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## Feature Article

## The use of acupuncture in patients with Parkinson's disease

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## ABSTRACT

Parkinson's disease, a progressive neuro-degeneration of multiple systems damaging motor and non-motor functions, affects individual and societal dimensions negatively. In addition to standard treatments, complementary and alternative medicine has been adopted, in which acupuncture, a traditional Chinese medical practice by needle penetration at specific stimulation points (acupoints) along the body, indicates positive outcomes in this illness. Apart from offering an overview of using acupuncture in Parkinson's disease, this literature review analyses the effects of acupuncture on Parkinson's-induced physical symptoms and mental problems such as slow movements, stiffness, constipation, and sleep disorders. In light of the 35 reviewed research projects in mainland China, Japan, Korea, Taiwan, and the United States of America, this study reveals the optimization of this approach through combined therapy and its preventive contribution using acupuncture alone. It also suggests research and practical implications that hint at enhancements in medical applications.

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## Introduction

In every hundred thousand people, 4.5–19% are suffering from Parkinson's disease.<sup>1</sup> Dorsey et al<sup>2</sup> warned that people with this illness over 50 years old in 15 major countries might increase to 9.3 million by 2030, including the United States of America, the United Kingdom, Germany, France, China, Japan, and Brazil. Heavy financial demands are placed on patients and their families by treatments and services, incurring over US\$14 billion annually.<sup>3</sup> Worse, early-onset Parkinson's (before 40 years old) dampens human resources and productivity.

Parkinson's disease is a chronic, progressive neuro-degeneration of the nigrostriatal system<sup>4</sup> due to a loss of dopamine neurons in the substantia nigra pars compacta, and the existence of eosinophilic protein deposits (Lewy bodies) in the cytoplasm.<sup>5</sup> It occurs in the aging brain; therefore, most people with this illness are diagnosed after the age of 60 years and characterize geriatric syndromes such as delirium, sleep problems, and falls.

As a multisystem disorder with a complex of pathological vitiation, the major clinical symptoms of Parkinson's disease related to motor system include resting tremors, muscle rigidity,

and bradykinesia.<sup>6,7</sup> Impairments associated with non-motor system involve restless limb movements, dysphagia, fatigue, pain, hallucination, and psychological discomfort.<sup>8</sup> These symptoms produce not only movement difficulties (for example, gait abnormalities, and postural instabilities) but also affective problems (for instance, mood dysregulation, failure to recognize facial expressions, and verbal communication issues). Also, pre-motor symptoms, such as constipation<sup>9</sup> and hyposmia,<sup>10</sup> reduce life satisfaction among patients. A set of non-motor symptoms are connected with a cognitive-affective disorders, including sensory dysfunctions,<sup>11</sup> alexithymia,<sup>12</sup> depression and anxiety,<sup>13</sup> psychosis,<sup>14</sup> and sleep disturbances.<sup>15–17</sup> Moreover, autonomic dysfunctions are caused as well, such as gastrointestinal dysfunction, urinary tract dysfunction, and erectile difficulty.<sup>18,19</sup> These severely diminish quality of life for patients affected by Parkinson's disease.

The etiology of this neurologic disorder is weakly understood but is multifactorial, including internal and external factors. Genetic mutations are deemed related to familial and sporadic cases.<sup>20,21</sup> Environmental conditions include toxicants,<sup>22</sup> pesticides,<sup>23,24</sup> and occupational chemicals.<sup>25</sup> Aside from these critical domains, genetic–environmental interaction<sup>26</sup> and post-trauma<sup>27</sup> are also causes of Parkinson's disease.

Medications and surgical treatments involve a variety of pharmaceutical substances (for example, Levodopa) and inhibitors (adjunct drugs to pharmaceuticals in order to improve wear-off symptoms; for instance, catechol-O-methyltransferase),<sup>28–31</sup> anti-Parkinsonian drugs<sup>32</sup> (such as diphenhydramine), and neuro-surgery<sup>33</sup> or sub-thalamic neuro-stimulation<sup>34</sup> (for example, Deep Brain Stimulation, and Motor Cortex Stimulation). They result in

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better mobility, less dyskinesia, and improved daily life activities, bodily discomfort, and emotional health.<sup>35</sup> For rehabilitation, physiotherapy,<sup>36</sup> perceptual and speech training,<sup>37</sup> physical exercise,<sup>38</sup> occupational therapy,<sup>39</sup> and dance/movement therapy<sup>40</sup> have all been adopted. In addition, complementary and alternative therapy has been increasingly used with traditional Chinese medicine for Parkinson's disease, particularly in China and Korea<sup>41</sup>; for example, massage, taiji (or tai chi), and acupuncture.<sup>42,43</sup>

Acupuncture is a traditional Chinese medical practice first utilized about 3500 years ago.<sup>44</sup> It uses slender and sterile metal needles to penetrate varying acupoints (specific stimulation points) along 14 meridians<sup>45</sup> in order to activate nerve endings and brain functions.<sup>46</sup> Consequently it restores balanced, healthy life energy throughout the body when the *qi* flow circulates regularly.<sup>47</sup> Its effectiveness has been documented in ancient Chinese records.<sup>48</sup> With the aid of modern technology, electro-acupuncture and laser waves have begun to strengthen treatment outcomes. A set of 6–12 acupuncture needles is simultaneously inserted the depth of 4–25 mm into the acupoints for a period of time (usually from a few seconds to a few minutes), causing slightly tingling.<sup>49</sup> Evidence-based research approves the advantages of acupuncture in treating physical and mental illnesses, including pain,<sup>50</sup> various types of headaches,<sup>51</sup> stroke,<sup>52</sup> gastrointestinal diseases,<sup>53</sup> psychotic symptoms,<sup>54</sup> and addictive behavior.<sup>55</sup> Also, acupuncture combined with other therapies is not rare; for instance, it has been used in combination with Chinese medicine,<sup>56</sup> herbal drugs,<sup>57</sup> and Western pharmaceuticals.<sup>58</sup>

