

**SOUTH BAYLO UNIVERSITY**

**Effectiveness of Acupuncture and Herbal Medicine on  
Cold Hypersensitivity of Hands and Feet: A Systematic Review and Meta-Analysis**  
수족냉증 질환의 임상적 증상과 치료 효과에 대한 체계적 문헌고찰 및 메타분석

By

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**Effectiveness of Acupuncture and Herbal Medicine on**

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**A Systematic Review and Qualitative Meta-Analysis**

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**ABSTRACT**

**Objective:** The purpose of this study is to review and analyze the effectiveness of acupuncture and herbal medicine treatment on Cold Hypersensitivity of Hands and Feet through qualitative meta-analysis.

**Method:** This study reviewed literatures and previously conducted studies regarding acupuncture and herbal medicine treatment of Cold Hypersensitivity of Hands and Feet (CHHF) in order to compare and meta-analyze effectiveness of acupuncture and herbal medicine treatment as well as to establish enhanced understandings on acupuncture treatment on CHHF. This study carried out utilizing various online database including Pubmed, National Discovery for Science Leaders, Embase, Cochrane Library, Sciencedirect, Google scholar, Research Information Sharing Service, Korean Medical Database and Korean Traditional Knowledge Portal from year 2000 to 2020. Searching keywords are various combination of “cold hypersensitivity of hands and feet”, “acupuncture”, “Herbal medicine”, Traditional Chinese Medicine (TCM)” in English and Korean.

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## I. INTRODUCTION

Cold Hypersensitivity of Hands and Feet (CHHF) or primary Raynaud's Phenomenon (RP) is diagnosed by history of cold temperature or emotional stress precipitating episodic digital coldness. It is said that 5 to 10 percent of the population is affected by Raynaud's phenomenon. That is 15 to 30 million people in numbers. In spite of the large number of affected populations, due to its non-emergent symptoms, as well as the "subjective" sensation of coldness among patients, it makes it difficult for practicing clinicians to objectively diagnose. Thus limited information on treatment protocols and researches have been conducted up to the present.

Conventional medicine (a.k.a Western Medicine), considers CHHF as Raynaud's / phenomenon with an unknown etiology for digital peripheral arterial constriction upon exposure to low temperatures or stress. Therefore the Western Medical approach was treatment with pharmacologic drugs that dilate peripheral arteries such as Calcium Channel Antagonist (Nifedipine, Felodipine, Amlodipine) or  $\alpha$ 1-adrenergic antagonist (Prazosine, Doxazosine, Terazosin). In severe cases that do not respond to pharmacologic treatments, sympathectomy, a procedure wherein peripheral sympathetic nerves are resected can be recommended.

In Korean Medicine (a.k.a Traditional Chinese Medicine), CHHF is based on "cold disease" through various differential diagnostic methods such as Zang-fu Differential diagnosis and 8 principles differential diagnosis and other methods of diagnosis. It is considered as an imbalances of Yin / Yang, vital organs, Qi/ Blood, thus treatment focuses on correcting the imbalance using various methods such as herbal decoction, acupuncture, moxibustion and treatment modalities.

The Ministry of Health and Welfare of Republic of Korea has developed a project for

Korean Medicine Clinical Guidelines by establishing a Guideline center of Korean Medicine starting year 2016. And on year 2017, through extensive research and experiments in collaboration with Society of Korean Medicine Obstetrics and Gynecology, and Society of Saseng Constitutional Medicine, they were able to publish Korean Medicine Clinical Practice Guideline for Coldness of Hands and Feet.

This research reviewed literatures and previously conducted studies that utilized acupuncture and herbal medicine to treat CHHF in order to compare and meta-analyze effectiveness of acupuncture and herbal medicine treatment as well as to establish enhanced understandings on acupuncture treatment on CHHF,

## LITERATURE REVIEW

### Raynaud's disease

According to Mayo Clinic, Raynaud's disease is defined as numbness and coldness of fingers and toes in response to cold temperature or stress. In this disease, small arteries that supply blood to skin constricts and limits blood circulation in the affected area. It is more common among women than men, and also those who live in colder climates. Specific causes are unknown but there are theories that considered overreaction,/ hypersensitivity of blood vessels to cold and stress as possible pathophysiology

