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Review Article

## Acupuncture Treatment in Clinical Studies for Parkinson's Disease : A Literature Review



Soo Ah Sohn<sup>1</sup>, Kyoung Yun Lee<sup>1,\*</sup>, Chang Wan Kim<sup>1</sup>, Yu Jin Lee<sup>2</sup>

<sup>1</sup> Department of Acupuncture and Moxibustion Medicine, Dongsuwon Oriental Hospital, Suwon, Korea

<sup>2</sup> Department of Korean Medicine Rehabilitation, Dongsuwon Oriental Hospital, Suwon, Korea

### ABSTRACT

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#### Keywords:

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**Background:** Parkinson's disease is the second most common degenerative brain disease after Alzheimer's disease. This study reviewed clinical practice of acupuncture and moxibustion treatment for Parkinson's disease to assess the future direction of these treatments.

**Methods:** The literature search used 5 Korean Internet databases. The search terms were "Parkinson's disease." and "Parkinson (Korean)." 36 papers were selected: 27 case reports, 2 retrospective studies, 3 uncontrolled clinical trials, 3 randomized controlled trial, 1 non-randomized controlled trial.

**Results:** Filiform needles were used in most of studies. Pharmacopuncture, electro-acupuncture, and auricular acupuncture therapy were also used in combination with Filiform needles. The most commonly used basic acupoints for Parkinson's disease was *Saamchimbeop*. The most commonly used form of pharmacopuncture involved Bee-venom.

**Conclusion:** It is expected that treatment of Parkinson's disease with a variety of acupuncture and moxibustion therapies will continue to be studied, in addition to treatments that utilize existing Filiform needle treatments in clinical practice.

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### Introduction

Parkinson's disease is the second most common degenerative brain disease after Alzheimer's disease. The major symptoms are resting tremors, bradykinesia, and rigidity. The pathology is that of a neurological degenerative disease of the nervous system that produces characteristic symptoms along with the loss of dopamine neurons in the substantia nigra. There are several suspected causes of Parkinson's disease, but none have been proven. In addition to motor symptoms listed, non-motor symptoms play a major role in reducing the patients' quality of life caused by sleep problems, emotional disorders, impaired cognitive function, pain and fatigue. Whilst the drug Levodopa is known to be the most potent drug to decrease symptoms of Parkinson's disease, it causes dysplaxia and on-off syndrome associated with long-term use [1].

In Korean medicine, Parkinson's disease is similar to tremor, a convulsive disease, where convulsions, stiffness and tension in the limbs inhibit normal bending and stretching, hemiplegia of wind stroke, bowel stroke (a serious form of wind stroke with onset of

fainting), hemiplegia, distortion of the face and dysphasia [2].

In Korea, there has been an analysis of intervention studies for Parkinson's disease [3] and a review of acupuncture and moxibustion for the treatment of Parkinson's disease [4]. In China, research into oriental medicine treatments for Parkinson's disease has also been reported [5,6]. Recently, a handbook was published by the Korean Acupuncture and Moxibustion Medicine Society, commenting on the high level of interest that is given to drugs for the treatment of Parkinson's patients, and addresses the limitations of Western drug treatments [7].

This current study was worked in a hospital specializing in collaborative treatment of Korean and Western medicine, in close cooperation with the Neuropathy department of the Western Medical Hospital, where background knowledge of Korean Medicine treatment used for Parkinson's diseases was needed to cure neurological inpatients with Parkinson's disease. Acupuncture and moxibustion treatments for Parkinson's disease used in clinical practice throughout this review were assessed.

\*Corresponding author.  
Department of Acupuncture and Moxibustion Medicine, Dongsuwon Oriental Hospital, Suwon, Korea  
E-mail: [janus6970@gmail.com](mailto:janus6970@gmail.com)

## Materials and Methods

The literature search used 5 Korean internet databases (www.ndsl.kr, www.riss.kr, www.koreantk.com, kiss.kstudy.com, oasis.kiom.re.kr). The search terms were “Parkinson’s disease” and “Parkinson (in Korean).”

A total of 89 domestic studies on Parkinson’s disease were retrieved; 39 publications were excluded initially (4 papers without text, 25 in vivo or in vitro experimental studies, 5 reviews, 1 literature review, 4 surveys), with a further 14 being excluded from the study (2 without a Parkinson’s disease diagnosis, 7 without mention of acupuncture, 2 had additional symptoms, 3 focused on other diseases) leaving 36 publications to review.

This review included studies of acupuncture treatment performed on Parkinson’s patients and 36 case reports that were retrospectively analyzed, uncontrolled clinical trials, randomized controlled trials (RCT), and non-randomized controlled trials (nRCT, Fig. 1).

