | Improved   |
| Baek (2013) [8]   | 1  | Filiform needle   | GV20, GV23, TE5, SI3, GB41  | VAS                                  | VAS 5→2  |
| Yun (2013) [9]    | 1  | Filiform needle   | HT8, KI10, SI5, BL66  | VAS                                  | VAS 9→0  |
| Oh (2013) [10]    | 3  | Filiform needle   | Spleen jungkyuk (lesser yin person)<br>LiverSeunggyeok (greater yin person)   | NRS<br>SF-36<br>HIT-6                | NRS: 2→0, 4→1, 8→6<br>SF-36: 21→50, 23→32, 49→43<br>HIT-6: 60→42, 69→63, 62→62 |
| Lee (2004) [11]   | 1  | Filiform needle   | LU8, SP3, KI3, KI10, LR1, LR2, GB41, BL66   | VAS                                  | VAS 10→0-1   |
| Cha (2008) [12]   | 1  | Filiform needle   | GV20, EX-HN1, ST40, ST36, CV12, LI4, LR3  | Clinical results<br>VAS<br>BPI       | Improved<br>VAS 8→2-3<br>BPI decreased   |
| Park (2010) [13]  | 2  | Filiform needle (Saamchimbeop)                                | Kidney Jeonggyeok<br>Lung Jeonggyeok  | VAS                                  | VAS 10→2, 10→2   |
| Won (2013) [14]   | 1  | Filiform needle   | A-shi points GB20, GV16, GB21, ST8  | VAS                                  | VAS 10→3   |
| Lee (2001) [15]   | 2  | Filiform needle   | Trigger point (SCM, suboccipital m.)<br>GV20, EX-HN1, EX-HN3, EX-HN5, ST8, GB20, BL10, GV16, LI4, TE5, LU7, LR3, ST36, ST40, GB41 | Pain intensity                       | +3→±0, +3→±0   |
| Bang (2010) [16]  | 1  | Filiform needle   | GV20, GB1, GB8, GB20, LI11, LI4, ST36, LR3  | VAS                                  | VAS 10→1   |
| Kim (2004) [17]   | 15 | Filiform needle   | GB43 supplementation<br>LI1 draining  | Clinical results                     | Improved   |
| Kim (2018) [18]   | 1  | 1)Pharmacopuncture (Trionycis Carapax)<br>2)Filiform needle   | 1) GB20, GV16, GB12, GB21, BL43, Trigger Point<br>2) GV20, EH-HN3, EX-HN5, ST9, LI11, LI4, ST36, LR3                              | NRS<br>HDI<br>Six point Likert scale | NRS 6→1<br>HDI 42→22<br>Six point Likert scale 4→2                             |
| Kim (2018) [19]   | 1  | Filiform needle (electro-acupuncture)                         | GV20, LI4, LR3, GB20, (GB8, EX-HN5)   | NRS<br>Attack frequency              | NRS 7→0<br>Attack frequency 2→0  |
| Cha (2018) [20]   | 1  | Filiform needle   | GV20, GB20, SP3, ST43, CV12, Ashi-points  | NRS                                  | NRS 5→1  |
| Shin (2017) [21]  | 4  | Filiform needle   | Trigger Point (splenius capitis m, SCM, rhomboid m, levator scapulae m, trapezius m, )<br>GV20, GV16, GB20, TE17                  | NRS                                  | NRS 10→0, 10→0, 10→2, 10→2   |
| Hwang (2017) [22] | 3  | 1) Pharmacopuncture (Trionycis Carapax)<br>2) Filiform needle | 1) GB20, GV16, GB12, GB21, BL43, Trigger Point<br>2) GV20, EH-HN3, EX-HN5, ST9, LI11, LI4, ST36, LR3                              | NRS<br>HDI<br>Six point scale        | HDI 10→2, 60→14, 70→60<br>VAS 7→1, 8→2, 6→2<br>Six-point scale 4→2, 4→2, 4→3   |
| Jeon (2000) [23]  | 1  | Filiform needle   | GV20, GV23, GV24, EX-HN5, GB8, ST8, GB20, LI4, LR3, PC6   | Pain intensity                       | +2→0   |

VAS, visual analogue scale; NRS, numerical rating scale; SF-36, short form-36 health survey; HIT-6, headache impact test-6; BPI, brief pain inventory; HDI, henry ford headache disability inventory.

