

2018

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Recommended Citation

Chon, Yoo Yuong, "Is acupuncture (including electroacupuncture) beneficial on the quality of life in patients with Parkinson's disease?" (2018). *PCOM Physician Assistant Studies Student Scholarship*. 353.

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“Is acupuncture (including electroacupuncture) beneficial on the quality of life in patients with Parkinson’s disease?”

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A SELECTIVE EVIDENCE BASED MEDICINE REVIEW

In Partial Fulfillment of the Requirements For

The Degree of Master of Science

In

Health Sciences – Physician Assistant

Department of Physician Assistant Studies
Philadelphia College of Osteopathic Medicine
Philadelphia, Pennsylvania

March 22, 2018

Abstract

Objective: The objective of this selective EBM review is to determine whether or not “Is acupuncture (including electroacupuncture) beneficial on the quality of life in patients with Parkinson’s disease?”

Study design: Systematic review of three primary studies published in 2015 and 2016

Data sources: Two randomized control trials and one non-randomized control trial were chosen through PubMed to study the effects of acupuncture (including electroacupuncture) improving the quality of life and activities of daily living in patients with Parkinson’s disease

Outcome(s) measured: The outcomes were measured by using two types of questionnaires: A 39-item Parkinson Disease Questionnaire (PDQ-39) to measure quality of life or Unified Parkinson Disease Rating Scale II (UPDRS) to measure activities of daily living

Results: Chen et al. (2015) found that the UPDRS II score increased by 65% in the acupuncture treatment group compared to 15% increase in the control group ($p=0.003$). Kluger et al. (2016) found that the PDQ-39 score decreased for the acupuncture treatment group (27.4 ± 10.0 to 21.6 ± 12.2 , $p=0.0002$) as did the score for the control group (31.2 ± 14.9 to 24.5 ± 15.0 , $p<0.0001$); when the score decreases were compared between the acupuncture group and control group, there was no significant difference ($p=0.6067$). Toosizadeh et al. (2015) found a 46% decrease in the UPDRS II in the electroacupuncture group when compared to baseline ($p<0.0001$), but a 9% increase in the UPDRSII score in the control group ($p=0.8$).

Conclusions: There is conflicting evidence as to the efficacy of acupuncture and electroacupuncture in the treatment of quality of life in patients with Parkinson’s disease. Chen et al. (2015) and Toosizadeh et al. (2015) both showed acupuncture and electroacupuncture provide an improvement in quality of life. Kluger at al. (2016) did not find acupuncture to be more effective compared to sham acupuncture; however, acupuncture and sham treatments both had a significant effect in improving quality of life.

Key words: Parkinson disease, acupuncture

Introduction

Parkinson's disease (PD) is a neurocognitive disease that causes progressively worsening motor symptoms. Its characteristic symptoms are tremors, bradykinesia, rigidity and instability of posture.¹ As these symptoms progress, patients have increasing difficulty with day to day activities such as getting dressed, bathing, walking which then leads to a decreased quality of life. To continually help these patients, new treatment methods are being studied.

Developing new and more efficacious treatments for Parkinson's disease is beneficial because it will improve the lives of patients, alleviate costs and decrease adverse outcomes. Parkinson's disease affects about one million people in America and about five million people worldwide.¹ It is the second most common neurocognitive disorder in the world.² Every year, \$25 billion are spent on treatment, social security payments and lost income due to an inability to work.³ Treatment for a single patient costs \$2,500 for medications and \$100,000 for therapeutic surgery every year.³ A person with Parkinson's disease is 1.44 times more likely to be admitted to the hospital than another person who is in the same age and sex category.⁴ Those admitted with Parkinson's disease also have a greater morbidity and mortality rate.⁴

Parkinson's disease is diagnosed by the four characteristic motor symptoms mentioned before along with many other motor and non-motor symptoms, such as freezing, speech difficulty, sleep difficulty, depression, anxiety, cognitive issues.¹ The hallmark characteristic of the disease is the degeneration of dopamine neurons.¹ There is still much that needs to be learned though. The exact cause is still unknown but it is believed to be a combination of genetic and environmental factors.¹