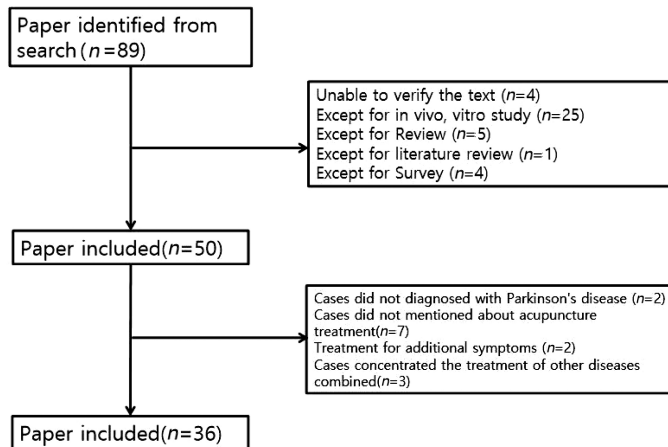


Fig. 1. Flow chart of the trial selection process.

## Results

### Classification by year

Since the first case report was published in 2001, there have been further publications of annual case reports of Parkinson’s disease. However, RCT’s have not been published since 2007 (Table 1).

### Classification according to the type of needle used for treatment

Among the 36 studies, 34 used Filiform needles, 12 used pharmacopuncture and 1 used intradermal needles. Pharmacopuncture and intradermal needles were used in conjunction with Filiform needles which were not used alone (Table 2).

### Analysis according to needle type

#### Filiform needle

\* Classification according to acupuncture method

In a literature review by Park et al [2], they reported both sides of Zusanli (ST36), Yanglingquan (GB34), Sanyinjiao (SP6), Taichong

Table 1. The Result of Searching Parkinson Disease and Acupuncture Treatment.

Year	Case report	Respropective study	Uncontrolled clinical trial	RCT	nRCT
2017	3	1	0	0	0
2016	6	1	0	0	0
2015	2	0	0	0	0
2014	1	0	0	0	0
2013	3	0	0	0	0
2012	2	0	0	0	0
2009	1	0	0	0	0
2007	4	0	0	2	0
2006	0	0	0	1	0
2005	1	0	2	0	0
2004	1	0	1	0	0
2003	1	0	0	0	1
2001	2	0	0	0	0
Total	27	2	3	3	1

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

Table 2. The Result of Classification According to the Type of Needle Used for Treatment.

Treatment	n (%)
Filiform needles,	34 (94.4)
Pharmacopuncture	12 (33.3)
Intradermal needle	1 (2.77)

(LR3), Hoku (LO4), Quchi (LI11), Waiguan (TE5), Fengchi (GB20), Shuigou (GV26), and Xiaguan (ST7) as the basic acupoints of Parkinson’s disease. In 2018, basic acupoints of Parkinson’s disease were presented by the Korean Acupuncture and Moxibustion Medicine Society: Taichong (LR3), Hoku (LO4), Fengchi (GB20), Waiguan (TE5), Quchi (LI11), Yanglingquan (GB34), Zusanli (ST36), Sanyinjiao (SP6), and Xiaguan (ST7) [7].

Of the 34 studies that used Filiform needles for treatment, studies were divided according to treatment by either; only 1 acupuncture method, or 2 or more acupuncture methods combined, and presented in Table 3.

In 14 studies, additional meridians were used depending on the symptoms above basic acupoints of Parkinson’s disease. Eight out of 10 papers used *Saamchimbeop* according to the constitution of the patient. In addition, there was 1 use of Visceral Pattern Identification, 2 cases based on Meridian and Collateral and 1 case based on 8 Constitutional acupuncture therapies.

A total of 4 cases were used in combination with 2 methods. Two cases where *Saamchimbeop* was used together with the basic meridians, and 1 case using Master Tung’s acupuncture treatment in addition to the basic meridians. There was 1 case that the Trigger point was used with *Saamchimbeop*.

Table 3. The Result of Classification According to the Type of Acupuncture Method.

Treatment	Number
Using only one Acupuncture method	
Basic Acupoints of Parkinson's disease	14
<i>Saamchimbeop</i>	8 (according to the 4-Constitution Medicine) 2 (according to the other reasons)
Visceral Pattern Identification	1
Meridian and Collateral	2
8 Constitutional Acupuncture Therapy	1
Treatment	Number
Combination with two methods	
Basic Acupoints of Parkinson's disease with <i>Saamchimbeop</i>	2
Basic Acupoints of Parkinson's disease + Master Tung's Acupuncture Treatment	1
<i>Saamchimbeop</i> with Trigger Point	1
Comparitive studies (used basic acupoints of Parkinson's disease and <i>Saamchimbeop</i> )	2

\* Classification of well used acupoints (Table 4).

Table 4. The Result of Well Used Acupoints for Commonly Used.