Clinical results: subjective symptoms of headaches.

Table 3. Summary of 9 Case Series.

| Authors (y)      | N  | Types of acupuncture                                | Acupoints   | Outcome measures                                   | Result  |
|------------------|----|---|---|--|---|
| Jang (2003) [24] | 82 | Pharmacopuncture<br>( <i>Hwangryunhaedok-tang</i> ) | GB20  | Intensity of headache by pain type (4-point scale) | Improved significantly ( $p < 0.01$ )                       |
| Jung (2005) [25] | 15 | Filiform needle                                     | GV20, EX-HN1, ST8, EX-HN5, TE17, GB20, LI4, LR3, ST36, LI11   | HRV (SDNN, RMSSD, TP, LF, HF)                      | TP improved significantly ( $p < 0.05$ )                    |
| Kim (2000) [26]  | 36 | 1) Filiform needle<br>2) Auricular acupuncture      | 1) GV20, EX-HN1, ST8, EX-HN5, TE17, GB20, LI4, LR3, ST36, LI11<br>2) Shenmen, Temple, Thalamus, Occiput, Forehead                                       | Intensity of headache by pain type (6-point scale) | Improved significantly in Tension-type group ( $p < 0.05$ ) |
| Kim (2010) [27]  | 15 | Pharmacopuncture (Carthmi-Flos)                     | GB21, GB20, EX-HN5  | HIT SF-36 HFD                                      | Improved  |
| Cha (2000) [28]  | 66 | Filiform needle                                     | GV20, GB20, LI4, LR3, EX-HN5, PC6, LU7, ST36, SP6, CV12   | Clinical results                                   | Improved  |
| Jung (2001) [29] | 30 | Filiform needle                                     | GV20, EX-HN1, EX-HN5, BL2, GB20, LI11, GB21, ST36, SP9  | Clinical results                                   | 80% improved  |
| Lee (2001) [30]  | 6  | Filiform needle                                     | EX-HN5, GB20, ST8   | MV, PI of MCA ACA BA                               | MV of MCA decreased by 13.3%, PI decreased by 10.4%         |
| Choi (2000) [31] | 37 | Pharmacopuncture<br>( <i>Hwangryunhaedok-tang</i> ) | GV20, GV14, GB20, GB21, etc   | Clinical results                                   | Improved  |
| Kim (2013) [32]  | 64 | Filiform needle                                     | Occipital-headache : greater yang meridian sinew<br>Temporal-headache : lesser yang meridian sinew<br>Frontal-headache : yang brightness meridian sinew | VAS Frequency of pain<br>Duration of pain          | 65.6-87.8% improved   |

HRV, heart rate variability; SDNN, standard deviation of all NN intervals; RMSSD, thr square root of the mean of the square of differences between adjust NN intervals; TP, total power; LF, low frequency; HF, high frequency; HFD, headache-free days; MV, mean velocity; PI, pulsatility index. Clinical results: subjective symptoms of headaches.

Table 4. Summary of 9 RCTs.

