ISSN: 2977-0033

Research Article

Journal of Clinical Research and Case Studies

The Efficacy of Neuropuncture™ Electrical Acupuncture Treatment of Patients with Parkinson's Disease

Tanja Brekke[1], Michael Corradino D[2], Patrick Conte J[3*] and Clete Linebarger T[4]

[1]Tanja Brekke is a licensed acupuncturist with a Master's degree in Oriental Medicine and Doctorate in Neuroscience Acupuncture, and practices in Bozeman, Montana at Traditional Oriental Medicine, Inc.

[2]Michael D. Corradino is a licensed acupuncturist with Master's degree and holds a Doctorate degree in Oriental Medicine and Doctorate in Neuroscience Acupuncture, and is the Creator and Founder of Neuropuncture, Inc.

[3]Patrick J. Conte is a medical doctor and is board-certified in Radiology and Nuclear Medicine, and holds a PhD in Ayurvedic Medicine, and a Doctorate degree in Neuroscience Acupuncture

[4]Clete T. Linebarger is a certified Chiropractic Physician at the Linebarger Chiropractic Center in Bozeman, Montana

Corresponding author

Patrick Conte J, Medical doctor and is board-certified in Radiology and Nuclear Medicine, and holds a PhD in Ayurvedic Medicine, and a Doctorate degree in Neuroscience Acupuncture, USA.

Received: June 12, 2025; **Accepted:** June 19, 2025; **Published:** June 26, 2025

ABSTRACT

The purpose of this study was to determine the neuro-rehabilitative effect on the dopamine-secreting neurons of the striata of the basal ganglia and the production of a neuroprotective effect that will reduce the symptoms of Parkinson's disease (PD) by applying a specific Neuropuncture™ electrical acupuncture prescription. Electrical stimulation of acupuncture needles placed into the scalp and body transmits a specific electrical dosage that targets pathological neural tissue intended to neuro-modulate, neuro-regulate, and neuro-rehabilitate the nervous system back into homeostasis [1-3]. Parkinson's Disease (PD) is a neurodegenerative disease characterized by motor symptoms, such as rigidity, resting tremors, gait disturbance, bradykinesia, and postural instability. Non-motor symptoms are associated with signs of autonomic dysfunctions, such as anosmia, fatigue, insomnia, depression, anxiety, frequent urination, cognitive impairment, and hallucinations [4,5]. The Participants who were clinically diagnosed with Parkinson's Disease were treated with electrical acupuncture and evaluated pre and post therapy utilizing the Unified Parkinson's Disease Rating Scale (UPDRS), which is the standard for rating the progression of the symptoms associated with PD. The UPDRS evaluation was performed pre-and post-therapy. A urinary neurotransmitter test from ZRT Laboratories was also obtained pre-and post-therapy to measure dopamine and tyrosine levels. The Neuropuncture™ electrical acupuncture prescription for Parkinson's disease was administered twice weekly for six weeks, totaling 12 treatments. There were improvements in the UPDRS scores in all the patients, and the urinary neurotransmitter tests showed stable or elevated levels of dopamine and tyrosine.

Thus, there was a positive correlation between the treatment using Neuropuncture™ electrical acupuncture's prescription for Parkinson's Disease and the pre-and post-therapy UPDRS evaluations for these patients. These findings support the treatment benefits of Parkinson's disease utilizing Neuropuncture™ electrical acupuncture and may be considered as an adjunct to current medical drug therapy.

Keywords: Parkinson's Disease (PD), Acupuncture, Electroacupuncture (EA), Neuropuncture™ Electrical Acupuncture, Basal Ganglia, Substantia Nigra (SN), DOPAMINE (DA)

Introduction

Clinical studies have demonstrated that electrical acupuncture application may be beneficial for PD patients, particularly in terms of ameliorating their symptoms, especially when combined with anti-PD medication, thus reducing the required dosage of medication and lessening associated side effects [6-12]. During the early stages of PD, it has been suggested that acupuncture may even be used to replace medication [13]. Researchers have found that acupuncture can protect dopaminergic neurons from degeneration via antioxidative stress, anti-inflammatory, and anti-apoptotic pathways, as well as modulating and restoring

Citation: Tanja Brekke, Michael Corradino D, Patrick Conte J, Clete Linebarger T. The Efficacy of Neuropuncture™ Electrical Acupuncture Treatment of Patients with Parkinson's Disease . J Clin Res Case Stud. 2025. 3(3): 1-7. DOI: doi.org/10.61440/JCRCS.2025.v3.76

the neurotransmitter balance in the basal ganglia circuit [6,8,11,14,15].