To cite Johns Hopkins Medicine, Raynaud's can occur on its own, known as primary form. Or it may happen along with other diseases, known as secondary form. The diseases most often linked with Raynaud's are autoimmune or connective tissue diseases such as:

- Lupus (systemic lupus erythematosus)
- Scleroderma
- CREST syndrome (a form of scleroderma)
- Buerger disease
- Sjögren syndrome
- Rheumatoid arthritis
- Occlusive vascular disease, such as atherosclerosis
- Polymyositis
- Blood disorders, such as Cryoglobulinemia
- Thyroid disorders
- Pulmonary hypertension



The primary form of Raynaud's is the most common type. It often begins between ages 15 and 25. It's less severe than secondary Raynaud's. Patients with primary Raynaud's do not often develop a related condition.

Both world famous hospitals of modern conventional medicine have recommended the following treatment of Raynaud's phenomenon:

- Avoiding exposure to cold
- Keeping warm with gloves, socks, scarf, and a hat
- Stopping smoking
- Wearing finger guards over fingers with sores
- Avoiding trauma or vibrations to the hand (such as with vibrating tools)
- Taking certain antihypertensive medicines during the winter months to help reduce constriction of the blood vessels

### **Cold Hypersensitivity of Hands and Feet (CHHF) in TCM**

“Cold disease” has been mentioned in Shang-han-Lun in several different sections. As common examples, coldness damages meridian channels, coldness stagnates over upper abdomen, and deficiency of Qi leads to coldness. Coldness often disrupts normal circulation of Qi and blood thus lead to Yang deficiency.

To further differentiate, through Zang-Fu Differential Diagnosis, there are Spleen Yang deficiency and Kidney Yang deficiency. However, CHHF should not be diagnosed solely based on coldness since there may be other accompanying symptoms such as lower back pain, knee

pain, frequent urination, indigestion, sensation of cold abdomen, edema of limbs, fatigues among others.

Through 8 principles differential diagnosis, there are deficiency of Qi, Blood, and Yang. Each deficiency explains different causes and symptoms further. Qi deficiency means a decrease in one or more of the functions of an organ. In some instances, it may mean decreased overall bodily function of generating heat, a body Yang function. Yang deficiency further correlates with Spleen and Kidney Yang deficiency as mentioned earlier.

Lastly, blood stagnation and Qi stagnation is very much related to the general circulation of body. Coldness can cause stagnation of blood throughout body and further affects peripheral blood vessels that may leads to blockage or constriction and thus causing coldness of hands and feet to develop.

## II. MATERIALS AND METHODS

The objective of this study is to review, compare and analyze previously conducted studies in order to establish an enhanced understanding on the effectiveness of acupuncture and herbal medical treatment on Cold Hypersensitivity of Hands and Feet through meta-analysis.

The detailed goals for this study are as follows:

1. Selected literatures and studies were analyzed and re-grouped accordingly.
2. Organization of each of the studies via charts in detail such as size of the studies, side effects, length of treatment, outcome of the treatments, etc.
3. Acupuncture points were noted on table when the treatment was done using acupuncture, and herbal prescription were noted when the treatment was done using herbal medicine.

### 1. Search Materials

Based on online research, Korean studies were collected via Research Information Sharing Service (RISS), Korean Medical Database (KMBASE), Korean Traditional Knowledge Portal (KTKP), Korean Institute of Science and Technology Information (KISTI, 한국과학기술정보연구원). For English studies, PubMed, National Discovery for Science Leaders, Embase, Cochrane Library, Sciencedirect, Google scholar were utilized.

### 2. Search Date

Researches were selected and studied from dated from year 2000 to 2020 among searchable Data-Base.

### 3. Search words

Search key words were limited to Korean and English. For English, “cold hypersensitivity of hands and feet”, “acupuncture”, “Herbal medicine”, “Traditional Chinese Medicine (TCM)” were utilized in combination. For Korean, together with “수족냉증”, “냉증”, “침”, “한의학”, “한방” were utilized in combination.

### 4. Selection of literature

#### 1) Inclusion Criteria

For systematic reviews and meta-analysis, specific PICO were utilized and applied.