| Authors (y)      | N   | Types of acupuncture   | Acupoints  | Outcome measures                                | Result   |
|------------------|---|--|--|---|--|
| Kim (2006) [33]  | Experimental (n = 13)<br>Control (n = 13) | Pharmacopuncture<br>( <i>Hwangryunhaedok-tang</i> )<br>Normal saline injection | GB20, GB21, LI4  | VAS BPI   | VAS improved significantly ( $p = 0.000$ ) BPI (all) improved significantly ( $p \leq 0.005$ )<br>VAS improved ( $p = 0.009$ ) BPI (Mood) improved significantly ( $p = 0.042$ )   |
| Hong (2007) [34] | Experimental (n = 13)<br>Control (n = 13) | Filiform needle<br>( <i>Saamchimbeop</i> )<br>Sham acupuncture                 | Bladder jungkyuk, GB20, GV20, EX-HN3<br>Stomach sunghanggyeok, EX-HN3<br>Gall Bladder seunggyeok, EX-HN3 | VAS HDI 6-point Likert scale                    | more improved in experimental group but not significantly  |
| Kwak (2008) [35] | Experimental (n = 17)<br>Control (n = 15) | Filiform needle<br>( <i>Saamchimbeop</i> )<br>Sham acupuncture                 | Bladder jungkyuk, GB20, GV20, EX-HN3<br>Stomach sunghanggyeok, EX-HN3<br>Gall Bladder seunggyeok, EX-HN3 | VAS HDI 6-point Likert scale<br>Algometer score | more improved in experimental group but not significantly<br>Algometer score improved significantly ( $p < 0.001$ )  |
| Bae (2013) [36]  | Experimental (n = 13)<br>Control (n = 13) | Thread-embedding acupuncture<br>Filiform needle                                | GB20   | VAS HIT HDI<br>HRV                              | VAS improved significantly ( $p < 0.001$ )<br>HIT improved significantly ( $p = 0.000$ )<br>HDI improved significantly ( $p = 0.000$ )<br>HRV improved but not significantly<br>VAS improved significantly ( $p < 0.001$ )<br>HIT improved significantly ( $p = 0.046$ )<br>HDI improved significantly ( $p = 0.006$ )<br>HRV improved but not significantly |
| Jung (2005) [37] | Experimental (n = 49)<br>Control (n = 43) | Filiform needle + nerve block<br>Filiform needle                               | GV20, HN23, ST8, HN46, TE17, GB20, LI20, LI11, LI14, ST36, LR3   | VAS BPI   | VAS improved significantly ( $p < 0.05$ ) BPI improved significantly (1 month) ( $p < 0.05$ )<br>VAS improved significantly ( $p < 0.05$ ) BPI improved significantly (2 month) ( $p < 0.05$ )   |

Table 4. (Continued).

| Authors (y)      | N                        | Types of acupuncture  | Acupoints   | Outcome measures                   | Result   |
|------------------|--------------------------|---|---|------------------------------------|--|
| Kwon (2012) [38] | Experimental A (n = 10)  | Filiform needle (Fixed-EA)  | ST36, ST37  | VAS BPI                            | VAS improved significantly (p < 0.05)  |
|                  | Experimental B (n = 10)  | Filiform needle (Varied-EA)   |   |                                    | BPI improved significantly (p < 0.05)  |
|                  | Control (n = 10)         | Filiform needle   |   |                                    | VAS improved but not significantly<br>BPI improved but not significantly   |
| Jeon (2019) [39] | Experimental (n = 15)    | Filiform needle (EA)  | GB12, GB20  | VAS 5-point Likert scale<br>KHIT-6 | VAS improved significantly (p = 0.013)   |
|                  | Control (n = 15)         | Filiform needle (Sham-EA)   |   |                                    | 5-point Likert scale improved significantly (p = 0.008)<br>KHIT-6 improved significantly (p < 0.05)<br>VAS improved but not significantly<br>5-point Likert scale improved but not significantly<br>KHIT-6 improved significantly (p < 0.05) |
| Jung (2004) [40] | Experimental (n = 23)    | Filiform needle (aroma acupuncture)   | GV20, EH-HN1, ST8, EX-HN5, LI20, TE117, GB20, LI11, L14, ST36, LR3  | VAS BPI                            | VAS improved significantly (p = 0.001)   |
| Control (n = 15) | Filiform needle          | BPI (all) improved significantly (p < 0.05)<br>VAS improved significantly (p = 0.008)<br>BPI (mood, relation) improved significantly (p < 0.05) |   |                                    |  |
| Lee (2001) [41]  | A (n = 20)<br>B (n = 20) | Filiform needle (Trigger point)<br>Filiform needle (Dong-si acupuncture)  | Upper Trapezius m, splenius m, semispinal m, temporalis<br>T22.04, T22.05, T77.22, T77.23, T66.05, T77.01, T77.02, T22.12 | VAS                                | improved but no significant difference between A and B   |

BPI, brief pain inventory; EA, electro-acupuncture; HDI, henry ford headache disability inventory; HIT, headache impact test; HRV, heart rate variability; KHIT-6, Korean headache impact-6; RCT, randomized controlled trial; VAS, visual analogue scale.

