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Research paper

# Usage status and satisfaction with pharmacopuncture in Korea: A survey among Korean medicine doctors

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ABSTRACT

*Introduction:* Pharmacopuncture is a traditional therapy combining acupuncture and herbal medicines. In this study, we investigated the usage status of pharmacopuncture among Korean medicine doctors (KMDs) and differences in satisfaction regarding pharmacopuncture use.

*Methods:* We conducted a self-reporting online survey via e-mail from April 25 to 7 May 7, 2018, and analyzed the responses of a total of 393 KMDs.

*Results:* Eighty-eight percent of respondents had used pharmacopuncture during the previous year. Their average clinical experience of using pharmacopuncture was 8.04 years and the percentage of patients treated using pharmacopuncture was 39.2%. Pharmacopuncture was used mainly to treat musculoskeletal, neurological, and gastrointestinal diseases. Bee venom and blood stasis pharmacopuncture were the most commonly used types. Participants were highly satisfied with treatment efficacy but were less satisfied with treatment cost. KMD satisfaction with pharmacopuncture was assessed with regards to two aspects: practitioner and patient (as evaluated by the practitioner) satisfaction. In both cases, satisfaction with pharmacopuncture was high in KMDs who use it for gastrointestinal diseases. However, practitioner satisfaction was low among KMDs who used bee venom and blood stasis pharmacopuncture, whereas patient satisfaction was high among those KMDs who treated them using ginseng pharmacopuncture.

*Conclusions:* Satisfaction with pharmacopuncture treatment tended to contrast with the frequency of use. Although KMDs are currently focusing on pain-related disorders, our results indicate that pharmacopuncture can be highly applicable in other areas such as the treatment of gastrointestinal diseases; however, this needs to be verified by further research.

## 1. Introduction

Pharmacopuncture is a traditional medicine treatment combining acupuncture and herbal medicines that originated in China and has been actively studied since the 1960s [1]. Pharmacopuncture involves the injection of herbal extracts into the body at acupuncture points after consultation with an Eastern traditional medicine doctor, to obtain a synergistic effect of acupuncture and herbal medicine. Pharmacopuncture preparations are obtained by extracting the components from a specific herbal medicine or decoction through alcohol impregnation, distillation extraction, compression, or dilution [1,2]. Pharmacopuncture has rapid effects and can be used for patients who have difficulty swallowing and who refuse to take herbal medicine orally, because with this method, the herbal extracts are directly absorbed without passing through the gastrointestinal tract [1].

Currently, in China, there are currently 141 registered

*Abbreviations:*KMDs, Korean medicine doctors

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pharmacopuncture products. More than 100 varieties have been produced by 154 companies, and the number is growing rapidly. In 2012, sales amounted for 41.2 billion yuan, with a rapid growth rate of 33.8%. In 2015, sales of the top 10 pharmacopuncture products were estimated at 10.473 billion yuan [3].

In Korea, pharmacopuncture was first officially introduced to the traditional Korean medicine community in 1967, when Sang-Cheon Nam recorded its use at Meridian-1 and -2. Subsequently, the *Korean Institute of Pharmacopuncture* was established in 1990, and research on and dissemination of pharmacopuncture have since progressed in earnest. All Korean medical universities teach pharmacopuncture as part of their acupuncture course and four Korean medical universities have adopted pharmacopuncture as a separate regular course [4]. Recently, various herbal extracts for use in pharmacopuncture have been developed and used effectively for various diseases. Currently, pharmacopuncture is widely used as one of the major treatment techniques in Korea [1,5].

The effectiveness of pharmacopuncture for various disorders has been well studied. Since the 1970s, animal experiment studies on pharmacopuncture have reported that treatment with extracts of Astragali Radix, *Angelica gigas*, Cornus cervi Parvum, and *Sorbus commixta* Hedl are effective for relieving pain, enhancing immunity, and alleviating obesity and arthritis. Since the 2000s, several clinical studies have indicated that pharmacopuncture is effective for various diseases, in particular musculoskeletal disorders [5–7].

According to a survey that investigated the status of Korean uninsured medical services in 2017, 67.4% of Korean medicine doctors (KMDs) working in clinics are using pharmacopuncture [8]. Although pharmacopuncture is commonly used by KMDs, it is not covered by health insurance, except for some cases that are covered by private insurance. Therefore, details pertaining to its usage have been indirectly estimated through the statistics obtained by private insurance companies.

Although a number of studies have been conducted on the use of pharmacopuncture, these were conducted more than 5 years ago. Moreover, these studies were sponsored by specific societies and did not encompass the entire KMD community [9–11]. Given the limited number of studies on pharmacopuncture compared with the rapid rate of ongoing development and the widespread application of this therapy in Korean medicine, we aimed in the present study to identify the status of the growing usage of pharmacopuncture and the factors affecting the satisfaction of those receiving pharmacopuncture by investigating its use by KMDs.

## 2. Methods

### 2.1. Survey method and subjects

We conducted a self-reporting online survey via e-mail for 12 days from April 25 to May 7, 2018, with the assistance of the Association of Korean Medicine (AKOM - an association representing Korean medical doctors). We sent an e-mail to 19,003 KMDs included in AKOM's mailing list and 681 KMDs accessed the survey website. Although we conducted the survey in April 2018, the questions we asked were related to treatment in the previous year. Accordingly, the findings of this may not provide a completely accurate picture of current developments, as the medical situation regarding pharmacopuncture is currently being updated.

During the survey period, 474 KMDs responded; however, of these, 81 did not complete the survey as they did not work in clinics, had not used pharmacopuncture over the previous year, or did not agree to participate.

### 2.2. Ethics

The entire survey process was approved by the Institutional Review Board of Kyung Hee University [IRB number KHSIRB-18-013(EA)]. The participants voluntarily agreed to participate in line with the consent question contained in the survey questionnaire.

### 2.3. Preliminary survey

We planned and analyzed the findings of this study based on conditions in the late 2017s and the item list, classification, and system underwent a preliminary examination by pharmacopuncture experts (KMDs), the Ministry of Health and Welfare, and pharmacopuncture herbal dispensaries.

Unlike the pharmacopuncture developed by some early leaders in the field, recent pharmacopuncture treatment is growing rapidly according to demand. Most previous studies did not assess the current situation at the time of research, and the latest information could only be obtained through interviews with related people or with reference to private government documents.