Acupoint	Number	Acupoint	Number
Zusanli (ST36)	16	Gongsun (SP4)	1
Taichung (LV3)	15	Shangguan (GB3)	1
Hoku (LO4)	14	Jingqu (LU8)	1
Yanglingquan (GB34)	13	Fuliu (KI7)	1
Baihui (GV20)	12	Taibai (SP3)	1
Quchi (LI11)	10	Taixi (KI3)	1
Sanyinjiao (SP6)	7	Dicang (ST4)	1
Fengchi (GB20)	6	Shangxing (GV23)	1
Waiguan (TE5)	4	Fengshi (GB31)	1
Xuanzhong (GB39)	3	Weichong (BL40)	1
Houxi (SI3)	2	Chengjin (BL56)	1
Chengjiang (CV24)	2	Chengshan (BL57)	1
Zhongzhu (TE3)	2	Neiguan (PC6)	1
Jianjing (GB21)	2	Tianshu (ST25)	1
Zulinqi (GB41)	2	Lianquan (CV23)	1
Shuigou (GV26)	2	Fenglong (ST40)	1
Xiaguan (ST7)	2	Zhaohai (KI6)	1
Zhongwan (CV12)	2		

\* Classification of using *Saamchimbeop*

Eight of the 10 papers using *Saamchimbeop* alone were based on 4-Constitution Medicine. On a constitutional basis, *Shinjungkyuk*, *Biseungkyuk* for a Lesser yang person was used, in addition *Bijungkyuk*, *Ganseungkyuk* for a Greater yin person was used. Other acupoints were added or *Saamchimbeop* itself was applied. Otherwise, Visceral Pattern Identification was used, or *Simpojungkyuk* according to historical old literature about Chinese medicine was performed.

\* Other methods of acupuncture

Patients were diagnosed based on the 4-Constitution Medicine, but there were occasions when they used Meridian and Collateral rather than *Saamchimbeop*. In the study of the effects of Electro-acupuncture, confluence points of the 8 vessels were used. In addition, there was a case in which the patient was diagnosed with yang deficiency and the Governor Vessel (GV) was used. There was 1 case that used 8 Principle Pattern Identification.

\* A study on the acupuncture treatment effect of Parkinson's disease

There were 4 comparative studies of acupuncture treatment. One was a nRCT, 1 paper that established a control group and compared the effects with the acupoints in use. And the other 2 papers studied the treatment effects and heart variation in 3 groups: control group basic meridians, *Saamchimbeop* based on 4-Constitution Medicine.

**Pharmacopuncture**

Type of pharmacopuncture

Pharmacopuncture commonly used Bee-venom (0.1 to 0.3 mL per acupoint) which is known to have neuro-protective effects (Table 5).

Table 5. The Result Type of Pharmacopuncture Used to Treatment.

Pharmacopuncture	Number
Bee Venom Pharmacopuncture	7
Hominis Placenta Herbal Pharmacopuncture	3
<i>Hwangrynhaedoktang</i> Pharmacopuncture	1
<i>Samgi-Halleak</i> Pharmacopuncture	1
<i>Jungsongouhyul</i> Pharmacopuncture	1

Well used acupoints for pharmacopuncture

The acupoints for which pharmacopuncture was primarily used are shown in Table 6.

Acupuncture treatment according to method of stimulation

Three studies used Electro-acupuncture.

Acupuncture treatment according to stimulating part of the body

Auricular acupuncture therapy was used in 1 study and Scalp acupuncture therapy was used in 5 papers.

**Moxa treatment**

A total of 9 papers utilized Moxa treatment, of which only 2 have

Table 6. The Result of Well Used Acupoints for Pharmacopuncture.

Acupoints	Number
Fengchi (GB20)	8
Quchi (LI11)	7
Yanglingquan (GB34)	7
Zusanli (ST36)	7
Taichong (LR3)	6
Neiguan (PC6)	1
Lianquan (CV23)	1
Yamen (GV15)	1
Guanyuan (CV4)	1
Jianyu (LI15)	1
Shenshu (BL23)	1
Qihai (BL24)	1

used Moxa treatment independently. The 7 papers were combined with acupuncture treatment.

#### The type of Moxa treatment

Direct moxibustion, indirect moxibustion and Wang-tteum (indirect burning moxa of large amounts of mugwort inside the instrument) were widely used in 7 papers.

#### Well used acupoints for Moxa treatment

Two cases used Meridian and Collateral like Governor Vessel (GV), and Conception Vessel (CV). There were studies that used Zhongwan (CV12), Guanyuan (CV4) with the commonly used basic acupoints of Parkinson's disease.

### Discussion

Acupuncture treatment for Parkinson's disease is the most widely known method of alternative treatment. In Korea, 76% of Parkinson's patients receive complementary alternative medicine, and of those, 62.8% receive acupuncture treatment [7].

Among the 36 publications selected for this study, there were 34 that used Filiform needles. The basic acupoints for Parkinson's disease were the most commonly used acupoints, with Zusanli (ST36), Taichong (LR3), Hoku (LI4), Yanglingquan (GB34), Baihui (GV20), Quchi (LI11), Sanyinjiao (SP6), Fengchi (GB20), and Waiguan (TE5) used in order of preference (Table 4).