Current treatments for Parkinson's disease are targeted at relieving motor symptoms. One of the most important prescription medications used is carbidopa/levodopa.¹ Of all other

treatments, this is the most effective at symptomatic relief. However, over time, the duration of effectiveness of the drug begins to decrease, which is called the “wearing off effect”.¹ As patients progress in their disease and lose benefit from the drug, they may cycle between being “on” and “off”, the former being symptom relief and the latter characterized by severe motor symptoms and painful dystonic episodes.¹ Other classes of prescription medications used are dopamine agonists, anticholinergics, MAO-B inhibitors and COMT inhibitors.¹ Some of these are used as monotherapy or as adjunct treatments with carbidopa/levodopa. In addition to prescription medications, there are two surgical treatments. Deep brain stimulation involves implanting electrodes to stimulate the brain and Duodopa involves delivering carbidopa/levodopa intractestinally as a gel formulation.¹

Despite the current treatments available, there are still motor and other non-motor symptoms that are not addressed. However, these affect the quality of life and activities of daily living in Parkinson’s disease patients. Acupuncture is a method that is not as invasive as surgical treatments and does not cause imbalance in chemical levels like other medications while attempting to improve other symptoms of Parkinson’s disease. This systematic review will evaluate two randomized controlled trials and one non-randomized controlled trial to assess the use of acupuncture (and electroacupuncture) in improving activities of daily living and quality of life in Parkinson’s disease patients.

Objective

The objective of this selective EBM review is to determine whether or not “Is acupuncture (including electroacupuncture) beneficial on the quality of life in patients with Parkinson’s disease?”

Methods

Among the three studies used in this review two were randomized controlled trials and one was a non-randomized controlled trial. All three included Parkinson's disease patients greater than 40 years old. One study by Toosizadeh et al. also included patients without the diagnosis of Parkinson's disease; the interventions used were acupuncture and electroacupuncture.⁵ Toosizadeh et al. and Kluger et al. compared acupuncture or electroacupuncture, respectively, against a sham treatment.^{5,6} Chen et al. compared acupuncture used with western medicine against only western medicine.² The three studies measured quality of life and activities of daily living.

Data sources were searched using the key words "acupuncture" and "Parkinson" in PubMed-NCBI. The studies were chosen if they addressed the research question and whether the outcomes studied were ones the patient would care about (POEMs). All articles were published data in the English language. Only primary research studies published after 2007 were included and studies with patients younger than 40 years old were excluded. The mean change from baseline, t test value, p-values, CI and NNT were used to determine clinical significance.

Table 1: Demographics & characteristics of included studies

Study	Type	#pts	Age (yrs)	Inclusion criteria	Exclusion criteria	W/D	Interventions
Chen FP, Chang CM, Shiu JH, et al., 2015 ²	Non-randomized controlled trial	40	55 or older	-Diagnosed with PD for over 6 months with Core Assessment Program for Intracerebral Transplantation (CAPIT)	-Severe diseases of heart, brain, liver, kidneys, endocrine or hematopoietic system -Psychosis or dementia	0	15 minutes of acupuncture therapy two times a week
Kluger BM, Rakowski D, Christian M, et al., 2016 ⁶	Randomized controlled trial	94	40-99	-UK Brain Bank criteria for probable PD -fluent in English -self-reported moderate or severe fatigue using the International Parkinson and Movement disorder society UPDRS fatigue item	-dementia -presence of another medical condition expected to produce fatigue -active depression -presence of an untreated sleep disorder -exposure to acupuncture within the past 6 months	5	30 minutes of acupuncture therapy two times a week, at least one day apart, for 6 weeks. It was followed by a 12-week wash out period
Toosizadeh N, Lei H, Schwenk M, et al., 2015 ⁵	Randomized controlled trial	59	55 or older	-55 years or older with idiopathic PD diagnosed by movement disorder specialists based on UK brain bank criteria	- Diagnosed with any type of neurological disorder other than PD or if they have prior experience of EA therapy	Not specified by authors	30 minutes of electroacupuncture once a week for 3 weeks

Outcomes Measured

Chen et al. used the Unified Parkinson Disease Rating Scale II (UPDRS II) to measure activities of daily living.² Each patient took the survey before they received any acupuncture treatment, after 9 weeks of treatment and at 18 weeks of treatment.² The score was compared between the groups receiving acupuncture treatment and western medicine with the group receiving only western medicine if there was an improvement in the score.²

Toosizadeh et al. also used the UPDRS II to measure activities of daily living.⁵ The interview was conducted by a trained examiner. It was given to each patient before they received electroacupuncture treatment at an “off medication stage”, which was defined as greater than 12 hours after the last medication dose they took, and after three weeks of electroacupuncture treatment.⁵ The trials were completed with both assessors and participants blinded.⁵ The score was compared between the groups receiving electroacupuncture treatment and sham treatment only if there was an improvement in the score.⁵

Kluger et al. used the 39-item Parkinson Disease Questionnaire (PDQ39), a self-report survey, to measure quality of life.⁶ The survey was completed before any acupuncture treatment and 6 weeks after acupuncture treatment.⁶ Participants were blinded during treatments.