According to a survey conducted at the end of 2017, there were approximately 76 representative pharmacopuncture products, and these were dispensed by the herbal dispensaries of pharmacopuncture institutes, extramural herbal dispensaries (10 sites), and intramural herbal dispensaries (75 sites) [3].

**Table 1**
Pharmacopuncture types.

| Type | Constitution & Features | Medicinal effect & Adaptation |
|---|---|---|
| Bee venom (BV) | The extraction and refining of Bee Venom (蜂毒). Therapies include "Bee Venom" pharmacopuncture that is relatively natural and "Sweet Bee Venom" pharmacopuncture based on purified toxins, and these are used at different concentrations. | Its effects include anti-inflammatory effects and is used to treat musculoskeletal and nerve diseases such as arthritis and multiple sclerosis. |
| Jinseng | The extraction and refining of Jinseng radix(人蔘). It is the representative of intravenous pharmacopuncture injection in Korea. | Its effects include reducing stress, fatigue, oxidation, and is used to treat diabetes mellitus and cancer. |
| Cornu cervi parvum (Nok-Yong) | The extraction and refining of *Cervus elaphus* Linne (鹿茸). | It has anti-inflammatory, anti-stress, and anti-aging properties, and is used for hemostasis, immunization, growth promotion, liver function improvement, and osteoporosis treatment. |
| Hominis Placenta (Jahageo) | The extraction and refining of Hominis placenta(紫河車). | It is used to treat consumptive disease and chronic fatigue exhaustion syndrome (虛勞), chronic hepatitis, liver cirrhosis, bronchial asthma, tuberculosis, and stroke. |
| Blood stasis | Extracts composed of herbal medicine, such as Angelicae Gigantis Radix(當歸), Paeoniae Radix(川芎), and Carthami Flos(紅花), promote blood circulation and correct blood stasis (瘀血). | It diminishes pain and used to treat sprains and other pain-related problems. |
| Hwangryunhaedok-tang (HHP) | Hwangryunhaedoktang(黃連解毒湯) is a representative herbal medicine decoction used for inflammation. It is composed of herbal medicine such as Coptidis rhizoma(黃連), Scutellariae radix(黃芩), Phellodendri cortex(黃柏), and Gardeniae Fructus(梔子). | It has anti-inflammatory and heat-clearing effects and is used to treat mild inflammatory diseases and early musculoskeletal diseases. |

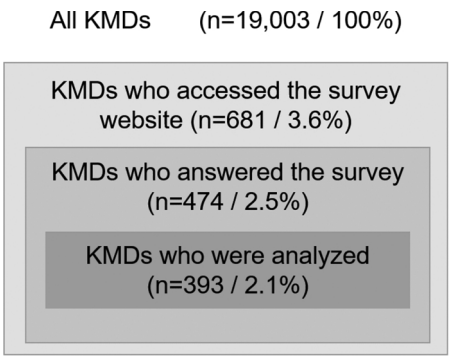


**Fig. 1.** Number of respondents and response rate.

These products can be classified into the following six representative types: Bee venom, Jinseng, Cornu cervi parvum, Hominis placenta, Blood stasis, and Hwangryunhaedok-tang. (Table 1)

### 2.4. Questionnaire

The questionnaire was developed based on those used in previous studies [8–10] and from consultations with experts, including clinicians, Korean medicine researchers, and workers in related industries. The draft questionnaire comprised 33 parameters. For face validity, a pilot test was conducted on 10 KMDs and based on their responses, the final version of the questionnaire was established. The questionnaire was converted into an electronic format online. An unfaithful reply was excluded in advance by ensuring that the survey was completed only when all answers were entered. The detailed variables were as follows.

1) Current clinical status (2 questions): These questions were designed to exclude individuals who worked in areas other than treatment or had not used pharmacopuncture over the past year. Those who answered “no” to one question could not proceed with the survey.
2) Number of patients treated (2 questions): These questions were designed to establish the generality of pharmacopuncture treatment.
3) Target disease and type of pharmacopuncture (2 questions): Pre-survey results showed that respondents indicated treatment of more than one disease and use of more than one type of pharmacopuncture, and therefore we decided to receive multiple (up to three) responses.
4) Clinical history and pharmacopuncture experience (2 questions): These questions were designed to establish how skilled the respondents pharmacopuncture treatment is.
5) Treatment satisfaction (2 questions): These questions were designed to determine how satisfied respondent are regarding pharmacopuncture as an effective treatment tool. We assessed satisfaction using a 5-point Likert scale ranging from “very dissatisfied” to “very satisfied.” Questions relating to KMD and patient satisfaction with pharmacopuncture treatment consisted of the four subcategories, namely, efficacy, convenience, safety, and cost, which are considered important in determining the priority of health insurance budgets.

Efficacy relates satisfaction with the excellence of the therapeutic effect; convenience relates to satisfaction with the ease of the treatment techniques related to time and difficulty; safety relates to satisfaction with the risk of adverse effects and side effects; and cost relates satisfaction with the cost of the treatment.

1) Personal information of respondents (5 questions): These questions relate to the basic characteristics of respondents, including gender, age, clinic location, and the number of KMDs in their clinic and their specialties.

A copy of the questionnaire and the consent form are included at the end of the paper.

### 2.5. Statistical analyses

The basic characteristics of the subjects were analyzed using frequency analysis. The values are presented as the mean ± standard deviation (SD). To determine the difference in satisfaction among KMDs and patients, one-way ANOVA and Scheffe post hoc test analyses were conducted. The Shapiro–Wilk test was conducted to test for normality. Furthermore, an independent *t*-test was used to determine differences in satisfaction of groups that use pharmacopuncture to treat certain diseases and satisfaction of groups that use certain types of pharmacopuncture for treatment. The satisfaction of practitioners and patients was analyzed with respect to four criteria (efficacy, convenience, safety, and cost). However, when comparing the satisfaction of groups by the type of pharmacopuncture used or by the disease treated with pharmacopuncture, the average satisfaction of the four criteria was used. Differences in p-values of less than 0.05 were considered statistically significant. The software used for all analyses was SPSS 15.0 for Windows (IBM, Chicago, IL)

## 3. Results

### 3.1. Basic characteristics of the respondents

In this study, there were 393 respondents to the survey questionnaire and the sampling error was 4.9% at a confidence level of 95% (Fig. 1). Among the respondents, 80.9% were male and 19.1% were female. The mean age of the respondents was 41.4 years (SD 9.2) and the average clinical experience was 13.4 years (SD 8.8). Of the 393 respondents, 102 (26.0%) were specialists, with clinical specialties of Korean internal medicine, acupuncture and moxibustion, Korean rehabilitation, and obstetrics and gynecology (presented in the order of increasing frequency).