Neuropuncture™ electrical acupuncture is the only complete neuroscience acupuncture system developed by examining the research of the neurophysiological mechanisms of acupuncture, integrating the research of electrical acupuncture's effects on specific neural tissues while integrating all this within the holistic traditional TCM health model. The acupuncture points (acunodes) selected for the Parkinson's disease Neuropuncture™ electrical acupuncture prescription have been carefully researched and have been applied in this study. Research supports that when electro-acupuncture (EA) is applied to selected points at specific frequencies (Hz), neuroprotective effects occur by shielding dopaminergic neurons from degeneration via antioxidative stress, anti-inflammatory factors, and antiapoptotic pathways. This effect helps modulate the neurotransmitter balance in the basal ganglia circuit, protecting neurons from oxidative stress and inhibition of neuroinflammation which leads to increased striatal DA levels secreted by the par's compacta of the substantia nigra [6,8,9,11,13,16-20]. This study seems to support the hypothesis that the selected neuropuncture points with applied electrical stimulation will improve the signs and symptoms of patients afflicted with PD.

Method

Neuropuncture™ is a neuroscience acupuncture system using an FDA-approved electro-acupuncture device to electrically stimulate needles in the scalp and body. The Pantheon device delivers an electrical dose to target neural tissue, aiming to modulate, regulate, and rehabilitate the nervous system to restore homeostasis. The Neuropuncture™ electrical acupuncture prescription for Parkinson's Disease was instituted for each treatment (Table 1). After skin disinfection, needles were inserted into GB34, LR3, and Anmian bilaterally with EA all at 2-4 Hz millicurrent, and GV14 and GV20 with EA at 100 Hz millicurrent. The treatment duration was 30 minutes for each participant. (Table 1). The Pantheon Research Electrostimulator 8C Pro (Venice, CA, USA) was used for electrical stimulation. This device is an FDA-registered medical device specifically designed for electrical acupuncture that applies electrical stimulation to the acupuncture needles to transmit a specific electrical dosage. The Pantheon 8CPro delivers a bi-phasic square waveform. An important and distinctive aspect of this device is that it delivers a micro-calibrated current that does not change with the loss of battery power. Acupuncture needle brand: ACUFAST Sterile and disposable surgical stainless steel acupuncture needles, Gauge: 0.25 diameter x 40 mm and 0.25 diameter x 30 mm Length (10 needles per sterile bulk package, insertion tube is separate, Box of 1000 needles). Treatment was provided two times per week for six weeks, for a total of 12 treatments. Each treatment had needle retention and EA for 30 min. Each patient was checked at 15 min and asked if any adjustment to the voltage of electro-acupuncture stimulation device was needed. There were no changes in the Neuropuncture™ electrical acupuncture prescription for Parkinson's disease (Table 1). Treatment was provided in a private clinical setting. Lighting was low after needle insertion, soothing music was played, and each patient had a buzzer that, if pushed, would buzz a wristwatch worn by the provider in case of discomfort of the patient. Informed Consent was obtained from each patient before treatment commencement. Pre- and post-treatment, each patient was evaluated using the UPDRS (2008) and a urinary neurotransmitter test supplied by the ZRT Laboratory was also performed. Section III (Motor Examination) was performed pre- and post-treatment by an independent provider (CTL). The Neuropuncture™ electrical acupuncture Parkinson's treatment prescription was then performed. The patients selected were diagnosed with Parkinson's by a board-certified neurologist prior to treatment.

Two patients were treated-one female and one male patient

The 60-year-old female diagnosed with PD had a mild tremor in her right hand and reported noticeable changes in her handwriting. She also complained of insomnia and occasional forgetfulness. She was treated with Carbidopa-Levodopa 25-100. She was also treated with Levothyroxine 50ug for hypothyroidism. The prescribed treatment schedule was twice per week for six weeks.

The 79-year-old male diagnosed with PD in 2013, 10 years prior to Neuropuncture treatment. He presented with a resting tremor in both hands, which was more noticeable than the leg tremors, and spoke with a low voice. His posture was stooped, and he walked with shuffling steps with no noticeable hesitation. He reported that in the previous six months, he had experienced freezing while standing still before starting to walk but he did not experience freezing while walking. He also reported constipation, which was managed with fiber. Since his diagnosis, he had been treated with a Sinemet. Because this patient missed one week between weeks 2 and 4, the treatment was extended by 1.5 weeks to achieve the prescribed 12 treatments.