- **Patient, problem or population (P):** patients who were diagnosed with Cold Hypersensitivity of Hands and Feet

- **Intervention (I):** patients underwent acupuncture and/or herbal medicine treatment comparison.

- **Control (C):** patients who did not receive acupuncture and/or herbal medicine treatment

- **Outcome (O):** data that had significant outcome results that can be objectified.

Literatures and studies searched through database were conducted any time between January of 2000 to December of 2020. All Randomized Controlled Trial (RCT) researches that contains words “Cold Hypersensitivity of Hands and Feet” or “수족냉증” were included.

## **2) Exclusion Criteria**

Data that did not qualify previously determined PICO upon reviewing titles and abstracts were excluded. Animal studies were excluded as well.

## **3) Selection of Literature and References**

This study collected and analyzed online based data according to keywords, discard duplicated or redundant data, then selected based on PRISMA-P (Preferred Reporting Items for Systematic Reviews and Meta-Analysis Protocol). When title and abstract were not sufficing to decide, entire research were reviewed prior to selection.

## **5. Selection of researches and arrangement**

Among all the researches, selection of studies followed previously planned selection criteria. Selection categories/criteria followed year of publish, study method, location of coldness, number of participants and sexes (test and controlled). For treatment methods, length of treatment and research, effectiveness, adverse effect, diagnostic tools and methods, objective of diagnosis and conclusion were focused. Microsoft Excel program was used for the purpose of simplified statistics, and utilized tables in order to arrange different acupuncture points that were used for treatments.

### **III. RESULT**

#### **1.Result of Research Selection**

In order to trace latest research on Cold Hypersensitivity of Hands and Feet, researches were selected among published documents dated from year 2000 to 2020. Thus, total of 27 researches were selected and following are the characteristics. (Table 1, 2)

Research results will be referred to its individual “reference number” 1 through 27.

#### **1) Selected Research Designs:**

Among 27 experimental research, 19 were case reports (Reference no. 1~19) (70.4%), 6 were Randomized Clinical Trials (Reference no. 20~25) (22.2%), and 2 were Non-Randomized Clinical Trials (Reference no. 26, 27) (7.4%)

#### **2) Year of Publish:**

6 researches were published from year 2000 to 2009 (Reference no. 1, 2, 20, 21, 22, 25), 21 researches were published from year 2010 to 2020 (Reference no. 3 ~ 19, 23, 24, 26, 27) (Table 3)

#### **3) Number of Research Participants:**

Total numbers of the participants among 27 selected researches were 624. (Table 1, 2)

Among 19 case reports, 7 of them had participant numbers less than 50 (Reference no. 1, 3, 4, 5, 7, 8, 9), 1 of them had participant number from 50 to 100 (Reference no. 2) and 1 of them

had participant number greater than 100 (Reference no. 6). And the rests 10 were single case reports (Reference no. 10, 11, 12, 13, 14, 15, 16, 17, 18, 19). (Table 1)

Among 8 Randomized Clinical Trial, 1 of them had participant numbers less than 50 (Reference no. 21), 5 of them had participant numbers more than 50 (Reference no. 20, 22, 23, 24, 25). 2 of Non-Randomized Clinical Trials had participants number less than 50 (Reference no. 26, 27).

**Table 1. Basic characters of cold hypersensitivity of hands and feet included case reports**

First Authors (Published year) – Reference number	Cold Hypersensitivity Classification	Participants Numbers	Treatment	Effectiveness	Adverse event
Tang (2002) - 1	Hands and feet	35	- Warm needling - Auricular acupuncture	Total efficacy rate: 97%	Not reported
Lu (2006) - 2	Hands and feet	52	- Warm needling	Total efficacy rate: 92.3%	Not reported
Gao (2010) - 3	Hands	20*	- Electroacupuncture - Herbal medicine	Total efficacy rate: 18/20	Not reported
Cho (2011) - 4	Hands and feet	1	- Acupuncture - Herbal medicine - Moxibustion	Temperature differences after treatment between LU4-PC8(°C): L2.1→0.9, R2.3→0.4  ST32-LR3(°C): L2.7→-0.5, R2.8→-0.6	Not reported
Ha (2011) - 5	Hands	1	- Acupuncture - Herbal medicine - Physiotherapy - Western medicine	Fingertip temperature rise.  VAS in pain and cold sensation: 10→0	Not reported
Li (2011) - 6	Hands and feet	152	- Acupuncture - Cupping	Total efficacy rate: 92.8%	Not reported