The distribution of the number of patients treated varied among respondents. The average number of patients treated each day was 30.2 (SD 26.7) and the average number of patients treated with pharmacopuncture each day was 11.3 (SD 11.6). The average ratio of the number of patients treated with pharmacopuncture to the total number of patients treated was 39.2% (SD 36.2) (Table 2).

### 3.2. Target diseases

We investigated the top three target diseases treated with pharmacopuncture. If only the top responding diseases were considered, musculoskeletal diseases were the most common, accounting for 89.3% (351 cases). If the top three diseases were considered, the frequency of diseases treated with pharmacopuncture decreased in the following order: musculoskeletal diseases (381 cases, 41.7%), neurological diseases (164 cases, 18.0%), and gastrointestinal diseases (82 cases, 9.0%). Other diseases represented less than 5% and their frequency decreased in the following order: cardiovascular diseases > endocrine diseases > genitourinary diseases > cerebrovascular diseases > mental diseases > respiratory diseases > cancer > gynecological diseases > skin diseases > eye-ear disorder > others (Fig. 2).

### 3.3. Type of pharmacopuncture

We surveyed up to three pharmacopuncture products used by each KMD and their herbal dispensaries. The responses were classified into groups with similar composition and manufacturing methods regardless of the dispensary. The types of pharmacopuncture most commonly used were bee venom (30.5%), blood stasis (18.9%), Hwangryunhaedok-tang (7.9%), ginseng (7.5%), and hominis placenta (6.6%) (Fig. 3).

**Table 2**
Basic characteristics of respondents.

| | | | N (%) | Mean (S.D.) |
|---|---|---|---|---|
| | Male | | 318 (80.9) | |
| | Female | | 75 (19.1) | |
| Age | 20s | | 43 (10.9) | 41.4 (9.2) |
| (year) | 30s | | 132 (33.6) | |
| | 40s | | 151 (38.4) | |
| | 50s | | 56 (14.3) | |
| | more than 60 | | 10 (2.6) | |
| Clinical experience | 10 or less | | 181 (46.1) | 13.4 (8.8) |
| (years) | more than 11 less than 20 | | 145 (36.9) | |
| | more than 21 less than 20 | | 51 (13.0) | |
| | more than 30 | | 16 (4.1) | |
| Training | General practitioner | | 291 (74.0) | |
| | Specialist | | 102 (26.0) | |
| Specialty | Internal medicine | | 23 (22.5) | |
| | Acupuncture moxibustion | | 22 (21.6) | |
| | Rehabilitation | | 18 (17.6) | |
| | Obstetrics and gynecology | | 15 (14.7) | |
| | Neuropsychology | | 8 (7.8) | |
| | Sasang constitutional medicine | | 8 (7.8) | |
| | Ophthalmology, otorhinolaryngology, dermatology | | 7 (6.9) | |
| Number of patients | Total patients treated | less | 82 (20.9) | 30.2 |
| (per day) | (A) | than 20 | 223 (56.7) | (26.7) |
| | | 20–39 | 56 (14.2) | |
| | | 40–59 | 24 (6.1) | |
| | | 60–79 | 8 (2.0) | |
| | | 80 or more | | |
| | Patients treated with | less | 114 (29.0) | 11.3 |
| | Pharmacopuncture | than 5 | 95 (24.2) | (11.6) |
| | (B) | 5–9 | 65 (16.5) | |
| | | 10–14 | 45 (11.5) | |
| | | 15–19 | 74 (18.8) | |
| | | 20 or more | | |
| | Ratio | less | 121 (30.8) | 39.2 |
| | (A/B) | than 20 | 103 (26.2) | (36.2) |
| | | 20–39 | 74 (18.8) | |
| | | 40–59 | 51 (13.0) | |
| | | 60–79 | 44 (11.2) | |
| | | 80 or more | | |

### 3.4. Satisfaction with pharmacopuncture treatment

In this part, practitioner satisfaction relates to the satisfaction expressed by the KMDs, and patient satisfaction relates patient satisfaction as estimated by the doctor.

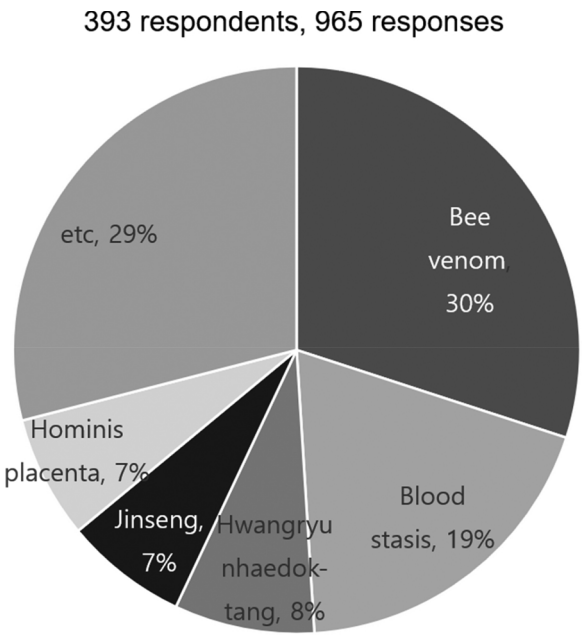


**Fig. 3.** Ranking of the type of pharmacopuncture (the maximum number of responses allowed was up to 3).

### 3.5. Total satisfaction

We conducted post hoc *t*-tests on the four subcategories of satisfaction relating to pharmacopuncture. Although we found no significant difference in practitioner satisfaction with regards to effectiveness and convenience, satisfaction with the effectiveness and convenience was shown to be significantly higher than that relating to safety, which in turn was significantly higher than the satisfaction with cost ($p < 0.001$). Patient satisfaction with the different aspects of pharmacopuncture decreased significantly in the following order: efficacy > convenience > safety > cost ($p < 0.001$). (Table 3).