Results

The Neuropuncture™ electrical acupuncture prescription for Parkinson's Disease was followed. After disinfection of the skin, needles were inserted into GB34 (Yanglingquan), LV3 (Taichong), Anmian ("Peaceful Sleep"), Du20 (Baihui), and Du14 (Dazhui) (Table 1).

Table 1: Neuropuncture™ electrical acupuncture Parkinson's disease Prescription

Point	PinYin	Location	Insertion
GB34	Yanglingquan	In the depression anterior & inferior to the head of the fibula	Perpendicular 0.5-1.0 inch
LR3	Taichong	On the dorsum of the foot, in the depression distal to the junction of the 1st & 2nd metatarsal bones.	Obliquely about 0.5-1.0 perpendicularly 0.3-0.5 inch
Anmian	"Peaceful Sleep"	Midpoint between SJ17 (Yi Feng) and GB20 (Feng Chi).	Obliquely about 0.5-1.0 inches
Du20	Baihui	On the midline of the head in line with the apex of the ears, it centers the crown of the head.	Obliquely, thread the needle through the subaponeurotic space 0.3-0.5 inches

Du14	Dazhui	Below the spinous process of the 7th cervical vertebra, approximately at the level of the shoulders.	Needle in between the two spinous processes about 0.5-1.0-1.5 inches.
Electroacupuncture	GB34-LR3: 2-4 Hz milli	Anmian (B): 2-4 Hz milli	Du14-Du20: 100 Hz milli

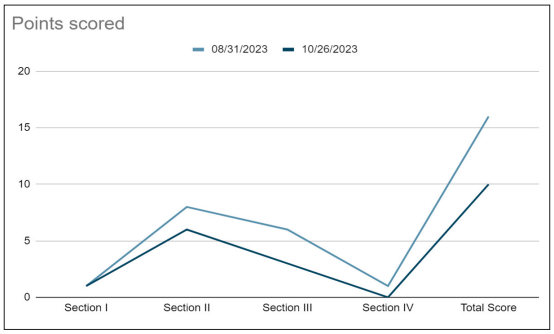
The electrical dosage was 2-4 Hz millicurrent on GB 34 (Yanglingquan) and LV3 (Taichong), as well as on Anmian ("Peaceful Sleep") bilaterally, and separately 100 Hz millicurrent on Du20 (Baihui) to Du14 (Dazhui) (Table 1). The Electrical acupuncture stimulator that was used is the Pantheon 8C which delivers a bi-phasic square waveform. This is an FDA-registered medical device specifically for electrical acupuncture (Appendix B). The treatment plan was to provide treatment 2 times per week for 6 weeks totaling 12 treatments. Each treatment had needle retention and EA for 30 minutes.

There were no changes in the Neuropuncture™ electrical acupuncture prescription for Parkinson's disease. The patients received 12 treatments.

The only variable that was changing was the intensity of stimulation for each pair of nodes at the start of treatment and at 15 minutes of each treatment, as well as from treatment to treatment. The goal of EA is to achieve stimulation as high as comfort will allow. The sensation often reduces as the time of stimulation increases. Therefore, adjustment at 15 minutes is done to provide the maximum stimulation without causing pain. (Table 2).

The patient reported on the Patient Perspective of the Treatment of Parkinson's Disease form that she stopped taking her Carbidopa-Levodopa after the second week of the treatments because her tremor had lessened, and she was only taking one dose per day. She reported that her sleep had improved, even though she had a very stressful time at work.

10b: Important follow-up diagnostic and other test results



Graph 1: Patient

UPDRS Scores:
Pre: I, II, IV: 10 Post: I, II, IV: 7 (patient assessment)
III: 6 III: 3 (practitioner assessment)
16 10

Change of -6 points total: Change in I, II, IV -3, Change in Motor (III) -3
There was a 3-point decrease in sections I, II, and IV (30%) and a 3-point decrease in section III (50%) for a total of 6-point decrease (38%) from pre-and post-treatment (Table 2).