Amongst the Korean publications, the study by Park [2] in 2004 was the first to refer to Parkinson's disease. Examination of historical Korean and Chinese literature suggest Baihui (GV20), Fengchi (GB20), and Dazhui (GV14) of the head, Zhongwan (CV12) and Chonchu (ST25) of the abdominal region, Shuigou (GV26), Xiaguan (ST7), Tongziliao (GB1), Dicang (ST4), and Yingxiang (LI20) of the face, Hoku (LI4), Quchi (LI11), Waiguan (TE5), Houxi (SI3), Shaohai (HT3), Jianyu (LI15), and Yanglao (SI6) of the upper part of body, and Zusanli (ST36), Yanglingquan (GB34), Sanyinjiao (SP6), Taichong (LR3),

Yongguan (KI1), Huantiao (GB30), and Weichong (BL40) of the lower part of the body. They also recommended Yundongqu, Wudaozhenchankongzhiqu, and Yuntingqu for Scalp acupuncture therapy and Electro-acupuncture, moxa treatment, and pharmacopuncture.

Trials published prior to 2004, tried various acupuncture treatments with more diverse reasons. In 2001, Kim et al [8] considered Parkinson's disease as a diagnosis for patients who had tremors that were more severe during rest and who experienced a sleeping disorder. Filiform needles were used at Baihui (GV20), Hoku (LI4), Quchi (LI11), Taichong (LR3), Zusanli (ST36), Yanglingquan (GB34), Sanyinjiao (SP6), Zhaohai (KI6), and Neiguan (PC6) on both sides. This was based on Korean medicine treatment for tremor.

In 2001, Oh et al [9] highlighted the difficulties of finding research on Parkinson's disease. 8 Principle Pattern Identification was used, focusing on pulse diagnosis and response to acupuncture treatment, and was the basis for the diagnosis. *Gibonbang*, *Janggyeyeomjeoungbubang*, *Jungsinsububang* of 8 Principle Pattern Identification for constipation, tremor, low back pain, and joint pain were used.

Lee et al [10] in 2003 treated drug-induced Parkinson's disease that occurred after taking medicine that was comprised of Matoclopramide and Levosulpiride. Hoku (LI4), Taichong (LR3), Zhongwan (CV12), Fenglong (ST40), Lianquan (CV23), Zusanli (ST36), Yanglingquan (GB34), Fengchi (GB20), and Baihui (GV20) were used as indicated by text in "Acupuncture and Moxibustion."

In a case study by Hong et al [11] in 2004, Parkinson's disease was diagnosed in patients as yang deficiency. acupuncture therapy on the Governor vessel was used on the grounds of stiffness of vertebrae. The Governor vessel is a reflection of a human's yang qi and a disease of it that causes the spinal cord to move inconveniently because it travels through the middle of the spine. Changqiang (GV1), Yaoshu (GV2), Yaoyangguan (GV3), Mingmen (GV4), Xuanshu (GV5), Jizhong (GV6), and Zhongshu (GV7) were chosen and moxa treatment used at the same acupoints for a more powerful therapeutic effect. The joints of the lower limbs reacted a little faster than those of the upper limbs.

The most frequently used acupuncture after the basic acupuncture point, was the *Saamchimbeop*. There were 8 of the *Saamchimbeop*, which were used independently in 10 studies that treated patients using 4-Constitution Medicine.

In a case using the 4-Constitution Medicine, patients were found to be mainly Lesser yang people, with mostly *Shinjungkyuk* and *Biseungkyuk*. Park et al [12] diagnosed Parkinson's symptoms as a person with Greater yin, but there was no improvement in symptoms following treatment and the patient was diagnosed as a Lesser yang person where *Shinjungkyuk*, *Biseungkyuk*. were used. They saw benefits not only on bradykinesia, but also for other symptoms such as constipation and thirst, that had reduced their quality of life. And Park et al [13] reported that by using *Shinjungkyuk* and *Biseungkyuk* showed efficacy on basic symptoms and depression in Lesser yang person patients with Parkinson's disease. In 2016, Park et al [14] gave long-term treatment (1 to 3 years) for a Lesser yang patient with Parkinson's disease. They reported that on-off symptoms did not show up in parallel with medicine taken in conjunction with *Shinjungkyuk*, *Biseungkyuk*. Symptoms did not progress, and the side effects from the medicine were mitigated through Korean therapy. In 2016, Kwak et al [15] also used *Shinjungkyuk* and *Biseungkyuk* for Parkinson's patients who complained of chronic abdominal pain and constipation. In case of Greater yin people, it showed a more diversified treatment trend.

In 2013, Lee et al [16] used *Pyejungkyuk* and *Ganseungkyuk*, based on lack of lung function and increased liver function as the characteristics of a Greater yin person. Lee et al [17] first diagnosed Parkinson's disease patients with orthostatic hypotension in 2016 as Lesser yang people, and reported that the patient did not benefit after using *Shinjungkyuk*, and that they diagnosed him as a Greater yin person again, used *Pyejungkyuk* and *Ganseungkyuk*, and reported that symptoms had improved. In 2012, Choi et al [18] used *Shinjungkyuk* based on the effect of relieving muscle stiffness and tremor on patients diagnosed as Greater yin people.