Wang (2011) - 7	Hands	1	- Acupuncture	Symptoms eliminated	Not reported
Yang (2011) - 8	Hands and feet	1	- Acupuncture	Skin color turned normal. Insensitivity eliminated.	Not reported
Omole (2012) - 9	Hands and feet	1	- Acupuncture	NRS: 8→3 <serum cytokine levels> IFN $\gamma$ : 152/141→13/49 IL: 138/133→48/59 TNF $\alpha$ : 59/67→23/28 VEGF: 808/986→580/706	Not reported
Zhao (2012) - 10	Hands and feet	1	- Acupuncture - Moxibustion	Skin color turned normal. Cold sensation eliminated. Temperature rise.	Not reported
Jiang (2013) - 11	Hands	1	- Acupuncture - Burning Acupuncture	Pain eliminated Skin color turned red	Not reported
Jang (2014) - 12	Hands	1	- Pharmacopuncture - Acupuncture - Herbal medicine	PC8 temperature rise on DITI VAS: 42→24	There was a process of coldness transferring to the upper arms, knees, and toes during treatment.
Gao (2014) - 13	Hands and feet	1	- Acupuncture - Moxibustion	Symptoms improved	Not reported
Wang (2014) - 14	Hands	1	- Acupuncture - Cupping - Moxibustion	Symptoms improved	Not reported



Zhang (2016) - 15	Hands	1	- Acupuncture	Pain eliminated Insensitivity eliminated Skin color turned normal	Not reported
Kim (2017) - 16	Hands and feet	1	- Acupuncture - Electroacupuncture, - Herbal medicine - Moxibustion	SF-MPQ grading scale: 17→10  Temperature difference in Front part: R3.22→2.77, L2.43→2.31  In Rear part: R1.69→1.34, L1.31→1.23	Not reported
Lee (2017) - 17	Hands and feet	1	- Acupuncture - Pharmacopuncture, - Herbal medicine - Western medicine	CRR: 0.02~0.38→1.22~1.37  NRS: 8→2	None
Guan (2019) - 18	Hands	1	- Herbal medicine - Fumigation	Pain eliminated. Temperature rise Skin color turned normal	Not reported
Choi (2020) - 19	Hands	1	- Herbal medicine - Moxibustion	Skin color turned normal Subjective symptoms: 100→30	Not reported

SF-MPQ : Short Form McGill Pain Questionnaire,  
DITI : Digital Infrared Thermographic Imaging,  
VAS : Visual Analog Scale,  
NRS : Numeric Rating Scale,  
IFN : Interferon,  
IL : Interleukin,  
TNF : Tumor Necrosis Factor,  
VEGF : Vascular Endothelial Growth Factor,  
CRR : Cooling Rewarming Ratio.  
\*Primary Raynaud's disease : 12, Secondary Raynaud's : 8

**Table 2. Basic characters of cold hypersensitivity of hands and feet included clinical trials**

First Authors (Published year) - Reference number	Study design	Cold Hypersensitivity Classification	Participants N (intervention/control)	Intervention Treatment	Control Treatment	Outcome measurement	Effect (Main Result)	Adverse event (Side effect)
Wang (2002) - 20	RCT	Hands and feet	60 (M9F21/30)	Warm needling	Betaloc tablets	Total efficacy rate Nail fold microcirculation	Total efficacy rate in intervention group: 90% (p < 0.05) Total efficacy rate in control group: 66.7% Nail fold microcirculation improved (p < 0.05)	
Lee YJ et al (2006) - 21	RCT	hands	8 (F4/F4)	Both LI-4, LI-11	Both KI-2, KI-10		After 1 Treatment, Yes	none