Table 2: Itemized UPDRS Results

Date of Evaluation	Section I	Section II	Section III	Section IV	Score	Total Score	Total Change
08/31/2023 by the Patient	1	8		1	10		
08/31/2023 by Dr. Linebarger			6		6	16	
10/2682023 by the Patient	1	6		0	7		-3 points = 30% improvement
10/26/2023 by Dr. Linebarger			3		3	10	-3 points = 50 % improvement
							-6 points = 38% improvement

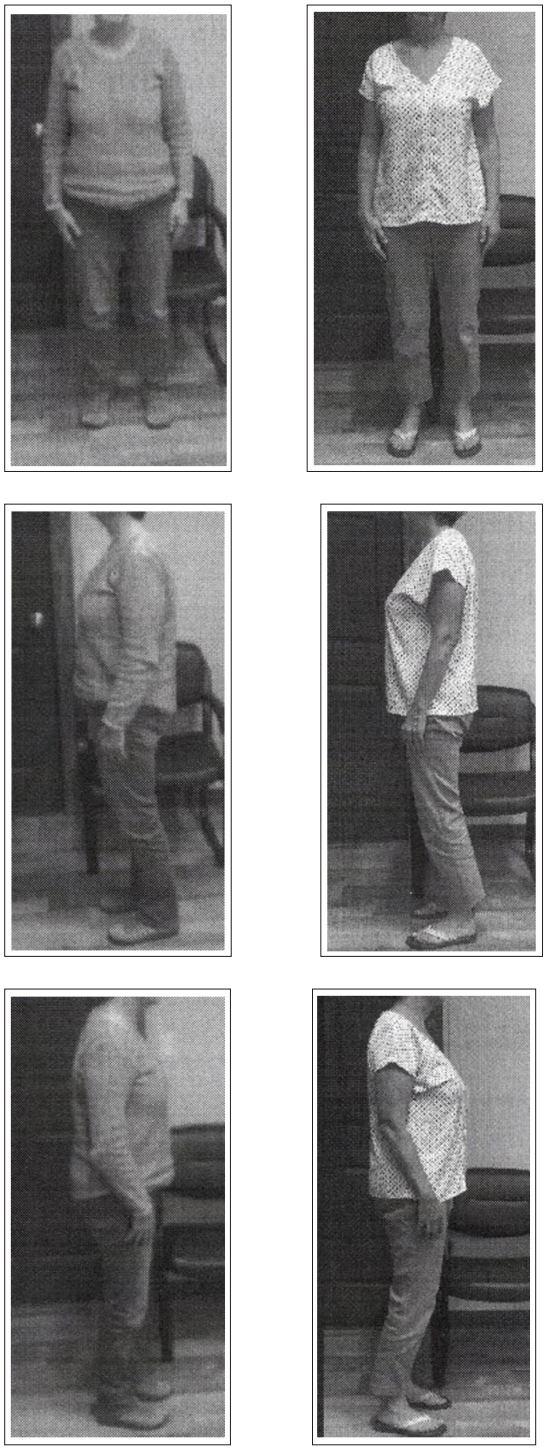
ZRT Neurotransmitter test results:
Pre: Dopamine: 433 (H) Post: Dopamine: 314 (H)
Tyrosine: 6452 Tyrosine: 4902

The ZRT neurotransmitter test results showed Dopamine had a decrease of 119 points, but it was still in the high range, even after stopping her carbidopa levodopa after the second week of treatments. The normal range is 103-282 mcg/g Cr (optimal 144-240).

Tyrosine decreased by 1550 but was still within the optimal range. The normal range is 3128-15,548 mcg/g Cr (Optimal 4790-10,278).

The photographs of this patient from the front, left side, and right side show an improvement in her posture. She is standing more upright with less of a hunched posture in the upper thoracic area of her spine in post-treatment photographs.

Pre-treatment post-treatment

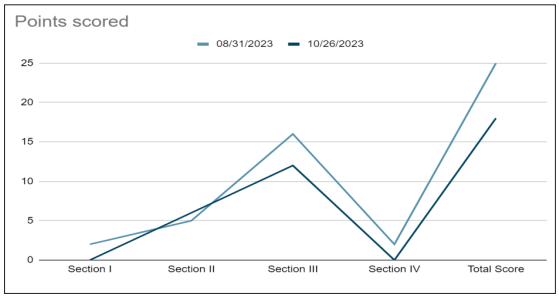


The Neuropuncture™ electrical acupuncture prescription applied two times per week for 6 weeks provided meaningful results both clinically and personally to the patient, as shown in the results of the UPDRS scores and the stable neurotransmitters results, in spite of the patient stopping her Carbidopa Levodopa. She also took notice of her improved posture.