Han et al [19], who reported in 2013, also used 12 acupoints that applied *Ganseungkyuk* for 1 case of Parkinson's diagnosis. For *Ganseungkyuk*, they used supplementation of Jingqu (LU8), Zhongfeng (LR4) and draining of Shaofu (HT3), and Xingjian (LR2). They found the reason for using *Ganseungkyuk* was that liver was associated with muscles, and tremor was also responsible for liver wind, and that this over-promoted tremor was excess syndrome. Therefore, it was judged that *Ganseungkyuk* was capable of suppressing excess syndrome.

In addition, Kim et al [20] in 2005 reported a case acupuncture treatment in parallel with *Chuna* treatment. The acupoints of the Heart meridian (HT) and Pericardium meridian (PC) on the basis of "*Chimgugapeulgyong*" - One of the 2 examples was left *Shimpojungkyuk*. It showed a decrease in UPRDS (unified Parkinson's disease rating scale), which is a clinical measure of Parkinson's disease in patients. In 2017, Kim et al [21] used both *Shimjungkyuk* and Chengjiang (CV24), Lianquan (CV23) for Parkinson's disease patients because they had diagnosed patients as qi and blood deficiency, heart qi deficiency.

Four papers that used 2 acupuncture treatments at the same time appeared from 2007 and later. It was performed when 2 acupuncture treatments were being used at the same time, and when other diseases were being treated in combination, for additional symptoms.

In 2007, Yim et al [22] used other acupuncture techniques in the morning and afternoon, for Parkinson's disease patients who suffered from epileptic seizures. They diagnosed liver-kidney yin deficiency and used basic acupoints in the morning and *Shinjungkyuk* based on *Saamchimbeop* in the afternoon.

Koo et al [23] also used basic acupoints and Master Tung's acupuncture treatment every other day for Parkinson's patients with pons infarctions. Use of basic acupoints aimed to generally improve Parkinson's disease, and combined with Master Tung's acupuncture treatment, digestive functions (nausea and vomiting) were restored. Zhenjing was used for nervous system disorders and the paralysis of the extremities, Shuijin and Shuitong were used for coughing and vomiting, Menjin and Sihuzhong were effective for the treatment of digestive tract disorders, and Neiguan (PC6) could also treat internal injuries and digestive disorders. In this case, the Parkinson's drug prescribed was discontinued due to persistent nausea and vomiting. The patient improved considerably with concurrent treatment of herbal medicine and basic acupoints and Master Tung's acupuncture treatment.

In 2007, Chu et al [24] reported that Parkinson's disease patients were spleen deficiency and dampness-phlegm. In the morning, *Bijungkyuk*, *Shinjungkyuk* of *Saamchimbeop* was taken, and in the afternoon, acupuncture for Trigger points of Trepezius muscle, facial muscle, and Sphenus Cerevis, Sphenus Capitis were used. The reason for using the Trigger Point was not specified.

In 2007, Kim et al [25] used basic acupoints for Parkinson's disease and also applied acupuncture to Yanglingquan (GB34), Weizhong (BL40), Chengjin (BL56), Chengshan (BL57), Sanyinjiao (SP6) to treat leg weakness and numbness.

There were research papers on the therapeutic effects of Korean

Medicine treatments such as acupuncture, electro-acupuncture therapy and moxibustion until 2007.

In 2003, Ha et al [26] reported a non RCT report on the therapeutic effects of acupuncture to Parkinson's disease. The report examined the degree of improvement in Parkinson's disease by dividing the number of patients who have been hospitalized for outpatients into 2 groups, 1 was stopped from taking drugs and the other was stopped from taking drugs for 3 months. Acupuncture treatment has been added to Zhongwan (CV12), Chonchu (ST25), Houxi (SI3), Baihui (GV20) in addition to main acupoints as Zusanli (ST36), Yanglingquan (GB34), Sanyinjiao (SP6), Taichong (LR3), Hoku (LI4), Quchi (LI11), Waiguan (TE5), Fengchi (GB20), Shuigou (GV26), and Xiaguan (ST7). The acupuncture therapy group that took the drug showed significant effects in terms of side effects. Furthermore, in 2004, Kang et al [27] reported the effect of treating 33 patients with Electro-acupuncture without a control group. Based on confluence points of the 8 vessels, they selected acupoints on the basis that Houxi (SI3) and Shenmai (BL62) belong to Greater yang meridian and are related to motor organ disease in the human body. They reported a turnaround in additional symptoms such as sleep disorders, appetite, and gastrointestinal symptoms that affect the quality of life.

In 2005, Park et al published 2 papers on the effects of moxibustion treatment with uncontrolled clinical trials, and 29 patients received 5 Moxibustions each Baihui (GV20), Zhongwan (CV12), Zusanli (ST36), Ganshu (BL18), Pishu (BL20) in 8 weeks. Patients reported positive outcomes with reduced symptoms such as nausea, vomiting, sleep disorders and orthostatic dizziness [28]. Significant decrease in the scores of UPRDS, a clinical measure of Parkinson's disease, and decrease in the number of heart beats affecting sympathetic and parasympathetic nerves in the autonomic nervous system have been found to increase autonomic nervous system function. Parkinson's disease patients showed difficulties in developing autonomic nervous functions such as salivation and sweat. Patients who had moxibustion for 8 weeks showed signs of improvement in autonomic nervous functions [29].