Table 5. Summary of 2 nRCTs.

| Authors (y)      | N                        | Types of acupuncture               | Acupoints   | Outcome measures   | Result  |
|------------------|--------------------------|------------------------------------|---|--|---|
| Yang (2003) [42] | A (n = 4)<br>B (n = 10)  | Filiform needle<br>Filiform needle | GB20, SI3, UB60                                       | Concentration of cytokines                               | Improved significantly (p < 0.05)   |
| Lee (2009) [43]  | A (n = 10)<br>B (n = 89) | Filiform needle<br>Filiform needle | Liver jungkyuk, Bladder seunggyeok, EX-HN5, ST8, GV20 | Mean velocity flow, systolic velocity, pulsatility index | Improved significantly (p < 0.05) in mean velocity flow and systolic velocity, but not significant differences in pulsatility index |

nRCT, non-randomized controlled trial.

Table 6. Types of Acupuncture Used for Treatment.

| Treatment                                  | N (%)     |
|--|-----------|
| Using only 1 type of acupuncture           |           |
| Filiform needle                            | 30 (79.0) |
| Pharmacopuncture                           | 4 (10.5)  |
| Thread-embedding acupuncture               | 1 (2.6)   |
| Using 2 types of acupuncture               |           |
| Pharmacopuncture with filiform needle      | 2 (5.3)   |
| Auricular acupuncture with filiform needle | 1 (2.6)   |

needles, 6 used pharmacopuncture, 1 used auricular acupuncture, and 1 used thread-embedding acupuncture. Most studies used filiform needles, 4 of the 6 studies using pharmacopuncture used only pharmacopuncture without any concomitant treatment, whilst the other 2 studies used both acupuncture and pharmacopuncture at the same time. The only study which performed auricular acupuncture also used filiform needles (Table 6).

**Analysis of methods by type of needle used for treatment**

Filiform needle

Of the 33 studies using filiform needles, 6 used filiform needles for local points, 8 used them for distant points, and 19 used them for both local and distant points.

Standards used for acupoints and acupoints used in treatment are summarized in Tables 7-9.

Table 7. Treatment Using Local Points.

| Local point         | No. of studies | Local point      | No. of studies |
|---------------------|----------------|------------------|----------------|
| Baihui (GV20)       | 19             | Shangxing (GV23) | 3              |
| Fengchi (GB20)      | 19             | Renying (ST9)    | 2              |
| Taiyang (EX-HN5)    | 16             | Wangu (GB12)     | 1              |
| Touwei (ST8)        | 9              | Shenting (GV24)  | 1              |
| Sishencong (EX-HN1) | 7              | Cuanzhu (BL2)    | 1              |
| Yifeng (TE17)       | 5              | Tongziliao (GB1) | 1              |
| Yintang (EX-HN3)    | 5              | Yingxiang (LI20) | 1              |
| Shuaigu (GB8)       | 3              | Tianzhu (BL10)   | 1              |
| Fengfu (GV16)       | 3              |                  |                |

Table 8. Treatment Using Distant Points.

| Distant point   | No. of studies | Distant point     | No. of studies |
|-----------------|----------------|-------------------|----------------|
| Zusanli (ST36)  | 13             | Sanyinjiao (SP6)  | 1              |
| Taichong (LR3)  | 12             | Dadun (LR1)       | 1              |
| Hegu (LI4)      | 11             | Xingjian (LR2)    | 1              |
| Quchi (LI11)    | 8              | Shangjuxu (ST37)  | 1              |
| Zhongwan (CV12) | 3              | Yanggu (SI5)      | 1              |
| Neiguan (PC6)   | 3              | Shaofu (HT8)      | 1              |
| Lieque (LU7)    | 2              | Kunlun (BL60)     | 1              |
| Fenglong (ST40) | 2              | Jingqu (LU8)      | 1              |
| Waiguan (TE5)   | 2              | Taibai (SP3)      | 1              |
| Yingu (KI10)    | 2              | Gongsun (SP4)     | 1              |
| Zutonggu (BL66) | 2              | Yinlingquan (SP9) | 1              |
| Zulinqi (GB41)  | 2              | Taixi (KI3)       | 1              |
| Houxi (SI3)     | 1              |                   |                |

### Pharmacopuncture

Table 9 summarizes the acupoints used in pharmacopuncture and the types of pharmacopuncture used for treatment are summarized in Table 10.