There was complete adherence and tolerability of the therapy provided. The patient was able to make every appointment at the scheduled time. She reported that one treatment during the second week was a little uncomfortable with the electro-acupuncture (EA) due to her feeling like she "should do as much as possible for best results versus going too far to where maybe it would be counterproductive." After more explanation that the EA should be comfortable and cause no pain, the rest of the treatments were comfortable. The patient was given a small buzzer that could be pressed at any time during the treatment if she developed any discomfort. She did not use the buzzer during any of the treatments. There were no adverse or unanticipated events during the therapy.

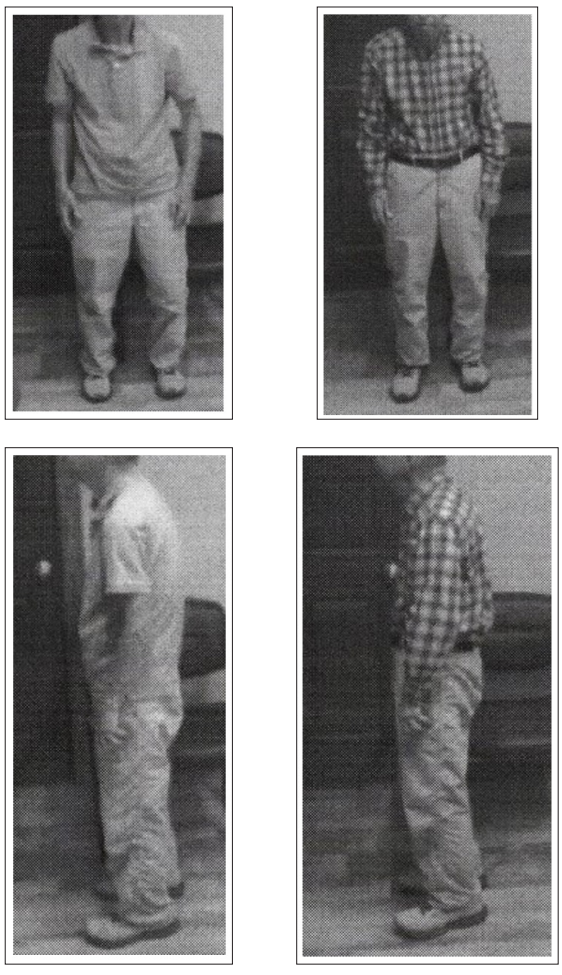
Patient 2

Patient 2 showed improvement in all four sections of the UPDRS by an overall decrease (improvement) of 3 points (30%) in the patient's report of sections I, II, and IV and a decrease (improvement) of 4 points (25%) in the independent evaluation of Section III (Motor Examination) from baseline. This patient had a 37% decrease in dopamine but remained in the high range, and he had a 4% increase in tyrosine levels. Table 2: Comparative Table of Results

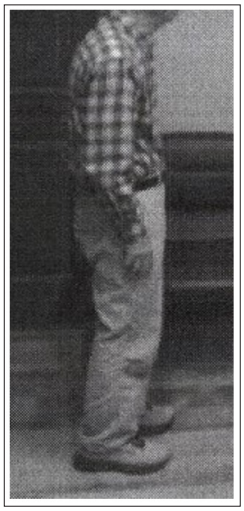


Graph 2: UPDRS Results

Pre-treatment post-treatment



Pre-treatment post-treatment



Discussion

The Neuropuncture™ electrical acupuncture prescription for Parkinson's disease is based on thorough research of the individual acupuncture points used and the electrostimulation (EA) of these points (nodes). This same prescription was applied for each patient. Neuropuncture EA at GB34 (Yanglingquan) enhanced neurogenesis in the subventricular zone (SVZ) as well as BDNF and pERK expression in the striatum, indicating that EA has the potential to promote neurogenesis in the SVZ by activating BDNF/ERK signaling and activates corticostriatal networks, and increase neuronal response in the substantia nigra, caudate, thalamus and putamen, Liver 3 (Taichong) (DPNN) has been shown to increase BDNF and GDNF and tyrosine hydroxylase, an important enzymatic protein that catalyzes the hydroxylation of tyrosine to L-DOPA, the precursor to Dopamine [9,21-26]. Yeo and Lim found that acupuncture at GB34 and LR3 upregulated serum/glucocorticoid-regulated kinase 1 (SGK1) and inhibited an alpha-synuclein increase, 30 Anmian (AKA "Peaceful Sleep") has been shown through research to increase the release of GABA. Regulation of the autonomic nervous system has been shown to occur because of manual and electrical acupuncture [21]. The non-motor symptoms associated with PD are believed to be the result of dysregulation of the autonomic nervous system; loss of GABA has been implicated in the symptoms of anosmia, depression, anxiety, phobias, and panic attacks, GV20 (Baihui), and GV14 (Dazhui) have been shown to increase GDNF and BDNF with electrical acupuncture stimulation, which is neuroprotective and reduces neuroinflammation, thus reducing oxidative stress, preventing Lewy body formation, and preventing or reducing the loss of dopaminergic neurons [5,21,27]. Stimulation of GV14 (Dazhui) and GV21 (Baihui) with 100 Hz has been shown to stimulate the upregulation of endogenous neurotrophins and BDNF and trkB receptors in a 6-hydroxydopamine- (6-OHDA-)-induced rat PD model, as well as the restoration of the homeostasis of dopaminergic transmission in the basal ganglia circuit and the suppression of inflammatory responses in the ventral midbrain [6]. EA at GV14 (Dazhui) and GV20 (Baihui) at 100 Hz for 20 minutes for two consecutive weeks demonstrated that electroacupuncture and L-dopa are possibly identical in improving cognitive function. The authors concluded that "appropriate use of electroacupuncture and L-dopa substitution can reduce motor complications, improve cognitive ability, and elevate the quality of life in PD patients with middle and advanced stages [18].