In 2006, Jung et al [30] applied acupuncture treatment to Parkinson's disease patients in a randomized controlled trial. Taichong (LR3) and Yanglingquan (GB34) were selected on the basis of reports of neuroprotective effects on the nigrostriatal dopaminergic system through an experimental animal model of Parkinson's disease. The control group was compared with the experimental group in order to apply acupuncture needles 1 cun above Taichong (LR3) and 1 cun above Xuanzhong (GB39). The experiment group and the control group showed significant differences of UPRDS scores from the pre-treatment and post-treatment of acupuncture needles, but there was no difference between the experimental and control group, however, there were some shortcomings in the experiment as the points used in the control group were on the same meridian of the experimental group.

In 2007, Park et al [31] conducted a comparative study on the effects of acupoints used for acupuncture treatment through RCT research. In a study of 46 patients, Meridian acupuncture group was treated with Taichong (LR3), Yanglingquan (GB34), and Zusanli (ST36) by referring to the studies of the acupoints and Parkinson's disease animal models, and clinical research, of acupoints in the lower limb, as presented in the Korean medical literature review. The control group provided better support for the results as it did not use the same meridian as in the previous study [30]. They used a point positioned at the same height as acupoints of the therapeutic arm on a virtual line positioned between the meridians. They also set up a 4-Constitution Medicine treatment group and compared that to 2 other groups. They used acupoints

that were set up by the construction referring to “Nangyung” and “Naegyung” at “Iiyukhandam”. In conclusion, the 4-Constitution Medicine group showed a difference in UPRDS compared with the Meridian acupuncture group.

In 2007, Kim et al [32] measured and compared heart rate based on criteria as described by Park et al [31] for 36 Parkinson's disease patients. Both the Meridian acupuncture group and 4-Constitution Medicine group had significant results and found 4-Constitution Medicine group to be more effective. In the case of the acupuncture and moxibustion therapy for Parkinson's disease, there were no studies or comparative papers on patients after this. More comparative studies are expected to be required in the future.

In the case of Pharmacopuncture, it has been used intermittently since the first appearance of Pharmacopuncture in a case report in 2013, with Bee-venom being the most used.

Bee-venom pharmacopuncture can be used for all diseases that can be treated with acupuncture. It has excellent effects on musculoskeletal symptoms and is recommended for use in intractable diseases that do not improve with general treatment [33]. Research has been conducted on the neuroprotective effect of Bee-venom, and it has been reported that needle therapy with Bee-venom may be used to treat disorders caused by inflammation of the nervous system. In the case of Parkinson's disease, Park et al [34] and Kim et al [35] used Bee-venom pharmacopuncture as an anti-inflammatory treatment to suppress the destruction of the dopamine nerve cells in the animal model of MPTP-induced Parkinson's disease. Cho et al [36] used Bee-venom pharmacopuncture and acupuncture to improve the mobility of Parkinson's patients. In particular, the Bee-venom groups showed that Berg balance scale improved and walking time was reduced by 30 meters.

In 2013, Lee et al [16] injected 25% Bee-venom pharmacopuncture 0.1 mL into Taichong (LR3), Xuanzhong (GB39), Zusanli (ST36), and Yanglingquan (GB34). In 2014, Lee et al [37] injected 0.1 mL of Bee-venom pharmacopuncture diluted at 1:20,000 into Taichong (LR3), Yanglingquan (GB34), Zusanli (ST36), Quchi (LI11), and Fengchi (GB20) every other day for the basic acupoints for Parkinson's disease in 3 patients who complained about the imbalance in their attitudes. In 2015, Lee et al [38] performed Bee-venom pharmacopuncture into Jianyu (LI15), Fengchi (GB20), Shenshu (BL23), and Qihaihu (BL24) in order to treat the pain in the shoulders and back of Parkinson's patients using 0.1 mL each, but developed redness in the abdomen. In 2016, Lee et al [39] injected 5% Bee-venom pharmacopuncture into Hoku (LI4), Quchi (LI11), Yanglingquan (GB34), Taichong (LR3), and Zusanli (ST36) in early Parkinson's disease patients. Yang et al [40] placed the Bee-venom pharmacopuncture diluted with 1:20,000 distilled water in both Taichong (LR3), Yanglingquan (GB34), Zusanli (ST36), Quchi (LI11), and Fengchi (GB20) for 47 patients in a retrospective study. Yang et al [41] reported in his 2017 paper that the same Bee-venom pharmacopuncture had been used for the same acupoints, which was the same method used in the studies by Cho et al [36] and Doo et al [42]. Cho et al performed a single treatment, Bee-venom pharmacopuncture, and Doo et al performed acupuncture at the same time. Bee-venom pharmacopuncture was reported to have an effect on both studies in terms of improving motility compared to control groups. In Hartmann's study [43], they compared Bee-venom pharmacopuncture with a group injected with saline solution, and concluded that there were no significant differences between the 2 groups. However, there are many differences among the study, frequency and method of treatment of Yang et al [40]. In this study, an intracutaneous injection of Bee-venom pharmacopuncture was performed once a month. They gave a muscle injection of Bee-venom pharmacopuncture through