Results

The three studies used for this systematic review reviewed the efficacy in acupuncture, or electroacupuncture, in improving activities of daily living and quality of life in patients with Parkinson’s disease. The inclusion and exclusion criteria of the studies are outlined in Table 1.

Chen et al. had 40 participants in their 18 week study.² They were placed into either the acupuncture and western medicine treatment group (experimental group) or only western medicine treatment group (control group), with 20 participants in each group. At baseline, there

was found to be no significant difference in the UPDRS II score between the experimental and control groups ($p=0.765$).² After 18 weeks, 65% of patients in the experimental had a score improvement compared to 15% of patients in the control group ($p=0.003$).² There was a large treatment efficacy, represented by numbers needed to treat (NNT) (Table 2). Relative benefit increase and absolute benefit increase were also calculated into Table 2. When the mean change in score at 18 weeks was compared to baseline scores, within each group, there was no significant difference (significant difference was defined as $p < 0.05$).² There were no specific adverse events or side effects reported in this study.

Table 2: Treatment efficacy analysis and statistical significance

CER	EER	RBI	ABI	NNT	p-value
15%	65%	333%	50%	2	0.003

Toosizadeh et al. had a total of 59 participants in their 3 week study.⁵ Fifteen participants had Parkinson's disease and 44 participants were healthy adults. Patients were either placed into the group receiving electroacupuncture treatment (experimental group) or a sham treatment (control group); twice as many PD patients were placed into the experimental group than the control group.⁵ Baseline comparisons were also made between the experimental group and control group with no significant difference found between the two groups ($p > 0.11$).⁵ There was a 46% decrease in the UPDRSII score from before treatment to after treatment in the experimental group ($p < 0.0001$) but a 9% increase in the UPDRSII score from before treatment to after treatment in the control group ($p = 0.8$).⁵ When the mean changes of the experimental and

control groups were compared with each other, there was a significant difference in the UPDRS II score ($p=0.02$) (Table 3).⁵ The difference between the mean changes was large, indicating a large treatment efficacy. The confidence interval is also reported in Table 3. There was no statement indicating adverse effects or side effects in this study.

Table 3: mean change after treatment in UPDRS II score and statistical significance

Mean change of experimental group from baseline \pm SD	Mean change of control group from baseline \pm SD	Mean change difference	95% CI	p-value
7.2 ± 5.5	0.4 ± 3.4	6.8 ± 2.1	(-5.9) to (-0.5)	0.02

Kluger et al. had a total of 94 participants in their 6 week study.⁶ Participants were equally split between two groups: the first receiving acupuncture treatment (experimental) and the second receiving a sham treatment (control). After treatment, there was a significant difference between the PDQ39 score at baseline and 6 weeks in both the experimental and control groups ($p=0.0002$, $p<0.0001$ respectively).⁶ When the changes were compared between the two groups, there was no significant difference ($p=0.6067$).⁶ There was a small mean change, indicating a small treatment efficacy (Table 4). One participant experienced increased constipation as an adverse event.⁶ There was a high treatment protocol compliance showing that 99.5% of treatments were completed.⁶

Table 4: mean change after treatment in PDQ39 score and statistical significance

Intervention	Mean \pm SD at week 1	Mean \pm SD at week 6	Mean changes from baseline \pm SD	Mean change difference \pm SD	p-value
Acupuncture	27.4 \pm 10.0	21.6 \pm 12.2	5.8 \pm 2.2	N/A	0.0002
sham	31.2 \pm 14.9	24.5 \pm 15.0	6.7 \pm (- 0.1)	N/A	<0.0001
Between acupuncture and sham	N/A	N/A	N/A	-0.9 \pm 2.3	0.6067