The purpose of this case study series is to determine the neuro-rehabilitative effect on the dopamine-secreting neurons of the basal ganglia, and the production of a neuroprotective effect that will reduce the symptoms of PD by applying the Neuropuncture™ electrical acupuncture prescription for the treatment of Parkinson's Disease [1-3]. It is the second most common neurodegenerative disease worldwide. In the U.S. nearly one million people are living with Parkinson's disease, and the rate of incidence is nearly 90,000 cases per year [24,28-31]. With an aging population, both the prevalence and incidence of PD are expected to increase by more than 30% by 2030. It is predicted that by 2030 there will be 1.2 million cases in the U.S. Approximately 10 million people worldwide suffer from PD. The incidence of Parkinson's disease increases with age, but an estimated four percent of people with PD are diagnosed before age. Men are 1.5 times more likely to have Parkinson's disease than women [29]. The economic impact is also staggering. The combined direct and indirect cost of Parkinson's, including treatments, social security payments, and lost income, is estimated to be nearly $52 billion per year in the United States alone. Medications alone cost an average of $2,500 a year and therapeutic surgery can cost up to $100,000 per person [29,30].

Clinical studies have demonstrated that electrical acupuncture benefits Parkinson's patients regardless of their response to drug therapy [6]. Research has presented potential neuroscience mechanisms for the positive effects of electrical acupuncture. Some studies report increases in neurotransmitter production, while others provide images of the brain activated by electrical acupuncture stimulation [14]. Dopamine is the main neurotransmitter that has been identified to be dysfunctional and the basal ganglia, specifically the substantia nigra, is the cerebral region of focus. The onset of neurodegenerative problems such as resting tremor, rigidity, bradykinesia, postural instability, and signs of autonomic dysfunctions are the result of degeneration of dopaminergic neurons in the substantia nigra leading to loss of dopamine, which then results in the loss of the basal ganglia's activities [5,7,9,22,32-34,].

Neuropuncture™ electrical acupuncture is a complete acupuncture system created by Dr. Michael Corradino, DNA, DAOM, MSTOM, AP, DNA, that masterfully unites the centuries-old practice of "Traditional Chinese Medicine" (TCM) practice of acupuncture with twenty-first-century medical sciences. Specifically, the effects of the insertion of an acupuncture needle and the communication with the neuroanatomy, neurophysiology, and neurochemistry of the body. Neuropuncture™ electrical acupuncture aims to achieve neuromodulation, neuroregulation, and neurorehabilitation of the nervous system to support homeostasis and health restoration. The holistic evaluation of a patient in Traditional Chinese Medicine (TCM) is maintained while incorporating findings from reproducible research on the impact of acupuncture on neurophysiological mechanisms and the effects of electrical acupuncture on specific neural tissues. The Neuropuncture™ Trinity provides a framework

for acupuncturist to follow when confronted with patient complaints. It is a detailed and systematic organization of the Neurophysiological Mechanisms, Neuropuncture™ Treatment Principles, and Neuropuncture™ Electrical Techniques. By understanding the neurophysiological mechanisms associated with a patient's condition, the appropriate treatment principles can be applied to restore the neuropathology of the condition being treated. In addition, the proper electrical stimulation parameters based on research can be applied to neuromodulate, neuroregulate, and neurorehabilitate the nervous system back to health and achieve the desired treatment results [1,32].