acupoints. The results showed not only regulation of the chemical and pharmacological effects of Bee-venom, neuroinflammation and microglial activation, but also suppressed dopaminergic neurons with apoptosis. They also found a beneficial effect of inserting Bee-venom pharmacopuncture into the muscle and physically stimulating acupoint using the principles similar to acupuncture treatment. In 2016, Kim et al [44] injected Bee-venom pharmacopuncture into drug induced Parkinson's disease patients once a day and *Jungsongohyul* pharmacopuncture was injected into both coagulation point of the iliopsoas muscle and gasrocnemius.

Hominis Placenta Herbal pharmacopuncture was also popular. It has the effect of increasing the body's resistance [45]. The use of Hominis Placenta Herbal pharmacopuncture was based on a report on the neuroprotective effect of the MPP+/MPTP-induced Parkinson's disease model [46]. Kwak et al [15] applied it to a Lesser yang patient, both Fengchi (GB20) and *Saamchimbeop*. When the patient complained of a stomach ache, they used Hominis Placenta Herbal pharmacopuncture and *Soyum* Herbal-acupuncture for Guanyuan (CV4). In 2017, Koh et al [47] used it for both Fengchi (GB20) and Lianquan (CV23). Kim et al [21] used it for Quchi (LI11), Fengchi (GB20), Neiguan (PC6), and Taichong (LR3) at 0.1 mL.

Ryu et al [48] used Yamen (GV15) for aphasia treatment and Fengchi (GB20) for stroke treatment with *Samgi-Halleak* pharmacopuncture. *Samgi-Halleak* pharmacopuncture was used to protect brain cells, known for its antioxidant and immune enhancement effects. Kim et al [49] injected *Hwangrynhaedoktang* pharmacopuncture into both sides of Yanglingquan (GB34) and Zusanli (ST36) separately.

In the case of Electro-acupuncture, in 2004, Kang et al [27] reported the effect of implementing Electro-acupuncture on Houxi (SI3) and Shenmai (BL62), but since then, it has not been widely utilized in other cases.

Lee et al [37] used Electro-acupuncture for 2 patients. It was used for 1 on both Hoku (LI4), Waiguan (TE5), Zusanli (ST36), and Xiajuxu (ST39), and the other who had symptoms of inclining to the left when walking treated on the left Hoku (LI4), Waiguan (TE5), Shousanli (LI10), Quchi (LI11), Zusanli (ST36), Xiajuxu (ST39), Sanyinjiao (SP6), and Taichong (LR3). In 2017, Kim et al [49] used a 2 Hz current for both Yanglingquan (GB34) and Zusanli (ST36). They combined with the treatment of Yanglingquan (GB34), which has the effect of relaxing sinews and vessel on abnormal movement symptoms.

In ancient China, there has been a record of Auricular acupuncture therapy using ears to cure disease as described in the literature. Paul Nogier, a French doctor, developed the Auricular appendage therapy as it is currently recognized. He systemized the distribution and location by observing the expression of the disease in the auricular acupoint, which is distributed to the ear when there is a physical disease [50]. It was the only study that was used in the Auricular acupuncture therapy that Kim et al [49] performed in 2017, where it was used on both Ershenmen and Neifenmi. Ershenmen, in particular, had the effect of opening the orifices, so it is commonly used for nervous system diseases such as insomnia and nervous breakdowns [51]. When Auricular acupuncture therapy is combined with Filiform needle therapy, it would be expected to be a more effective treatment for additional symptoms of Parkinson's disease such as indigestion and urinary disturbance. In addition to what has been reported so far, clinical applications for other acupoints are likely to be necessary in the future.

The basic theory of Scalp acupuncture is based on the cerebral cortical theory of Western medicine and applies the treatment of acupuncture in herbal medicine on the scalp. Jiaoshi

Scalp acupuncture therapy and Biaozhun Scalp acupuncture therapy are representative examples [52] Key acupoints, which Kim et al [6] in 2011, reported in a clinical study of Parkinson's disease in Chinese patients. Scalp acupuncture treatment, using MS6, MS4, MS8, MS9, MS14 of Biaozhun Scalp acupuncture therapy or Wudaozhenchankongzhiqu, Yundongqu, Ganjuequ of Jiaoshi Scalp acupuncture therapy. In Korea, a total of 5 case reports used Scalp acupuncture. It was used on Wudaozhenchankongzhiqu, Yundongqu of Jiaoshi Scalp acupuncture therapy [10,12,13,15,17].

Moxa treatment uses mugwort, which is effective for warming the body, and is known to be used for pain and paralysis for on-prevention and health effects [53] In the treatment of Parkinson's disease, Moxa treatment was used to raise the conditioning of a patient and to reduce additional complaints of inconvenience in addition to the main symptoms of Parkinson's disease.