Guo (2008) - 22	RCT	Hands and feet	60 (M6F24/M8F22)	Pharmacopuncture Moxibustion	Moxibustion (LI11, LI10, TE5, TE3, TE4, LI4, EX-UE9, SP6, ST36, SP9, GB39, EX-LE10)	Total efficacy rate Nail fold microcirculation	Total efficacy rate in intervention group: 83.33% (p < 0.05) Total efficacy rate in control group: 56.66% Treated group is superior to the control group in the vascular status integral and total integral of nail fold microcirculation (p < 0.05)	Not reported
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Shen (2011) - 23	RCT	Hands and feet	69 (M12F27/M9F21)	Warm needling Fumigation	Acupuncture (TE5, LI11, LI4, EX-LE10, ST36, LR3)	Total efficacy rate	Total efficacy rate in intervention group: 92.31% (p < 0.01) Total efficacy rate in control group: 50.00%	Not reported
Yang (2013) - 24	RCT	Hands and feet	60 (30/30)	Electroacupuncture Conventional treatment of Raynaud's disease	Conventional treatment of Raynaud's disease	Total efficacy rate Blood rheology, immunization series, complement determination, limb peripheral blood flow	Total efficacy rate in intervention group: 96.67% Total efficacy rate in control group: 83.33% Blood rheology, immunization series, complement determination, limb peripheral blood flow improved	Not reported

Ren (2015) - 25	RCT	Hands and feet	60 (M11F19/M13F17)	Acupuncture	Western treatment	Total efficacy rate	<p>Total efficacy rate in Acupuncture group: 90.0% (p &lt; 0.01)</p> <p>Total efficacy rate in Western treatment group: 73.3%</p>	Not reported
Lee (2006) - 26	NRCT	Hands	8	Acupuncture		CST recovery rate	<p>CST recovery rate in group of distal acupuncture point: 0.86±0.92 → 0.88±0.09</p> <p>CST recovery rate in group of proximal acupuncture point: 0.99±0.18 → 2.40±2.79 (p &lt; 0.05)</p>	Not reported

Schalger (2011) - 27	NRCT	Hands and feet	26	Electroacupuncture		Attack frequency	Attack frequency: 28.8±38.3 → 3.5±4.9 (p<0.001)	None
						Severity of Raynaud attacks	Severity of Raynaud attacks: VAS 6.0±2.4 → 3.0±2.8 (p=0.001)	
M : Male, F : Female, RCT : Randomized Controlled Trial, VAS : Visual Analog Scale, NRCT : Non-Randomized Controlled Trial, CST : Cold Stress Test								

**Table 3. Year of publication**

Year of publication	Case report	RCT	Uncontrolled clinical trials	Total
2000~2009	2	3	1	6
2010~2020	17	3	1	21
Total	19	6	2	27

## 2. Acupuncture Treatment Methods

### 1) Treatment Method

12 researches used acupuncture as only treatment method (Reference no. 1, 2, 7, 8, 9, 11, 15, 20, 21, 25, 26, 27).

15 researches used acupuncture with other treatments methods (Reference no. 3, 4, 5, 6, 9, 12, 13, 14, 15, 17, 18, 19, 22, 23, 24).

Treatment methods used other than acupuncture were Herbal medicine, Cupping therapy, Moxibustion therapy, Fumigation therapy and Western medicine. (Table 4)

Acupuncture treatment methods were regular manual acupuncture, electro-acupuncture, pharmaco-acupuncture, warm needling acupuncture, burning acupuncture and auricular acupuncture.

**Table 4. Treatment methods of cold hypersensitivity of hands and feet**

Treatment	N (%)
Acupuncture	12 (44.4%)
Acupuncture+Moxibustion	3 (11.1%)
Acupuncture+Cupping	1 (3.7%)
Acupuncture+Herbal medicine	2 (7.5%)
Acupuncture+Fumigation	1 (3.7%)
Acupuncture+Western medicine	1 (3.7%)
Acupuncture+Herbal medicine+Moxibustion	3 (11.1%)
Acupuncture+Herbal medicine+Fumigation	1 (3.7%)
Acupuncture+Herbal medicine+Western medicine	1 (3.7%)
Acupuncture+Herbal medicine+Western medicine+Physiotherapy	1 (3.7%)
Acupuncture+Moxibustion+Cupping	1 (3.7%)
Total	27 (100%)

**Table 5. Treatment methods of acupuncture**

Acupuncture	Number of Research (N)
Manual acupuncture	14
Warm needling	5
Electro-acupuncture	4
Pharmaco-acupuncture	3
Auricular acupuncture	2
Burning acupuncture	1

### **(1) Acupuncture Treatment**

Among acupuncture treatment methods, 14 researches used regular acupuncture, 5 researches used Warm needling, 4 researches used Electro-acupuncture, 3 researches used Pharmaco-acupuncture. 2 researches used Ear acupuncture and 1 used Burning acupuncture. (Table 5)

Among 5 researches that used Warm needling, 3 of them used Warm needling alone (Reference no. 2, 18, 20), 1 research used warm needling with fumigation treatment (Reference no. 23), and 1 research used Warm needling with Ear acupuncture (Reference no. 1).