Conclusion

The PD Neuropuncture™ electrical acupuncture prescription, based on research and reproducibility, demonstrated promising patient outcomes in this limited series that support the effectiveness of this treatment for Parkinson's Disease. This treatment can improve physical activity, motor function, decrease tremor frequency, improve non-motor symptoms, and slow the progression of the disease. It may reduce the originally prescribed drug treatment dosage and enhance the physical and mental function of these patients. The acupuncture prescription and the electrical parameters are clearly stated in this paper so that future studies utilizing this treatment plan will provide consistent and reproducible treatment outcomes. This treatment is relatively easy to perform and is both safe and effective, with minimal, if any, side effects. The treatment can be administered repeatedly over the long term and is also cost-effective. Although the study yielded positive outcomes and shows promise in treating PD, further robust studies with larger sample sizes are necessary. Large randomized controlled trials are required to validate the therapeutic efficacy of the Neuropuncture™ electrical acupuncture prescription for treating Parkinson's Disease as was suggested in this limited study.

Funding

We would like to thank the G. Dolph Corradino Neuropuncture Research non-profit corporation for its financial support. The financial support was invaluable in attaining the ZRT test results and for help with academic financial support.

Estimated costs: Dry urine neurotransmitter tests: $189.00 per test. (each patient had pre and post-treatment testing)

Conflict of Interest

The authors have no competing interests to declare.

References

1. Corradino MD. Neuro Lab. Neuro Lab. 2023.
2. Corradino MD. Neuropuncture: A clinical handbook of neuroscience acupuncture. Singing Dragon. 2017. 48-61.
3. Corradino MD, Law HK. Neuropuncture Case Studies and Clinical Applications: Neuropuncture Inc. 2020. 57.
4. Bastide MF, Meissner WG, Picconi B, Fasano S, Fernagut PO, et al. Pathophysiology of L-dopa-induced motor and non-motor complications in Parkinson's disease. Progress in neurobiology. 2015. 132: 96-168.
5. Błaszczyk JW. Parkinson's Disease and Neurodegeneration: GABA-Collapse Hypothesis. Frontiers in neuroscience. 2016. 10: 269.
6. Lee Y, Lee H, Bae CH, Seo JE, Kim HY, et al. Electroacupuncture at GB34 modulates neurogenesis and BDNF-ERK signaling in a mouse model of Parkinson's disease. Journal of traditional and complementary medicine. 2023. 13: 263-269.
7. Liang Yue D, Yijun G. Chinese Acupuncture and Moxibustion. Foreign Languages Press. 1987. 48-50.
8. Pereira CR, Machado J, Rodrigues J, de Oliveira NM, Criado MB, et al. Effectiveness of Acupuncture in Parkinson's Disease Symptoms-A Systematic Review. Healthcare (Basel, Switzerland). 2022. 10: 2334.
9. Chen FP, Chang CM, Shiu JH, Chiu JH, Wu TP, et al. A clinical study of integrating acupuncture and Western medicine in treating patients with Parkinson's disease. The American journal of Chinese medicine. 2015. 43: 407-423.
10. Xu W, Ou Yang S, Chi Z, Wang Z, Zhu D, et al. Effectiveness and safety of electroacupuncture in treating Parkinson disease: A protocol for systematic review and meta-analyses. Medicine. 2021. 100: 25095.
11. Yeo S, Lim S, Choe IH, Choi YG, Chung KC, et al. Acupuncture stimulation on GB34 activates neural responses associated with Parkinson's disease. CNS neuroscience & therapeutics. 2012. 18: 781-790.
12. Yeo S, van den Noort M, Bosch P, Lim S. A study of the effects of 8-week acupuncture treatment on patients with Parkinson's disease. Medicine. 2018. 97: 13434.
13. Zhao Y, Zhang Z, Qin S, Fan W, Li W, et al. Acupuncture for Parkinson's Disease: Efficacy Evaluation and Mechanisms in the Dopaminergic Neural Circuit. Neural plasticity. 2021. 9926445.
14. Xiao D. Acupuncture for Parkinson's Disease: a review of clinical, animal, and functional Magnetic Resonance Imaging studies. Journal of traditional Chinese medicine = Chung i tsa chih ying wen pan. 2015. 35: 709-717.
15. Yeo S, Lim S. Acupuncture Inhibits the Increase in Alpha-Synuclein by Modulating SGK1 in an MPTP Induced Parkinsonism Mouse Model. The American journal of Chinese medicine. 2019. 47: 527-539.
16. Kim SN, Doo AR, Park JY, Bae H, Chae Y, et al. Acupuncture enhances the synaptic dopamine availability to improve motor function in a mouse model of Parkinson's disease. PloS one. 2011. 6: 27566.
17. Ko JH, Lee H, Kim SN, Park HJ. Does Acupuncture Protect Dopamine Neurons in Parkinson's Disease Rodent Model?: A Systematic Review and Meta-Analysis. Frontiers in aging neuroscience. 2019. 11: 102.
18. Lei H, Toosizadeh N, Schwenk M, Sherman S, Karp S, et al. A Pilot Clinical Trial to Objectively Assess the Efficacy of Electroacupuncture on Gait in Patients with Parkinson's Disease Using Body Worn Sensors. PloS one. 2016. 11: 0155613.
19. Nam MH, Ahn KS, Choi SH. Acupuncture stimulation induces neurogenesis in adult brain. International review of neurobiology. 2013. 111: 67-90.
20. Wen X, Li K, Wen H, Wang Q, Wu Z, et al. Acupuncture-Related Therapies for Parkinson's Disease: A Meta-Analysis and Qualitative Review. Frontiers in aging neuroscience. 2021. 13: 676827.
21. Langevin HM, Churchill DL, Cipolla MJ. Mechanical signaling through connective tissue: a mechanism for the