### 3.6. Satisfaction with pharmacopuncture according to treated disease

We investigated the difference in overall practitioner satisfaction and patient satisfaction as estimated by KMDs according to the treated diseases. The results of the analysis of total satisfaction, with disease as the third priority, showed that practitioner and patient satisfaction with pharmacopuncture was significantly higher in the group of KMDs who used pharmacopuncture for the treatment of gastrointestinal diseases

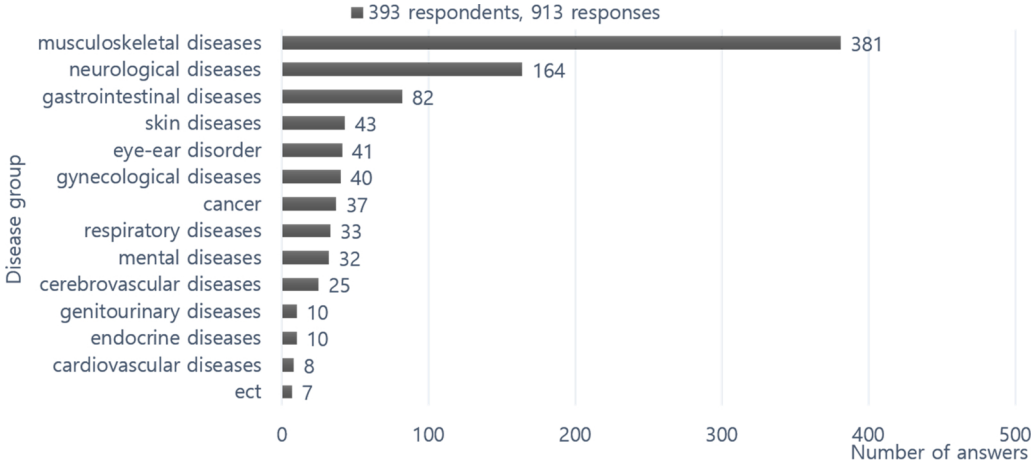


**Fig. 2.** Major disease groups treated using pharmacopuncture (multiple responses allowed).

**Table 3**
Satisfaction with pharmacopuncture based on four criteria among Korean medicine doctors (KMDs) and patients.

| Satisfaction with pharmacopuncture | Efficacy[a] | Convenience[b] | Safety[c] | Cost[d] | F | p | Post hoc |
|---|---|---|---|---|---|---|---|
| KMDs | 4.01 ± 0.81 | 3.98 ± 0.79 | 3.66 ± 0.88 | 3.01 ± 1.02 | 108.78 | < .001 | a = b<br>a > c > d<br>b > c > d |
| Patients (estimated by KMDs) | 4.02 ± 0.68 | 3.80 ± 0.75 | 3.69 ± 0.76 | 3.12 ± 0.86 | 98.93 | < .001 | a > b > c > d |

*One-way ANOVA and Scheffe post hoc test were conducted.
*The letters for each post hoc group are represented by superscripts in the classification table.

**Table 4**
Satisfaction with pharmacopuncture according to treated disease among Korean medicine doctors (KMDs) and patients.

| Satisfaction with pharmacopuncture | | KMDs | | Patients (estimated by KMDs) | |
|---|---|---|---|---|---|
| Disease | Treatment/Treated with pharmacopunture | Mean ± SD | p-value | Mean ± SD | p-value |
| Musculoskeletal disease | Yes (n = 381) | 3.67 ± 0.66 | 0.827 | 3.66 ± 0.59 | 0.749 |
| | No (n = 12) | 3.63 ± 0.64 | | 3.60 ± 0.46 | |
| Neurological disease | Yes (n = 163) | 3.64 ± 0.68 | 0.581 | 3.66 ± 0.60 | 0.995 |
| | No (n = 230) | 3.68 ± 0.65 | | 3.66 ± 0.58 | |
| Gastrointestinal disease | Yes (n = 82) | 3.85 ± 0.75 | 0.005** | 3.84 ± 0.62 | 0.001** |
| | No (n = 311) | 3.62 ± 0.62 | | 3.61 ± 0.57 | |

*p < 0.05 **p < 0.001.
* Shapiro–Wilk test for normality. Independent *t*-test was conducted.

(n = 82) than in those who did not (n = 311) (p < 0.001). In the remainder of case, differences were not significant (Table 4).

### 3.7. Satisfaction with pharmacopuncture according to the type of pharmacopuncture

We investigated the difference in overall practitioner satisfaction and patient satisfaction as estimated by KMDs according to the type of pharmacopuncture used. The results of an analysis of differences in satisfaction between those groups with and without a certain type of pharmacopuncture treatment as the third priority, showed that practitioner satisfaction among the respondents who mainly used bee venom pharmacopuncture (n = 294) and blood stasis pharmacopuncture (n = 149) was significantly lower than that of those who did not use these treatments (n = 671/n = 816) (p < 0.05). Patient satisfaction was significantly higher among the respondents who used ginseng treatment (n = 33) than among those who used other treatments (n = 932) (p < 0.05). In the remainder of cases, the differences were not significant. (Table 5).

## 4. Discussion

### 4.1. Purpose of the study

Pharmacopuncture is a novel mode of therapy whereby herbal medicine extracts are injected directly into an acupoint, which can reduce the use of drugs and improve therapeutic effects compared with oral administration [12]. It has been used in Korea since the 1960s, and various types were developed during the 1980s and 1990s. Furthermore, since 2000, it has become one of the major treatment options in Korea [13,14]. However, the usage status of pharmacopuncture has yet to be investigated as it is not covered by public health insurance in Korea. Against the background of this milieu, we aimed in the present study to investigate the use of pharmacopuncture and to establish how satisfied KMDs are regarding pharmacopuncture. Moreover, we wanted to evaluate the use of acupuncture as a treatment tool based on practitioner/patient satisfaction.