### Auricular acupuncture

Only 1 study was published on auricular acupuncture treatment for headaches. Kim et al [26] used acupuncture and auricular acupuncture concomitantly. The points of auricular acupuncture were Shen men, Temple, Thalamus, Occiput, and Forehead. The report of treatment effects was outstanding in the tension-type headache group.

### Thread-embedding acupuncture

One study used thread-embedding acupuncture in the chronic tension headache group. Bae et al [36] divided participants into the thread-embedding acupuncture group and acupuncture group, and the acupoints were left and right Fengchi (GB20) in the Wangu (GB12) direction. Effectiveness in reducing headaches was observed in both groups, and the authors reported that thread-embedding acupuncture (which has a long-lasting acupoint effect with only 1 acupuncture session), could be performed effectively in a patients' busy day.

Table 9. Well-Used Acupoints for Treatment with Filiform Needle and Pharmacopuncture.

|                                    | No. of studies  |                  |
|------------------------------------|-----------------|------------------|
|                                    | Filiform needle | Pharmacopuncture |
| Local and distant points           | 19              | 2                |
| Local points only                  | 6               | 4                |
| Distant points only                | 8               | -                |
| Local points                       |                 |                  |
| Standard Acupuncture Point         |                 |                  |
| - Governor Vessel (GV)             | 21              | 2                |
| - Gallbladder meridian (GB)        | 21              | 5                |
| - Extra Point (EX-HN)              | 16              | 1                |
| - Stomach meridian (ST)            | 12              | -                |
| - Triple Energizer meridian (TE)   | 5               | -                |
| - Bladder meridian (BL)            | 1               | 2                |
| - Large Intestine meridian (LI)    | 1               | -                |
| Trigger point                      | 3               | 1                |
| A-shi point                        | 2               | -                |
| Distant point                      | -               | -                |
| Commonly used acupoints            | 21              | -                |
| <i>Saamchimbeop</i>                | 8               | -                |
| <i>Dong-si</i> acupuncture therapy | 1               | -                |

Table 10. Results Based on Type of Pharmacopuncture Used for Treatment.

| Type of pharmacopuncture                     | N (%)  |
|--|--------|
| <i>Hwangryunhaedok-tang</i> Pharmacopuncture | 3 (50) |
| Trionycis Carapax pharmacopuncture           | 2 (33) |
| Carthmi-Flos pharmacopuncture                | 1 (17) |

## Discussion

Headache refers to a symptom of pain in the head, and it is caused when mechanical stimulation, chemical stimulation, inflammation, or circulatory disorders stimulate pain-sensitive tissue inside the skull. Whilst a headache is not categorized as a disease it can be a symptom of an accompanying disease, extreme tension or fatigue, and can be sometimes a warning sign for disease within the skull [44]. According to the ICHD-III [2], headaches are divided into primary headaches which are caused by the headache itself, and secondary headaches which are caused by underlying diseases. Primary headaches include migraines and tension headaches. Secondary headaches include eye disorders, dental

disorders, otorhinolaryngology disorders, systematic infections, and headaches caused by disorders/disease within the skull.

Various oriental medicine methods have been used in an attempt to treat headaches including pharmacopuncture, auricular acupuncture, Chuna therapy, acupuncture and herbal medicine. Acupuncture in particular has been used to treat headaches. According to 1 study titled "Acupuncture Point Choice Method According to Cause" [45], it is necessary to identify which meridian a headache belongs to, by the region of pain.