therapeutic effect of acupuncture. FASEB journal : official publication of the Federation of American Societies for Experimental Biology. 2001. 15: 2275-2282.
22. Kolacheva A, Alekperova L, Pavlova E, Bannikova A, Ugrumov MV. Changes in Tyrosine Hydroxylase Activity and Dopamine Synthesis in the Nigrostriatal System of Mice in an Acute Model of Parkinson's Disease as a Manifestation of Neurodegeneration and Neuroplasticity. Brain sciences. 2022. 12: 779.
23. Koller WC, Rueda MG. Mechanism of action of dopaminergic agents in Parkinson's disease. Neurology. 1998. 50: 11-48.
24. Kouli A, Torsney KM, Kuan WL. Parkinson's Disease: Etiology, Neuropathology, and Pathogenesis. In: Stoker TB, Greenland JC, editors. Parkinson's Disease: Pathogenesis and Clinical Aspects [Internet]. Brisbane (AU): Codon Publications; 2018.
25. Kremer T, Taylor KI, Siebourg-Polster J, Gerken T, Staempfli A, et al. Longitudinal Analysis of Multiple Neurotransmitter Metabolites in Cerebrospinal Fluid in Early Parkinson's Disease. Movement disorders: official journal of the Movement Disorder Society. 2021. 36: 1972-1978.
26. Kumari S, Kumaran SS, Goyal V, Sharma RK, Sinha N, et al. Identification of potential urine biomarkers in idiopathic parkinson's disease using NMR. Clinica chimica acta; international journal of clinical chemistry. 2020. 510: 442-449.
27. Lee MS, Shin BC, Kong JC, Ernst E. Effectiveness of acupuncture for Parkinson's disease: a systematic review. Movement disorders: official journal of the Movement Disorder Society. 2008. 23: 1505-1515.
28. Lintang G. Pathogenesis and Treatment of Parkinson's Disease. Academia Letters. 2021.
29. Parkinson's Foundation. Retrieved. 2023.
30. Yang W, Hamilton JL, Kopil C, Beck JC, Tanner CM, et al. Current and projected future economic burden of Parkinson's disease in the U.S. NPJ Parkinson's disease. 2020. 6: 15.
31. The Michael J. Fox Foundation. The Micheal J. Fox Foundation. The Michael J. Fox Foundation. Retrieved. 2023.
32. Concha-Marambio L, Farris CM, Holguin B, Ma Y, Seibyl J, et al. Seed Amplification Assay to Diagnose Early Parkinson's and Predict Dopaminergic Deficit Progression. Movement disorders: official journal of the Movement Disorder Society. 2021. 36: 2444-2446.
33. Fahn S, Sulzer D. Neurodegeneration and neuroprotection in Parkinson disease. NeuroRx: the journal of the American Society for Experimental NeuroTherapeutics. 2004. 1: 139-154.
34. Huo LR, Liang XB, Li B, Liang JT, He Y, et al. The cortical and striatal gene expression profile of 100 hz electroacupuncture treatment in 6-hydroxydopamine-induced Parkinson's disease model. Evidence-based complementary and alternative medicine: eCAM. 2012. 908439.