Currently, we can only determine the exact usage status of pharmacopuncture in Korea through official statistics on car insurance. According to the data, in 2014, 1,555,000 pharmacopuncture treatments were administered to 168,089 patients in Korea [15]. In 2014,

**Table 5**
Satisfaction with pharmacopuncture according to the type of pharmacopuncture among Korean medicine doctors (KMDs) and patients.

| Satisfaction with pharmacopuncture | | KMDs | | Patients (estimated by KMDs) | |
|---|---|---|---|---|---|
| Type of pharmacopuncture | Treatment/Treated with in pharmacopuncture treatment | Mean ± SD | p-value | Mean ± SD | p-value |
| Bee venom | Yes (n = 294) | 3.62 ± 0.64 | .049* | 3.62 ± 0.56 | .124 |
| | No (n = 671) | 3.71 ± 0.64 | | 3.68 ± 0.57 | |
| Blood stasis (angelica, safflower, etc.) | Yes (n = 149) | 3.59 ± 0.55 | .040* | 3.60 ± 0.50 | .123 |
| | No (n = 816) | 3.70 ± 0.65 | | 3.68 ± 0.58 | |
| Ginseng | Yes (n = 33) | 3.84 ± 0.75 | .152 | 3.87 ± 0.54 | .033* |
| | No (n = 932) | 3.68 ± 0.63 | | 3.66 ± 0.57 | |
| Hwang-ryun (Hwangryunhaedoktang) | Yes (n = 76) | 3.70 ± 0.73 | .818 | 3.58 ± 0.63 | .153 |
| | No (n = 889) | 3.68 ± 0.63 | | 3.87 ± 0.56 | |
| Hominis Placenta (Jahageo) | Yes (n = 64) | 3.68 ± 0.62 | .951 | 3.63 ± 0.45 | .600 |
| | No (n = 901) | 3.68 ± 0.64 | | 3.67 ± 0.57 | |

*p < 0.05 **p < 0.001.
*independent *t*-test was conducted.

the treatment cost covered under car insurance by Korean medical institutions was 269.8 billion won. Of which, the cost of pharmacopuncture treatment was 14.35 billion won, which represented 5.3% of the total car insurance expenses. In 2016, the cost of pharmacopuncture treatment was 28.52 billion won, which represented 6.3% of the total car insurance expenses. At present, the use of pharmacopuncture treatment is increasing rapidly each year [16], and although it is not covered under car insurance, pharmacopuncture is used extensively in Korea.

### 4.2. Use status of pharmacopuncture

#### 4.2.1. Usage and career

Four hundred and seventy-four individuals responded to the study survey, of whom 88.0% had used pharmacopuncture during the previous year. Therefore, it can be inferred that most KMDs generally use pharmacopuncture. According to a study of medical records of 12 musculoskeletal specialist in Korean medicine institutions in 2016, 98.6% of inpatients and 77.6% of outpatients were treated with pharmacopuncture for musculoskeletal diseases [17], whereas a survey conducted in 2015 on KMDs belonging to the same medical institution, revealed that 95.9% of 123 respondents reported that they use pharmacopuncture for the treatment of intervertebral disc herniation [18]. In the hitherto most recent survey conducted on uninsured Korean medicine treatment in 2017, 67.4% of KMD respondents reported using pharmacopuncture in their medical practice [8].

The average clinical experience of KMDs participating in the present study was 13.4 years, whereas the average clinical experience of KMDs using pharmacopuncture treatment was 8.04 years, and 76.8% of all respondents had less than 10 years' experience of using pharmacopuncture treatment. Pharmacopuncture was introduced into the regular study course at the Eastern Traditional Medical College in 1995 and from 2000 this began to popularize the use of this treatment in Korea [9]. Since January 2006, when it was listed as an uninsured Korean medical treatment under the National Health Insurance Act, pharmacopuncture has been more widely used [8]. It can accordingly be inferred that students who studied pharmacopuncture at the university have actively used it as an important means of treatment.

#### 4.2.2. Target diseases

In terms of the diseases treated using pharmacopuncture, the responses of KMDs indicated that frequency decreased in the following order: musculoskeletal > neurological > gastrointestinal diseases. This can readily be explained by the fact that Eastern traditional medicine treatment in Korea is mainly applied to musculoskeletal and neurological diseases. Among the patients who have been treated at the Korean Medicine Hospital in 2016, the code of some of the top 10 diseases among outpatients was as follows: five pain-related diseases, such as back pain (M54); other non-categorized soft tissue disorders (M79), other muscle disorders (M62), shoulder lesions (M75), and other non-categorized joint disorders (M25). The code of some of the top 10 diseases among inpatients was as follows: cerebral infarction (I63), sequelae of cerebrovascular disease (I69), hemiplegia (G81), and dementia in Alzheimer's disease (G30) [4]. These medical conditions have accordingly influenced research and development on pharmacopuncture focusing on pain-related diseases. Clinical studies on pharmacopuncture treatments have mainly focused on musculoskeletal disorders [2], and among new patents, musculoskeletal and neurological diseases were found to be the most common target diseases [19].

#### 4.2.3. Type of pharmacopuncture

The results of the present survey revealed that bee venom (30.5%) and blood stasis (18.9%) are the most commonly used types of pharmacopuncture. Bee venom and blood stasis pharmacopuncture are actively used mainly for pain-related disorders and neuropathy in clinical practice, and several studies have reported that the treatment is highly effective [20]. In the present study, we established that the KMDs focused on musculoskeletal and neurological diseases for treatment with pharmacopuncture. Therefore, it is to be expected that the KMDs mainly use bee venom and blood stasis pharmacopuncture, which are known to be effective in the treatment of these diseases.

Bee venom has been used in East Asia since the second century BCE and has been extensively used and studied, particularly in Korea. Chemical analyses of the components of bee venom have revealed that it consists of enzymes and peptide and non-peptide components. The enzymes promote cell membrane lysis, thereby facilitating diffusion of the bee venom, whereas the peptide components induce hyperactivity in the nervous system and the non-peptide components act as allergens and parasympathetic stimulants [20,21].

When employed in pharmacopuncture, bee venom is used in a diluted form, and the pharmacological action of the bioactive compounds in bee venom and the mechanical action of acupuncture stimulation act in concert to exert the treatment's therapeutic effects. In this regard, it has been reported that bee venom pharmacopuncture has anti-inflammatory, analgesic, antipyretic, blood-circulation, anti-convulsive, and immune enhancement effects [22]. Bee venom has also been found to have excellent effects on musculoskeletal disorders, such as neuralgia, headache, arthritis, and herniated intervertebral disc, and has been applied to various other diseases such as autoimmune diseases and cancer [23–28]. To date, however, clinical application and research on bee venom pharmacopuncture have mainly focused on musculoskeletal diseases (66%) [22].