Discussion

Acupuncture is the use of needles, electric current or heat to stimulate meridian points, which are areas that were thought to correct energy flow of the body.⁷ Modern theories suggest that it may help by blocking neurotransmission or endorphin release or neurotransmitter stimulation.⁷ This practice has become more widely popular in America; it is regulated in 40 states and the District of Columbia.⁷ It has been utilized for many different conditions and ailments. The most common areas where research has shown possible effectiveness is for back pain, chemotherapy-induced nausea and vomiting, fibromyalgia, insomnia, knee pain and migraines.⁷ As of this point, there is not enough evidence about the efficacy of acupuncture in PD.⁷

There are some studies that have shown safe usage of acupuncture for as long as periods of 24 months, and also for use in children and pregnancy; Electroacupuncture has insufficient evidence for use in pregnancy and is not recommended.⁷ There are rarely side effects associated with acupuncture treatment. However, some minor side effects that are possible are nausea, vomiting, dizziness, pain and fainting.⁷ Some examples of rare cases of more serious injuries are serious infections, including HIV and hepatitis, organ puncture, particularly lung, hematomas

and broken and migrating needles.⁸ Most side effects of acupuncture are usually due to negligence or lack of training.⁸ Despite the rarity of these side effects, there are still certain conditions in which acupuncture is contraindicated, such as, arrhythmia, anemia and a number of other conditions.⁸ However, there also appears to be no set standard for contraindications to acupuncture.⁸

A study by Nadin et al. showed that there was an increase in the amount of consumers who used acupuncture between the years 2002 and 2012.⁹ However, many did not have health insurance coverage for acupuncture.⁹ If they did, it was only partial coverage.⁹ Therefore, these data show that insurance coverage for acupuncture is not increasing even though consumer usage is. For those without the monetary means of paying out of pocket for acupuncture, this could be a barrier to trying this treatment.

The limitations of the studies mentioned in this review that must also be considered. With all three of the studies, the sample size is small. Kluger et al. had the biggest sample size and it was only 94 participants.⁶ Another limitation in all three studies is differences in skill between those administering acupuncture in needle insertion. Placements may not have been as accurate between practitioners. Chen et al. was also limited in that the study was not randomized and not blinded.² While the study states that other measures were taken to limit bias, without blinding, there are expectations and previous beliefs from the study workers and participants that may have influenced the results of the study. For Kluger et al., the study had excluded PD patients that did not have fatigue.⁶ For the purposes of their study, this was acceptable; however, for this current review, it limits the generalization of the results.

Toosizadeh et al. also had limitations. It is not stated in the article whether all subjects were accounted for at the end of the study. Therefore, there could have been bias in data analysis

if certain patient data was not included. There is a similar limitation in Kluger et al. where the intention to treat is conducted using the last observation carried forward.⁶ However, they do not specify if there was a certain number of patient data that were not included. Compared to the other two studies in this review, Toosizadeh et al. had a much shorter treatment period. Its participants received three treatment sessions, as opposed to Chen et al., who had 36 treatment sessions, and Kluger et al., who had 12 treatment sessions.^{2,5,6} Therefore, Toosizadeh et al. is limited in that they might not have provided enough treatments to reach efficacy.

Conclusions

The evidence on whether acupuncture and electroacupuncture can improve quality of life in Parkinson's disease patients is conflicting. Chen et al. and Toosizadeh both show significant improvements in activities of daily living, which indicate an improvement in quality of life, when receiving acupuncture or electroacupuncture, respectively.^{2,5} However, Chen et al. only showed a significant difference when comparing the experimental and control group, but no significant difference after acupuncture treatment from baseline.² On the other hand, Kluger et al. showed no significant improvement in quality of life after acupuncture treatment when compared to the control group.⁶ However, it did show a significant improvement when the experimental group and control group were compared to each respective baseline.

For future studies, it would be interesting to see if acupuncture treatment is only effective at a certain stage of Parkinson's disease. Subjective scores using the UPDRS II or PDQ39 would be taken before acupuncture treatment and subjects would be split into groups depending on the severity of their scores. Studies may show acupuncture to only provide a benefit at certain score severities. It would also be beneficial to study different lengths of treatment for acupuncture to

see how long a person with Parkinson's disease should attend acupuncture treatment for efficacy and also to see when the treatment becomes less effective.

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