In total, 33 of the 38 studies used filiform needles, of which 6 used filiform needles for local points, 8 used them for distant points, and 19 used them for both local and distant points. The treatment method combining local and distant points at the same time was used most widely. In these studies, local points were used widely in the order of Baihui (GV20), Fengchi (GB20), Taiyang (EX-HN5), and Touwei (ST8). Other local points included Sishencong (EX-HN1), Yifeng (TE17), Yintang (EX-HN3), Shuaigu (GB8), Fengfu (GV16), and Shenting (GV24). The meridians most commonly used in studies included the Governor Vessel (GV), the Gallbladder meridian (GB), and the Stomach meridian (ST). Other meridians included the Triple Energizer meridian (TE) and the Bladder meridian (BL). The Governor Vessel (GV), the Gallbladder meridian (GB), the Stomach meridian (ST), the Triple energizer meridian (TE), and the Bladder meridian (BL) all flow through the head. Given this fact, the selection of acupoints in headache treatment seems to be heavily affected by the flow of a meridian.

The A-shi point (a point of pain reported by the patient), is based on the approach of treating the point of pain. You et al [46] stated that the acupoint of the meridian sinew is the A-shi point, the acupoint of the myofascial pain syndrome is the trigger point, and the A-shi point and the trigger point are related to the tender point. Three studies [15,16,41] which used the trigger point, made reference to the trapezius, sternocleidomastoid, splenius capitis, splenius cervicis, semispinalis capitis, semispinalis cervicis, suboccipital, occipitalis, and temporalis muscles. A comparison of these muscles, and acupoints by the Fengchi (GB20) meridian (which was 1 of the most used local points), suggests that the trigger point is located between the trapezius and sternocleidomastoid muscles with the splenius capitis muscle underneath. The sternocleidomastoid muscle includes Yifeng (TE17) and Wangu (GB12) acupoints, whilst the temporalis muscle includes ST8 and EX-HN5. In addition, trigger points in the muscles of the head and neck are often located in the sternocleidomastoid and trapezius muscles, and is situated along the Bladder meridian (BL).

Furthermore, Kim et al [32] found the tender point of each meridian sinew through oriental medicine's original theory of meridian sinew MPS and trigger points, which served as the basis of muscle therapeutics, and meridian tendino-musculature acupuncture was performed. Twelve meridian sinews were traditionally used to divide the body's muscles into 12 muscle groups along the pathways of 12 meridians, closely related to muscles and joints in anatomy.

From these results, it is believed that acupuncture at the A-shi point and for stiff muscles alleviates tension at the trigger point, and shows effectiveness at easing pain. It also demonstrated that local points are significant for the meridian and they directly contribute to alleviating tension and stiffness in muscles, ligaments and soft tissue from where the pain originated.

Of the studies that used distant points, 13 studies used Zusanli (ST36) in the Liver meridian (LR), 12 used Taichong (LR3) in the Stomach meridian (ST), and 11 used Hegu (LI4) in the Large Intestine meridian (LI). Zusanli (ST36) is the main acupoint in a robust healthy body, effective in supplementing qi and the

blood, strengthening the spleen, restoring and giving energy, treating dizziness, throbbing, and blurred vision. The Taichong (LR3) is effective in restoring the liver, removing heat and easing convulsions by treating internal wind, and is used to treat strokes, headaches, vertigo, red eye and pain in the eye. The Hegu (LI4) is the major acupoint for the treatment of eye, nose and facial disorders, and is effective in treating headaches caused by too much thinking. Many articles report that the Hegu (LI4) is combined with acupoints in the head such as the Baihui (GV20), Fengchi (GB20), and Taiyang (EX-HN5) to treat headaches [47].

Eight studies used *Saamchimbop*, 2 of which [37,38] initially used the acupoint Bladder jungkyuk and subsequently added Fengchi (GB20) for pain in the back of the head, Baihui (GV20) for pain in the top of the head, and Yintang (EX-HN3) for pain in both eyes. Yintang (EX-HN3) was added for pain in the front of the head in addition to Stomach sunghanggyeok. Taiyang (EX-HN5) was added to treat the Taiyang headache in addition to Gall Bladder Seunggyeok. Gall Bladder Jeonggyeok was added when there was tenderness in the shoulder, and acupuncture was performed at the point contralateral to the region of pain. The study showed that the symptoms were alleviated, and the quality of life improved by easing tension in the temporalis muscle. Oh et al [10] used the Spleen Jeonggyeok and Liver Seunggyeok for patients with lesser yin person greater yin disease syndrome, and greater yin person dryness-heat syndrome. Park et al [13] used the Kidney Jeonggyeok and Lung Jeonggyeok for recurrent paroxysmal tension headaches of the lesser yang person and greater yin person, respectively.