In the present study, we found that not only Jungsongouhyul pharmacopuncture but also herbal medicine pharmacopuncture that contributes to improving blood circulation, such as Angelicae Gigantis Radix, Paeoniae Radix, and Carthami Flos pharmacopuncture, are classified as blood stasis pharmacopuncture. Jungsongouhyul pharmacopuncture is used to treat symptoms related to blood stasis. It comprises herbal medicines, such as Gardeniae Fructus, Corydalis Tuber, Olibanum, Myrrh, Salviae Miltiorrhizae Radix, Paeoniae Radix, Sappan Lignum, and Persicae Semen, which can enhance blood circulation. Several studies have reported the analgesic and neuro-regenerative effects of Jungsongouhyul pharmacopuncture, and it has accordingly been applied clinically for pain-related and paralytic diseases [29].

It has been confirmed through various studies that Angelicae Gigantis Radix has anti-inflammatory, analgesic, immunity enhancement, and anti-cancer effects, which are attributable to the coumarins decursin and decursinol angelate [30], and has been used to treat cancer, arthritis, and dementia [19]. Paeoniae Radix has been reported to inhibit the differentiation and production of osteoclasts and is commonly used for headache, abdominal pain, and limb spasm and pain [31]. Paeoniae Radix pharmacopuncture is mainly used for joint diseases, degenerative nerve diseases, muscle pain, and obesity [19], and has been demonstrated to inhibit the acidification of cells and to have cell protective effects [32].

Carthami Flos pharmacopuncture reduces the expression of cytokines associated with early rheumatoid arthritis, prevents damage to the lacrimal joint, and decreases the level of cytokines such as interleukin in the serum. It can thus be used to alleviate the symptoms of arthritis. Carthami Flos pharmacopuncture has also been proven to have anti-thrombogenic effects by reducing the number of platelets and levels of fibrinogen [33–35]. Diseases that have been reported to be improved by this treatment include musculoskeletal and neurological diseases such as carpal tunnel syndrome and degenerative knee arthritis [36].

#### 4.2.4. Satisfaction with pharmacopuncture

In this study, we sought to determine the satisfaction of practitioners and patients with respect to pharmacopuncture treatment in terms of efficacy, convenience, safety, and treatment cost, which are considered important evaluation tools with respect to health insurance. The average satisfaction score based on a 5-point scale was 3.67 and

3.66 points for the practitioners and patients, respectively. Among the subscales, “treatment effectiveness” was scored as the most satisfactory and “treatment cost” was found to be significantly less satisfactory. The effectiveness of a treatment is an important factor determining the level of satisfaction with a medical service, and among patients, medical cost is also a primary factor affecting their utilization of medical services [37–39]. According to data on the status of health insurance benefits relating to 22 categories of Korean medical treatment published by the National Statistical Office (NSO) in 2016, total medical expenses for Korean medicine was 21,774.3 won and the average medical expenses paid by the patient was 5,316.3 won [40]. In a survey of outpatients using Korean medicine and herbal medicine by the NSO, 51.8% of the respondents indicated that improvement in insurance coverage is a priority for the development of Korean medicine. However, in the same survey, 28.2% of the respondents indicated that they considered Korean medicine to be expensive [41]. Although the significant effects of pharmacopuncture treatment have previously been reported through several studies [5–7], we found in the present study that satisfaction in terms of cost was low, as pharmacopuncture is not included under national health insurance coverage and the treatment cost is high.

In this study, we analyzed satisfaction with pharmacopuncture treatment according to target disease or the type of pharmacopuncture administered. We believed that by assessing differences in satisfaction among groups of KMDs who use pharmacopuncture in different ways, it would be possible to identify the factors determining the satisfaction with pharmacopuncture treatment and to infer the applicability of pharmacopuncture as a therapeutic tool depending on a particular disease or type of pharmacopuncture.

Contrary to expectations, our analysis shows that satisfaction patterns in this study did not correspond with the aforementioned frequency analysis results. We found that satisfaction with pharmacopuncture was significantly high in KMDs who use it for gastrointestinal diseases compared with those who use it for other diseases, in terms of both practitioner and patient satisfaction. Satisfaction was significantly higher among the patients of those KMDs who provided treatment with ginseng pharmacopuncture than others who used alternative types of pharmacopuncture, whereas practitioner satisfaction was significantly lower among KMDs who used bee venom and blood stasis pharmacopuncture treatment than among those who used other types of pharmacopuncture. This accordingly tends to contradict the common assumption that higher usage is indicative of higher satisfaction.

Given that Korean medicine treatments have tended to focus primarily on pain-related disorders, pharmacopuncture research and development has correspondingly concentrated on pain-related disorders. This is borne out by the findings of the frequency analysis conducted in the present study, which revealed that pharmacopuncture treatment is mainly used for musculoskeletal and neurological diseases, and that the commonly used types of pharmacopuncture are bee venom and blood stasis pharmacopuncture, which are known to be effective in the treatment of pain [20]. However, the fact that our results relating to satisfaction do not mirror the frequency of use indicate that pharmacopuncture can also be effective in the treatment of gastrointestinal disease.

Furthermore, on the basis of the findings of the present study, we suspect that there exists a group of experts who use various type of pharmacopuncture for various diseases, and that there are differences in satisfaction with pharmacopuncture between the expert group of KMDs who use it in various ways and the general group of KMDs. Accordingly, satisfaction with pharmacopuncture in the general group who typically use bee venom and blood stasis pharmacopuncture was found to be lower than that in group of experts who use these treatments and also the less frequently used types of pharmacopuncture for treatment of both non-pain-related diseases and gastrointestinal disease, and who expressed high satisfaction in this study. However, further research will be needed to verify this assumption.