Among 4 researches that used Electro acupuncture, 2 researches used Electro acupuncture only (Reference no. 3, 24), 1 researches used electro acupuncture with regular acupuncture (Reference no. 4), and 1 research used electro acupuncture with ear acupuncture (Reference no. 1).

Among 3 researches that used pharmaco-acupuncture treatments, 1 research used pharmaco-acupuncture only (Reference no. 18), and 2 researches used pharmaco-acupuncture with regular acupuncture (Reference no. 12, 17). For pharmaco-acupuncture, 1 research (Reference no. 12) used 자하거 약침 (Horminis Placenta), 1 research (Reference no. 22) used 단삼 주사액 (Dan Shen), and 1 research (Reference no. 17) used 봉침(Apitherapy / Bee Venom Therapy).

1 research used Ear acupuncture with Warm needling (Reference no. 1), and 1 research used ear acupuncture with electro acupuncture (Reference no. 27). And 1 research used Burning acupuncture with regular acupuncture (Reference no. 11).



## **(2) Combination Therapy (acupuncture with other treatment methods)**

12 researches used acupuncture only (Reference no. 1, 2, 7, 8, 9, 11, 16, 20, 21, 25, 26, 27). 15 researches used acupuncture with other treatment methods (Reference no. 3, 4, 5, 6, 10, 11, 13, 14, 16, 17, 18, 19, 22, 23, 24). (Table 4) 3 researches used acupuncture and moxibustion therapy (Reference no. 10, 13, 22), 1 research used acupuncture and cupping therapy (Reference no. 6), 2 researches used acupuncture and herbal medicine (Reference no. 3, 12), 1 research used acupuncture and fumigation therapy (Reference no. 23), 1 research used acupuncture with conventional/Western medicine (Reference no. 24).

Total 5 researches used more than 2 combined therapies with acupuncture. 3 research used acupuncture, herbal medicine and moxibustion therapy (Reference no. 4, 16, 19), 1 research used acupuncture, herbal medicine and fumigation therapy (Reference no. 18), and 1 research used acupuncture, moxibustion therapy and cupping therapy (Reference no. 14).

## **2) Acupuncture points for Treatment**

### **(1) Utilized acupuncture points**

According to the researches, selection of local acupuncture points over extremities was effective. 1 research used LI 4 as single acupuncture point (Reference no. 9). 4 researches used EX-B2 point (Reference no. 3, 8, 11, 24).

Most commonly used acupuncture point was LI 11, followed by LI4, ST36, LR3, TE/SJ5, SP6, EX-UE9.

## **(2) Multiple acupuncture utilization**

Each research used minimum of 1 acupuncture point and maximum of 19 acupuncture points. LI11, LI4, ST36, SP6 were mostly used and proven effective.

## **3. Evaluation methods**

Except 2 researches (Reference no. 4, 26), all 25 researches used subjective symptomatic improvement as evaluation methods. 10 researches (Reference no. 1, 2, 3, 6, 20, 21, 22, 23, 24, 25) evaluated based on participant's level of improvements after treatment in order to establish effectiveness. Level of improvements were classified based on subjective sensation of improvement, recurrence of symptoms and potential improvement.

1 research (Reference no. 5) evaluated based on participants' subjective recognition of CHFF frequency, alteration of tactile sensation and pain.

6 researches (Reference no. 5, 9, 12, 16, 17, 27) used VAS (Visual Analog scale), SF-MPQ (Short Form McGill Pain Questionnaire) grading scale, NRS (Numeric Rating Scale), survey and diary to record frequency, duration, and severity of symptoms as evaluation methods.