A body of research has reported the positive impacts of acupuncture on Parkinson's symptoms, such as delaying dopamine (DA) neuron depletion, ameliorating a dopaminergic (DA-ergic) system, increasing neuroprotective effects, improving the motor control network in the basal ganglia, attenuating oxidative stress, enhancing gait, and alleviating psychiatric symptoms.<sup>59–63</sup> Some scholars consider acupuncture as a neuroprotective approach<sup>47</sup> that may affect neurotrophic factors, cell death regulatory proteins, and anti-inflammatory proteins.<sup>64</sup>

Apart from using various methods of acupuncture for Parkinson's disease, including scalp acupuncture, body acupuncture, electro-acupuncture, combined acupuncture,<sup>65</sup> and Qin's eight-point scalp method,<sup>66</sup> practitioners also incorporate acupuncture into other methods such as cupping, reflexology,<sup>67,68</sup> and Western medicine,<sup>69</sup> reflecting the diversity of this approach.

This literature review serves two purposes. First, it offers an overview of using acupuncture in patients affected by Parkinson's disease. Second, the review of the articles provides an analysis of the effects of acupuncture on Parkinson's disease both through acupuncture alone and through integrated therapy, improving motor and non-motor impairments, autonomic symptoms, pre-motor dysfunctions, and mental disorders. It expands the usefulness of complementary and alternative medicine in coping with this illness, which offers more options for physicians and patients to tackle this syndrome.

## Research method

This study reviewed English and Chinese publications retrieved from 27 major online sources in ProQuest, including Biological Sciences, British Nursing Index, Medical Database, ProQuest Medical Library, PsycARTICLES, and PsycINFO, along with China National Knowledge Infrastructure (CNKI) and Taiwan Electronic Periodical Services (TEPS). The search process used a Boolean operator: "and".

In the English databases, by inputting "acupuncture" and "Parkinson's disease" in the "document title" and "identifier" fields separately, 58 and 32 pieces of potential literature were listed respectively. In the Chinese databases, 144 and 5 pieces of works

were listed on CNKI and TEPS respectively when "針灸" and "帕金森病" were used for the search.

The inclusion criteria included the following: first, they were peer-reviewed articles in scholarly journals; second, they were empirical studies (quantitative, qualitative, and mixed research); and lastly, they were full texts, including Online First publications. However, this review excluded duplications, literature reviews, book reviews, dissertations, editorials and commentaries, letters to editor, letters, case reports, and research notes.

Fifty-nine out of 239 researches were acquired in accordance with the inclusion criteria. A subsequent removal of inappropriate studies which meet the exclusion criteria resulted in 35 pieces of academic works ( $n = 17$  in English, and  $n = 18$  in Chinese) for a thorough review (Fig. 1).

## Findings and discussion

The 35 reviewed projects included 1701 participants in mainland China, Japan, Korea, Taiwan, and the United States of America, aged 35–84 years old. The demographical data were presented in Table 1. The results indicated the effectiveness of acupuncture on Parkinson's symptoms and related problems such as dysphagia, constipation, dyskinesia, fatigue, and mental disorders (Table 2).

Traditional acupuncture practices are used either alone or in other Chinese medical methods; for example, moxibustion, and Chinese drugs. Prevalent studies on integrating Chinese and Western medicine for Parkinson's disease have drawn the attention of medical practitioners.

### Using acupuncture alone

The neurological effects of acupoint GB34 (yanglingquan) on Parkinson's disease were manifested through activating the pre-frontal cortex, precentral gyrus, and putamen.<sup>82</sup> This acupoint is extensively employed to treatments for muscle stiffness, muscle atrophy, pain in knee, and emotional problems. Twelve patients with idiopathic Parkinson's disease and 12 healthy participants first underwent 5 min of sham acupuncture (a fake trial conducted by penetrating the skin with needles but not at targeted acupoints), followed by 5 min of venom acupuncture stimulation per session.<sup>82</sup>

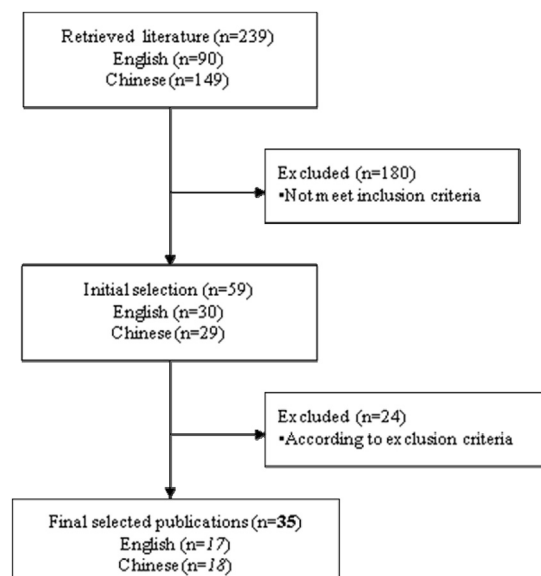


Fig. 1. Selection procedures.

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