Among the papers on Parkinson's disease patients, Park et al [28], who researched the effects of Moxa treatment on Parkinson's disease in 2005, used indirect moxibustion for Baihui (GV20), Zhongwan (CV12), Zusanli (ST36), Ganshu (BL18), Pishu (BL20). Moxa treatment was also used as Wang-tteum for Zhongwan (CV12), Guanyuan (CV4) and other reasons in order to strengthen the patient's momentum, and it was also used in a variety of other ways. In 2004, Hong et al [11] performed direct moxibustion at the same acupoints that were treated by Filiform needles, in order to obtain a stronger tonifying yang effect. In 2007, Yim et al [22] used moxa treatment for Zhongji (CV3), Qihai (CV6), and Guanyuan (CV4) of the conception vessel (CV) in Parkinson's disease patients who suffered from epileptic seizures. Kim et al [25] used Wang-tteum for Guanyuan (CV4) and moxa stick moxibustion for Yanglingquan (GB34), Xuanzhong (GB39) and Taichong (LR3). In 2012, Kim et al [54] used moxa treatment for Zhongwan (CV12) and Guanyuan (CV4), and Jung et al [55] used it for Guanyuan (CV4). In 2014, Lee et al [36] used Moxa treatment according to the patient's condition. A patient who complained about lower back pain was given direct moxibustion to Shangliao (BL31), Ciliao (BL32), Zhongliao (BL33), and Xialiao (BL34). Direct moxibustion has also been used on baxie for patients with trembling hands. For patients who leaned to the left while walking, it was used for Hoku (LI4), Waiguan (TE5), Shousanli (LI10), Quchi (LI11), Zusanli (ST36), Xiajuxu (ST39), Sanyinjiao (SP6), and Taichong (LR3) on the left side. In 2016, Kim et al [44] used direct moxibustion on the right side Rangu (KI2), Taixi (KI3), and Xuanzhong (GB39) for tremors in the right hand and foot.

## Conclusion

Firstly, a comparative study with other acupoints is required for basic treatment using acupoints for Parkinson's disease. Since 2007, there has been no control group study on acupuncture and moxibustion therapy for Parkinson's disease, with case reports being a major contributing factor in the literature. If comparative studies of the actual effectiveness of the basic treatment acupoints or other acupoints presented in other case reports were conducted, it would provide improved knowledge for the treatment of a variety of different types of Parkinson's disease.

Secondly, the relationship between the study that has already been conducted and the case report is insufficient. The basic treatment acupoints shown in the Handbook [7] is the most commonly reported, but other Electro-acupuncture, moxa treatment, Auricular acupuncture therapy, and Scalp acupuncture therapy were not widely studied so no conclusions could be made on their effectiveness. In addition, there were some papers that did not clearly state the reasons for their use. As mentioned above, it

is considered necessary to study the effects of acupoints, in clinical use.

Thirdly, accumulation of case utilizing various therapeutic methods is necessary. Research on Oriental herbal medicine for Parkinson's disease has been conducted in a variety of ways, but in acupuncture and moxibustion therapy, it was often treated as an auxiliary method. Acupuncture and moxibustion therapy may be beneficial for treatment of musculoskeletal pain caused by rigidity, which is one of the basic symptoms of Parkinson's disease.

Kim et al [56] recently treated Parkinson's patients with lower back pain with acupuncture treatment. Although they treated patients according to the general lower back pain treatment method, patients with Parkinson's disease reported positive effects on Parkinson's disease-related symptoms such as dizziness, anxiety and depression. Therefore, acupuncture and moxibustion therapy may be applied to not only major symptoms such as gait disorder but also additional medical symptoms such as constipation and insomnia.

For various acupuncture treatments, in the case of Scalp acupuncture, it would be difficult to use it in domestic clinical applications, such as the number of stimulation methods per minute or more than 30 minutes needle retention time, but Electro-acupuncture and Auricular acupunctures are expected to be fully utilized. In particular for Auricular acupuncture, the prophylactic effects may be of benefit. The needle-embedding method, which is a way to use Auricular acupuncture therapy, is commonly used for chronic diseases. Patients attach intradermal needles to the ear and press them several times daily by themselves to make the stimulus stronger [57] This will be a highly accessible treatment that will make it easier for patients to use at home under the guidance of doctors, when it is difficult to receive acupuncture due to the inability to visit hospitals frequently due to the worsening of Parkinson's disease and the difficulty of maintaining one's posture. Treatments for Parkinson's disease, such as drug therapy, are given in a passive way and accepted by patients. Parkinson's disease is a long-term progressive disease that has been treated for a long time. If active treatment methods like Auricular acupuncture therapy are studied and utilized that allow patients to participate and work on their own, it is expected that the therapeutic effects of Parkinson's disease and the quality of life of patients will increase.

It is expected that a variety of acupuncture and moxibustion treatments will be used in addition to treatments that utilize existing Filiform needle treatments in clinical practice.

## Conflicts of Interest

The authors have no conflicts of interest to declare.

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