15 researches (Reference no. 4, 5, 8, 10, 11, 12, 15, 16, 17, 18, 19, 20, 22, 24, 26) evaluated body temperature, changes in skin color, and vascular perfusion.

7 researches (Reference no. 4, 5, 7, 8, 10, 12, 16) used changes in body temperature as main evaluation, and 5 of these researches (Reference no. 4, 5, 12, 16, 17) used DITI (Digital Infrared thermal Imaging) as evaluation tool.

6 researches (Reference no. 8, 10, 11, 15, 18, 19) focused observation on skin color changes, and 1 of these research (Reference no. 19) used photography in order to compare/evaluation.

3 researches (Reference no. 20, 22, 24) evaluated effectiveness of treatment via measuring changes in vascular perfusion.

2 researches (Reference no. 17, 26) used local CST (Cold Stress Test) to measure recovery time of local body temperature,

Other researchers used microscope to observe capillaries (Reference no. 24), followed changes in cytokine level before and after treatment in order to check relationship with pain (Reference no. 9).

#### **4. Treatment results/outcome**

All studies confirmed improvements in participants' symptoms. (Table 1.2)

Statistically significant change was confirmed in 6 randomized controlled clinical studies and 2 uncontrolled clinical studies.

In all 19 case studies, improvement of symptoms was confirmed.

#### IV. DISCUSSION

Cold Hypersensitivity of Hands and Feet (CHHF) not only deteriorates the quality of life due to the inconvenience it causes, but is also associated with various diseases. In Korea, it has been found that poor circulation is related to uterine fibroids, ovarian cysts, dysmenorrhea, and infertility, and in other countries, shoulder stiffness, fatigue, low back pain, headaches, etc. are related to poor circulation. Thus, it has been reported that not only symptomatic treatment, but also comprehensive treatment for the health of patients with poor circulation is necessary.

From the year 2000, large numbers of clinical and treatment researches related to specific characteristics of patients with CHHF began to be conducted. There were various treatment approaches that were taken into consideration, as well as diagnostic methods. The systematization of specific characteristics of CHHF were recognized in some extent. Hence, this suggests researchers shifted interests from mere therapeutic purpose to exploring effectiveness of various treatment methods.

Cold hypersensitivity of Hands and Feet is a commonly complained Cold Symptom, Although CHHF itself is not considered as a specific disease, vast numbers of patients complained of discomforts in daily activities and preferred Oriental medicinal treatments.

This meta-analysis collected, studied, and reviewed recent CHHF researches in order to investigate different treatment methods and their results clinically.

The purpose of this study is to provide data that can be utilized in clinical practices in order to easily understand the efficacy of treatment by analyzing previously conducted multiple

clinical researches, that has been believed to be useful in individual clinical practices.

In order to search clinical researches, following online websites were selected:

Research Information Sharing Service (RISS),  
Korean Medical Database (KMBASE),  
Korean Traditional Knowledge Portal (KTKP).  
Pubmed,  
National Discovery for Science Leaders,  
Embase,  
Cochrane Library,  
Sciencedirect,  
Google scholar

For the CHHF search words, the research considered other similar word that may describe and represent CHHF, thus Cold Symptom was included in search words. For Clinical researches, comparison of before and after, RCT and non-RCT were included.

Through review of literature, total 27 researches were selected; 19 Case studies, 6 RCT, and 2 non-controlled studies. 14 researches used Regular acupuncture needle, followed by 5 researches with Warm needling, 4 researches with electro-acupuncture needle, 3 researches with pharmaco-acupuncture needle, 2 researches with ear acupuncture, and 1 research with burning acupuncture. Upon reviewing treatment methods, 14 researches used acupuncture as sole treatment.

Warm needling treatment process follows attachment of moxibustion stick over the needle handle after needle insertion on acupuncture point, thus generating both acupuncture stimulation and heat stimulation at the same time. This has often been considered as treatment of choice for CHHF. Burning needling treatment process entails, heating up the acupuncture needle

till red before insertion thus considered to be effective in fighting off coldness.

3 researches utilized Pharmaco-acupuncture needle. However, different liquids were used; Placenta, Dan Shen, and Apitherapy, for pharmaco-acupuncture, LI 4 and LI 11 were commonly used acupuncture points for pharmaco-acupuncture. Due to its limited numbers of pharmaco-acupuncture research, more numbers of clinical trials and researches are required in order to establish systematized standard treatments.