Lee et al [41] used *Dong-si* acupuncture therapy and compared headache treatment effects. The notable characteristics of *Dong-si* acupuncture therapy are that it consists of 740 acupoints, is simple and practical to perform, uses distant points to massage the affected part or allow it to move freely, and often employs the contralateral heterotopic method based on the human body's natural resistance and relative equilibrium. Acupuncture is performed in a contralateral part, and if there is a sense of paralysis or electrostatics after acupuncture, it is regarded as a *De-qi*. *Dong-si* acupuncture therapy uses the motion method, which allows the patient's affected part to move by twisting a needle. While it has different acupoints from the 14 meridians, it encompasses the principles of the 5 phases in the operation of Qi-Blood [48]. Lee et al [41] divided tension headache patients into the trigger point acupuncture group and the *Dong-si* acupuncture group, and compared their effectiveness. The authors reported that both treatment groups were effective in the treatment of tension headaches and there was no statistically significant difference between the 2 groups. The study by Lee et al [41] is the only one that compared local and distant points.

While the existing literature regarding acupoint principles for headaches is not consistent, Kim et al [17] reported cases where acupuncture at Xiashi (GB43) supplementation and Shangyang (LI1) draining, produced immediate improvements for headaches.

A total of 19 studies combined local and distant points, which accounted for most of the studies reviewed. The patient's different headache symptoms were typically accommodated and acupuncture was provided at distant points combined with basic head points. Symptoms varied depending on the region and cause, therefore it was necessary to identify the symptoms and prescribe the acupuncture method accordingly to treat the headaches.

Of the studies that used filiform needles, 5 used electro-acupuncture. Electro-acupuncture is a combination of oriental medicine's meridian and acupoint theory, and Western medicine's low-frequency electric current stimulation. The strength of electro-acupuncture is that the operator can change the intensity and

length of stimulation as necessary, and because the stimulation can be quantified it can be replicated easily. After performing acupuncture for chronic tension headaches at Zusanli (ST36) and Shangjuxu (ST37), which were known to control the autonomic nervous system [38], Kwon et al [38] divided the patients into 3 groups. There was a fixed electro-acupuncture group that had the same level of electrostimulation during the acupuncture period. There was a variable electro-acupuncture group that had different levels of electrostimulation in accordance with HF changes (as heart rate variability was measured every 5 minutes), and a control group that had no electrostimulation. They reported that only the fixed electro-acupuncture group showed significant improvements. Jeon et al [39] performed acupuncture at Wangu (GB12) and Fengchi (GB20), which are acupoints effective for the treatment of headaches and myofascial trigger points, anatomically between 2 muscles. The participants were divided into 2 groups, the experimental group who underwent electrostimulation, and the control group who underwent placebo electrostimulation at non-acupoints. The study found that electro-acupuncture had a significant effect on chronic tension headaches. Kim et al [19] performed electro-acupuncture on Shuaigu (GB8) and Taiyang (EX-HN5), and reported that a patient, with chronic migraine that was not controlled using Western treatment methods, saw improvements in a relatively short period of time following electro-acupuncture.

One of the studies that used filiform needles performed aromatic acupuncture. Aromatic acupuncture combines acupuncture with aromatherapy. Aromatherapy uses aromatic essential oils extracted from plants to prevent or treat diseases, and promote and maintain health. By delivering an aroma to the nose and skin, it produces mental and physical therapeutic effects. Jeong et al [40] used aromatic acupuncture, where acupuncture needles coated (through solubilizers and lubricants) with essential oils mixed with lavender and rosemary, which have sedative and analgesic effects were used. Participants were divided into the acupuncture group and the aromatic acupuncture group, and it was reported that aromatic acupuncture had significant improvements at reducing headaches, and improving quality of life. It was hypothesized that a combination of acupuncture's analgesic effect and aroma therapy stress-relieving effects, led to a positive effect in treating headaches.