#### 4.2.5. Significance

In Korea, a number of KMDs are commonly using pharmacopuncture in clinical practice. The present study is the most recent large-scale study on the current use status of pharmacopuncture by all KMDs. The importance of this study lies in the fact that it has previously been difficult to determine the use status of pharmacopuncture because it is not covered under the national health insurance. In addition, during recent years, the variety of extramural herbal dispensaries has grown in number, and the pharmacopuncture market has undergone substantial change, resulting in the development of various different types of pharmacopuncture. Accordingly, textbooks and previous studies do not reflect the current situation. By showing the current usage status of pharmacopuncture, this study can contribute to our understanding of contemporary usage patterns and implications for utilization, not only for KMDs but also for traditional doctors from other countries who are currently unfamiliar with pharmacopuncture.

Furthermore, in this study, we investigated how satisfied KMDs are regarding pharmacopuncture and examined differences in satisfaction according to the type of pharmacopuncture they mainly use and which diseases they mainly use it to treat. Surprisingly, the results showed that satisfaction tended to contrast with the frequency of use. This emphasizes the need for caution when interpreting usage data, and has potential implications for both the use and study of pharmacopuncture. Even though this therapy has previously been studied and developed mainly with respect to the treatment of pain-related diseases, further research and utilization will be necessary with regards to the application of pharmacopuncture in other areas, such gastrointestinal disease, which we found to be associated with high satisfaction in the present study. Accordingly, it will be meaningful to verify the satisfaction with pharmacopuncture among the aforementioned group of experts and report on the way they use pharmacopuncture.

#### 4.2.6. Limitations

This study does, however, have certain limitations and we accordingly suggest a number of areas for further research.

First, to a certain extent are results may be limited in terms of generality. Although we aimed to include all currently practicing KMDs in the present survey, there was a low response rate and the sample size was correspondingly small. The survey method used in the present study is similar to that used in previous studies that have examined the actual use of treatment tools in KMDs because of its convenience and likelihood of securing a reasonable number of respondents [42,43]. However, given that our questionnaire was voluntary and administered via the indirect means of e-mail, the response rate was lower than we had hoped for. There have been no previous studies that have sought to reflect the characteristics of the entire KMD community comparable to the characteristics of the sample responding in the present study. However, considering that the characteristics of the KMDs surveyed in our study did not differ markedly from those surveyed in similar studies [42,43], our results are considered to be significant. In addition, considering that 84.1% of KMDs were engaged in clinical practice according to the 2017 statistics [4] and that 67.4% of KMDs used pharmacopuncture in a survey conducted in the same year [3], the actual number of KMDs surveyed in this study is estimated to be lower, and therefore the reliability is considered to be higher.

In addition, the sample group surveyed in the present study is probably not completely representative because we did not use a random or stratified sampling method. Due to the nature of the online survey, there were limitations in terms of the percentage of KMDs over 60 years of age participating in the survey, as they are not familiar with the internet. Furthermore, there is a possibility of recall bias by surveying using the questionnaire format without directly examining medical records. Instead, we attempted to increase the validity of the survey through other means. We limited the time and conditions of the investigation to KMDs who had used pharmacopuncture over the previous year. When a question was not answered, the participants were

prohibited from proceeding to the next stage of the questionnaire, and thus the respondents had to respond to all the questions to increase their credibility.

Second, there are potential limitations with regards to the method we used to evaluate satisfaction. Although we intended in this study to assess patient satisfaction with pharmacopuncture, we were only able to do this indirectly based on an assessment of patient satisfaction expressed by KMDs, and patient satisfaction based solely on practitioner evaluation might differ from the actual satisfaction of the patients themselves. Nevertheless, practitioner assessment is considered meaningful and was thus included in this survey. Furthermore, we investigated the satisfaction with pharmacopuncture among respondents with respect to several different criteria, which were not directly related to the different pharmacopuncture types or target disease. Therefore, it is necessary to exercise a certain amount of caution when interpreting the data obtained in this study. In subsequent studies we will need to verify the results of the present study by investigating satisfaction in a more direct manner. In addition, studies on the effectiveness and safety of pharmacopuncture are needed through large-scale experimental studies, rather than via indirect estimates based on subjective satisfaction.

## 5. Conclusions

Among the respondents, 393 KMDs, who are currently practicing and using pharmacopuncture, voluntarily participated in the survey. Eighty-eight percent of the KMDs who responded to the questionnaire had used pharmacopuncture during the previous year, and their average clinical experience of using this therapy was 8.04 years.

According to their responses, the percentage of the number patients treated with pharmacopuncture relative to total number of patients was 39.2%. The subjects were generally highly satisfied with the treatment effect of pharmacopuncture but were less satisfied with the cost of this treatment. In this study, pharmacopuncture was mainly used to treat musculoskeletal, neurological, and gastrointestinal diseases, and bee venom and blood stasis pharmacopuncture were the most commonly used types. Satisfaction with pharmacopuncture was high in KMDs who use it for treating gastrointestinal diseases. Patient satisfaction was high as assessed by KMDs who treated these patients with ginseng pharmacopuncture and practitioner satisfaction was low among KMDs who treated patients with bee venom and blood stasis pharmacopuncture. We thus found that the results pertaining to satisfaction were not totally consistent with the frequency of use.

The responses to the survey questionnaire revealed that KMDs recognize and use pharmacopuncture as an effective treatment tool despite institutional and cost limitations, including the lack of guaranteed health insurance. Although KMDs are currently focusing on pain-related disorders, our results indicate that pharmacopuncture can also be effective in the treatment of gastrointestinal diseases. Accordingly, caution needs to be exercised when interpreting data relating solely to usage, and further research and utilization will be required to assess the applicability of pharmacopuncture in areas other than pain-related disorders. In the present study, we identified a group of experts, and compared their usage and satisfaction with those of a general group who typically use bee venom and blood stasis pharmacopuncture, and accordingly found higher satisfaction in the group of experts who tend use less popular types of pharmacopuncture. However, further research will be needed to verify this.

Although KMDs use pharmacopuncture as one of the main treatment methods, there is currently a lack of institutional support, such as verifications of effectiveness and safety and the national health insurance systems. However, KMDs are keen to develop and popularize pharmacopuncture as an effective treatment, and thus it is necessary to strengthen the financial coverage. Further large-scale studies are recommended to provide significant evidence with regards to the efficacy and safety of pharmacopuncture, which could provide a basis for policy aimed at incorporating pharmacopuncture into the national health insurance system.

## Authors

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## Conflict of interest

None.