Most commonly used acupuncture point was LI 11 followed by LI 4, ST 36, LR 3, TE/SJ 3, SP 6, EX-UE 9. Acupuncture points over extremities were used rather than trunk area. LI 11 follows Hand Yangming Large Intestine meridian and known to treat headaches, high blood pressure, facial nerve palsy, hemiplegia, arm joint pain, elbow joint pain and other upper extremity diseases. ST 36 follows Foot Yangming Stomach meridian and used for headaches, high blood pressure, intestinal disorders, mental weakness and lower extremities diseases. LI 4 and LR 3 are considered as proximal selection of acupuncture point that showed improved recovery time after Cold Stress Test (CST) compared to distal selection of acupuncture points KI 10 and KI 2 which failed to show improved recovery time after CST. Four Gates are composed of LI 4 and LR 3. LI 4 is origin point of Hand Yangming Large Intestine meridian and LR 3 is origin point of Food Liver meridian. The combination of these two points control entire 12 meridians by controlling Qi and Blood of both Yin and Yang meridians. Thus Four Gates can treat Cold symptoms through adjustment of Qi and Blood stagnation via meridian communications.

From 27 researches that this study has review, LI 11, ST 36, LI 3, SP 6, LR 3 were the acupuncture points that were mainly used for CHHF treatments and showed positive results. Hence, theses points should be considered as main treatment acupuncture points in order to treat

CHHF symptoms in the clinical practices.

For evaluation of Cold Hypersensitivity of Hand and Feet (CHHF), frequency, recurrence and severity of subjective sensation of coldness have been evaluated. And as for the evaluation scale, NRS, VAS, SF-MPQ were used. Among 16 of the researches, changes in body temperature, changes in skin color, and vessel perfusion were evaluated. Although CHHF is considered as a disorder with strong subjective symptoms, it was noted that different objective evaluation scales were used. Especially objectively evaluating changes in body temperature and skin color changes can further strengthen effectiveness of treatments.

To summarize above mentioned information, based on previously conducted treatment researches, selecting and utilizing LI 11, ST 36, LI 4, LR 3 acupuncture points can effectively treat CHHF. However, this study merely focuses on analyzing different acupuncture treatments for CHHF, thus collected as much data as possible even through both simple case reports and uncontrolled clinical studies which limits this study.

CHHF is one of the commonly complained symptoms that increase interests in treatment methods but no standardized diagnosis and treatments has been established. Although limited in Oriental medical researches till present, specific acupuncture points utilized in CHHF treatment shows statistical effectiveness nonetheless. Thus, the researcher believes further Randomized Controlled studies will be actively conducted in the future.

## V. CONCLUSION

Through this meta-analysis on Cold Hypersensitivity of Hand and Feet of previously conducted studies, the following conclusions have been established:

1. There were 19 Case Reports on acupuncture treatment for CHHF, 6 Randomized Controlled Trials, and 2 Non-Randomized Clinical Trials.
2. For CHHF acupuncture treatment, 13 researches used acupuncture treatment only, 14 researches used herbal medicine, cupping therapy and conventional/Western medicine together. In Combination treatment, 3 researches of Acupuncture with moxibustion therapy and 3 researches of acupuncture with herbal medicine and moxibustion.
3. For Acupuncture treatment methods, regular acupuncture needle was most commonly used followed by Warm needling, Electro-acupuncture, Pharmaco-acupuncture, Ear acupuncture and Burning needling.
4. Most commonly used acupuncture points for CHHF treatment were LI 11, LI 4, ST 36, LR 3, TE/SJ 5, SP 6, EX-UE9.
5. Based on frequency of utilization and effectiveness, LI 11, ST 36, LI 4, LR 3 were the main acupuncture points.
6. Definitive diagnosis and research on specific characteristics of CHHF have been studies continuously, yet the data from large scaled studies on effectiveness is limited. Especially large scaled studies utilizing herbal medicine as treatment method. Hence there should be further standardized researches and studies should be conducted based on Oriental medical differential diagnosis and treatments in order to enhance treatment effectiveness.



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