Of the 6 studies that used pharmacopuncture, 3 used local points and 3 used both local and distant points. All 6 studies used Fengchi (GB20) along with Jianjing (GB21), Taiyang (EX-HN5), Baihui (GV20), and Dazhui (GV14). Of these studies, 1 used Fengchi (GB20) and reported the effect of *Hwangryunhaedok-tang* pharmacopuncture. Three studies used distant points at Hegu (LI4), Xinshi (BL15), and Gaohuang (BL43). Four of the 6 studies using pharmacopuncture did not have any concomitant treatment and reported the effects of pharmacopuncture only treatment. Jang et al [24], Choi et al [31] and Kim et al [33] reported the treatment effects of the *Hwangryunhaedok-tang* pharmacopuncture, and Kim et al [33] published pharmacopuncture treatment results compared with a saline-treated control group. Kim et al [27] reported the treatment effects of the Carthmi-Flos pharmacopuncture, and Kim et al [18] and Hwang et al [22] reported cases which used the *Trionycis Carapax* pharmacopuncture for treatment of headaches.

One study used auricular acupuncture. Auricular acupuncture has a wide range of indications, its effectiveness manifesting quickly, convenient to control, cost effective, easy to learn and understand, has few side effects and ensures safety, can be used for prevention and cure, it supplements the method limitations of body acupuncture, is easy to use for needle embedding, and can be applied to anesthesia. Kim et al [26] performed both acupuncture treatment and auricular acupuncture with the



auricular acupuncture's acupoints Shen men, Temple, Thalamus, Occiput, and Forehead. It was reported that the treatment effects were outstanding, especially in the tension-type headache group.

In addition to the studies which used filiform needles, pharmacopuncture, and auricular acupuncture, 1 study used thread-embedding acupuncture (also known as "thread inserting acupuncture") that is based on the meridian theory which stimulates acupoints. Thread-embedding acupuncture first originated from the idea of holding acupuncture needles steady because to treat a chronic disease it is necessary to place the needle in deeper and keep it there longer [49]. Bae et al [36] divided chronic tension headache patients into a thread-embedding acupuncture group and the acupuncture group, and performed acupuncture on the left and right of Fengchi (GB20) in the Wangu (GB12) direction. The study reported that since thread-embedding acupuncture showed similar pain-relieving effects to traditional acupuncture treatment, and had a longer-lasting effect, it could be applied efficiently for treatment intervals and frequencies. However, discomfort and pain may occur after thread-embedding acupuncture, so it can only be used in a clinical practice when the patient is fully informed beforehand, and hygiene is strictly controlled.

In Korea, various acupuncture treatments, trends and effects have been identified in this review which are being used to treat primary headache disorders. However, this analysis was limited because it only described how the acupuncture treatment was performed, and the qualitative evaluation of each study was not analyzed. Furthermore, the effects claimed in each study cannot be evaluated through this study. In addition, acupuncture treatment of primary headache disorder was specific to Korea. Further studies should be performed that include studies performed in other countries that used various acupuncture treatments like pharmacopuncture, auricular acupuncture, and thread-embedding acupuncture for primary headache disorders.

## Conclusion

A review of 38 Korean studies of acupuncture treatment for primary headaches led to the following conclusions:

1. In addition to general acupuncture, a variety of treatments have been used to treat primary headaches such as *Saamchimbeop*, *Dong-si* acupuncture, electro-acupuncture, aromatic acupuncture, pharmacopuncture, auricular acupuncture and thread-embedding acupuncture.

2. Many studies combined local and distant points. The most common local acupoints used were Baihui (GV20), Fengchi (GB20) and Taiyang (EX-HN5), and meridians were widely used in studies where the Governor vessel (GV), the Gallbladder meridian (GB), and the Stomach meridian (ST) were used. The most common distant acupoints used were Taichong (LR3), Zusanli (ST36) and Hegu (LI4).

3. Some case studies, RCT and nRCT studies reported significant effects, but the overall combined results were inconsistent. Therefore, there is insufficient evidence to determine the effect of acupuncture treatment for primary headaches. Further qualitative studies should be performed to confirm the efficacy of acupuncture treatment for primary headache disorders.

## Conflicts of Interest

The authors have no conflicts of interest to declare.

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