## Appendix A

< *Consent* >

*A Study on the Current Status and Perception of Pharmacopuncture at Korean Traditional Medical Centers*

Hello. We wish you all the best for your success. This research is being conducted to examine the current state of Korean traditional medical institutions' use of pharmacopuncture and its suitability as a target for preliminary health insurance. For each question, please select the answer that is closest to the actual clinical status.

The survey response time is expected to be about 10 min, and although you may be very busy, we ask you to actively participate in the survey so that the findings can be used as a valuable resource for the future development of Korean traditional medicine.

The institute that carries out this research is the preventive medicine department of Kyunghee University Oriental Medicine College and is co-hosted by the Association of Korean Oriental Medical Doctor. The research manager is Professor Jang Bo-hyung. Please give us your honest and sincere answers, as we promise that the data you submit will not be used for anything other than research and will be protected under the Personal Information Protection Act (Article 18).

If you wish, you can refuse to provide personal information, and if you do refuse, there will be no disadvantages. Even if you do agree to provide your personal information and enable us to use it, you can request the Kyunghee University Oriental Medicine College Office to review, correct, delete, or suspend your personal information.

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The first 200 people who respond to the survey will be sent text messages with mobile cultural gift certificates (10,000 won), and if there are more than 200 respondents, we will send them by lottery.

Do you participate in this research voluntarily?

○ Yes ○ No

< *Questionnaire* >

The following is a questionnaire about the current status of the Pharmacopuncture treatment. All answers are based on the average status you have been treated for the past year.

< **Current clinical status** >

Q1. Are you currently in clinical practice?

①Yes

②No

Q2. Have you had any pharmacopuncture treatments in the last year?

①Yes

②No

< **Number of patients treated** >

Q3. What is the average daily number of patients you've treated for

the past year? () People / Day

Q4. What is the average daily number of patients you've treated with the Pharmacopuncture for the past year?() People / Day

< **Treatment disease and Type of pharmacopuncture** >

Q5. What are the major diseases of the patients you've treated with the Phramacopuncture? (selectable up to the 3rd priority)

①Musculoskeletal disorders (back pain, disc disease, shoulder lesions, arthritis, sprains, etc.)

②Neurological disease (face paralysis, migraine, Parkinson's disease, etc.)

③cerebrovascular disease (stroke, etc.)

④Cardiovascular disease (hypertension, angina, arrhythmia, etc.)

⑤Cancer

⑥Endocrine disease (diabetes, thyroid disease, etc.)

⑦Gastrointestinal disease (indigestion, esophagitis, gastritis, gastric ulcer, etc.)

⑧Respiratory disease (cold, rhinitis, asthma, etc.)

⑨Mental disease (dementia, depression, anxiety disorder, etc.)

⑩Gynecological diseases (menstrual irregularities, female paranoid, menstrual pain, etc.)

⑪Genitourinary disorders (urinary incontinence, erectile dysfunction, male paranoid, etc.)

⑫Skin diseases (atopic skin, rash, dry skin, etc.)

⑬Eyes, ear abnormalities (tinnitus, decreased vision, etc.)

⑭Others ()

Q6. What type of Pharmacopunture did you use usually in your clinic for the past year? (selectable up to the 3rd priority)

(Please write down the full name, not the abbreviation.)

(E.g) Sanyang ginseng pharmacopunture of Korean Pharmacopuncture Research Institute

1st: Name of Pharmacopunture product () / Name of dispensary ()

2nd: Name of Pharmacopunture product () / Name of dispensary ()

3rd: Name of Pharmacopunture product () / Name of dispensary ()

< **Clinical history and pharmacopuncture experience** >

Q7. What is your clinical history?

()Year

Q8. What is the clinical history using Pharmacopuncture?

()Year

< **Treatment satisfaction** >

Q9. Were you satisfied with Pharmacopunture treatment as a doctor?

(1) Efficacy (Satisfaction with the excellence of the therapeutic effect.)

①Very dissatisfied ②Dissatisfied ③Neutral ④Satisfied ⑤Very satisfied

(2) Convenience (Satisfaction with the ease of the treatment techniques related to time and difficulty.)

①Very dissatisfied ②Dissatisfied ③Neutral ④Satisfied ⑤Very satisfied

(3) Safety (Satisfaction with the risk to adverse effects and side effects)

①Very dissatisfied ②Dissatisfied ③Neutral ④Satisfied ⑤Very satisfied

(4) Cost (Satisfaction with the cost of treatment paid)

①Very dissatisfied ②Dissatisfied ③Neutral ④Satisfied ⑤Very satisfied

Q10. Were the patients satisfied with Pharmacopunture treatment?

(1) Efficacy (Satisfaction with the excellence of the therapeutic effect.)

①Very dissatisfied ②Dissatisfied ③Neutral ④Satisfied ⑤Very satisfied

(2) Convenience (Satisfaction with the ease of the treatment techniques related to time and difficulty.)①Very dissatisfied ②Dissatisfied ③Neutral ④Satisfied ⑤Very satisfied

(3) Safety (Satisfaction with the risk to adverse effects and side effects)

①Very dissatisfied ②Dissatisfied ③Neutral ④Satisfied ⑤Very satisfied

(4) Cost (Satisfaction with the cost of treatment paid)

①Very dissatisfied ②Dissatisfied ③Neutral ④Satisfied ⑤Very satisfied

< **Personal information of respondents** >

Q11. Where is your clinic located?

(A)Seoul(B)Incheon(C)Gyeonggi(D)Gangwon

(E)Daejeon(F)Sejong(G)Chungbuk(H)Chungnam(I)Daegu

(J)Gyeongbuk(K)Busan(L)Ulsan(M)Gyeongnam

(N)Gwangju(O)Jeonbuk(P)Jeonnam(Q)Jeju-island

Q12. How many Korean Medical Doctors work in your clinic, including yourself?

() people

Q13. What is your gender?

①man

②woman

Q14. When were you born? (E.g) 1982

()

Q15. Are you a specialist?

①General doctor

②Specialist

(A) Acupuncture and moxibustion(B) Korean internal medicine

(C) Korean rehabilitation

(D) Korean Ophthalmology, Otolaryngology and Dermatology

(E) Sasang constitution(F) Korean obstetrics and gynecology(G) Korean Pediatrics(H) Korean Neuropsychiatry

The survey has been closed. Thank you for your sincere reply for a long time.

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