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Research Article

Descriptive Investigation of Intranasal (IN) Administration of Nicotinamide Adenine Dinucleotide for Management of Tremors and Symptoms Associated with Parkinson's Disease

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Abstract

Introduction: Parkinson's Disease (PD) is a neurodegenerative disease that causes individuals to experience cognitive impairment and motor dysregulation. Previous research documents a relationship between the neurodegeneration found in PD and the normal depletion of Nicotinamide Adenine Dinucleotide (NAD+) - a coenzyme found in all living cells which depletes with age. Clinicians at Springfield Wellness Center have developed Intravenous (IV) NAD+ administration protocols for treatment of a number of clinical conditions such as detoxification from opiate and alcohol use disorders, mood and anxiety disorders, migraine headache pain, and symptoms associated with Alzheimer's and PD. Collaborative efforts with physicians specializing in the use of IN NAD+ sphenocath/sphenopalatine ganglion block protocols resulted in effective treatment and management of migraine headache pain, suggesting that IN NAD+ is an effective strategy for management of symptoms associated with these conditions. We present data from three patients with PD who have undergone an initial 6-day IV NAD+ treatment administration protocol followed by administration of IN NAD+ treatment for PD symptom management over a 2 year follow up period.

Methods: Following the initial 6-day IV NAD+ treatment, patients were given the option to enroll in a maintenance program using IN NAD+ (200mg/mL NAD+ mixed into 2% lidocaine and administering 0.5 mL via each nostril). Patient data during the IN NAD+ administration period were analyzed and evaluated using clinic-derived consultation and procedural questionnaires that measured symptoms of pain, stress, energy and sleep. Tremors and other symptoms were recorded in daily nurse notes and analyzed following treatment of IV NAD+.

Results: The patients showed varying degrees of overall symptom improvement, ranging from 15% to 75% improvement over time. Tremors in Patient 1 and Patient 3 diminished by 50% within the first three days of the IV NAD+ treatment protocol. Patient data indicated that IN administration of NAD+ following the initial IV NAD+ treatment protocol aided in overall symptom management.

Conclusion: These findings indicate that the use of NAD+ administration protocols for initial treatment and follow-up show therapeutic potential in alleviating tremors and improving symptoms of pain and cognitive impairments associated with PD. The implementation of NAD+ in treatment of PD symptoms could be considered as an alternative to traditional medications and forms of standard of care; however, further studies are warranted to determine the effectiveness of NAD+ in comparison to traditional pharmaceutical interventions.

Keywords: Parkinson's disease; NAD+; Neurodegeneration; Cognitive impairment

Introduction

Parkinson's Disease (PD) is a neurodegenerative disease that causes individuals to experience cognitive impairment and motor dysregulation [1]. Previous research documents a relationship between the neurodegeneration found in PD and the normal depletion of Nicotinamide Adenine Dinucleotide (NAD+) - a coenzyme found in all living cells which depletes with age [1-3]. NAD+ depletion has been demonstrated to play an instrumental role in mitochondrial dysfunction, oxidative stress, and neuronal damage, which are key features of neurodegeneration in PD [3]. Additionally, studies suggest that NAD+ supplementation may mitigate some of the cellular damage found in PD through the enhancement of mitochondrial and neural functioning [2].

Clinicians at Springfield Wellness Center have developed IV NAD+ administration protocols for treatment of a number of clinical conditions: detox, mood and anxiety disorders, and symptoms associated with Alzheimer's and PD. In a study measuring symptom changes in a patient diagnosed with PD, the patient was found to be near asymptomatic after being administered a dosage of IV NAD+ [4]. Additionally, following a 6-day IV NAD+ treatment, a 59-year-old patient with PD experienced a significant reduction in tremors in a similar study [5]. We present data from three patients with PD disease who have undergone an initial 6-day IV NAD+ treatment administration protocol followed by administration of IN NAD+ treatment for PD symptom management over a 2 year follow up period.

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Methods

Three patients (#1,2,3) sought treatment at Springfield Wellness Center between Jan 2020-Nov 2022 for symptoms associated with PD. Patients 1 and 3 reported symptom onset 2 years prior, while Pt 2 reported onset 3m prior. Following the initial 6-day IV NAD+ treatment (1000 mg of NAD+ per day), patients were given the option to enroll in a maintenance program using IN NAD+ (200 mg/ml NAD+ in either 0.5% or 2% lidocaine). Patient data during the IN NAD+ administration follow-up period (1-2yr) were analyzed and evaluated using clinic-derived consultation and procedural questionnaires that measured symptoms of pain, stress, energy, and sleep, and documented daily activities to reduce stress as well as self-reported overall symptom improvement and/or changes. Tremors and other symptoms were also recorded in daily nurse notes and analyzed following treatment of IV NAD+.

Results

During the initial IV treatment protocol, nurse reports suggested a 50% reduction in tremors in Patient 1 and Patient 3 within the first three days of the IV NAD+ treatment protocol. Figure 1 shows patient self report ratings on a scale of 1-5 with categories of pain, stress, energy and sleep as a function of time in Patient 1, Patient 2 and Patient 3. For all three patients, the data shows that there is an overall trend of symptom maintenance for each patient. Figure 2 shows self-report data regarding overall symptom improvement for each patient. The patients showed varying degrees of overall symptom improvement, ranging from 15% to 75% improvement over time. The general trend for each patient indicates both gradual symptom improvement and symptom maintenance. Figure 3 shows the types of QOL activities each patient participated in outside of the NAD+ IV and IN treatment protocols in order to alleviate symptoms of PD. For all three patients, a combination of exercise and some type of rest, such as meditation, were the primary QOL activities to reduce stress. Patient data for all three patients indicated that IN administration of NAD+ following the initial IV NAD+ treatment protocol aided in management of symptoms associated with PD.

Discussion

Overview of findings

The combined administration of IV and IN NAD+ treatments aimed to assess the overall treatment benefit of NAD+ supplementation to combat the natural depletion of NAD+ in the human body, which, in previous research, has been associated with the exacerbation of symptoms of PD and has demonstrated effectiveness in this patient population [1,4]. During the initial two days of the IV NAD+ treatment protocol, a notable reduction in tremors was observed in patients 1 and 3. Following the completion of the IV NAD+ protocol and the initiation of IN NAD+ treatment, symptoms associated with PD, including pain, stress, energy levels, and sleep, were consistently maintained throughout the treatment course for all three patients. There was no reported evidence of substantial improvement or decline in each patient's condition. However, gradual improvements ranging from 15% to 75% were observed across all three patients during the course of the IN NAD+ treatment. Symptoms for all three patients were maintained throughout the course of treatment using combined interventions of IV and IN administration of NAD+ as well as outside activities supporting quality of life, namely exercise, rest, and meditation, which were the highest rated activities among all three patients to reduce stress.

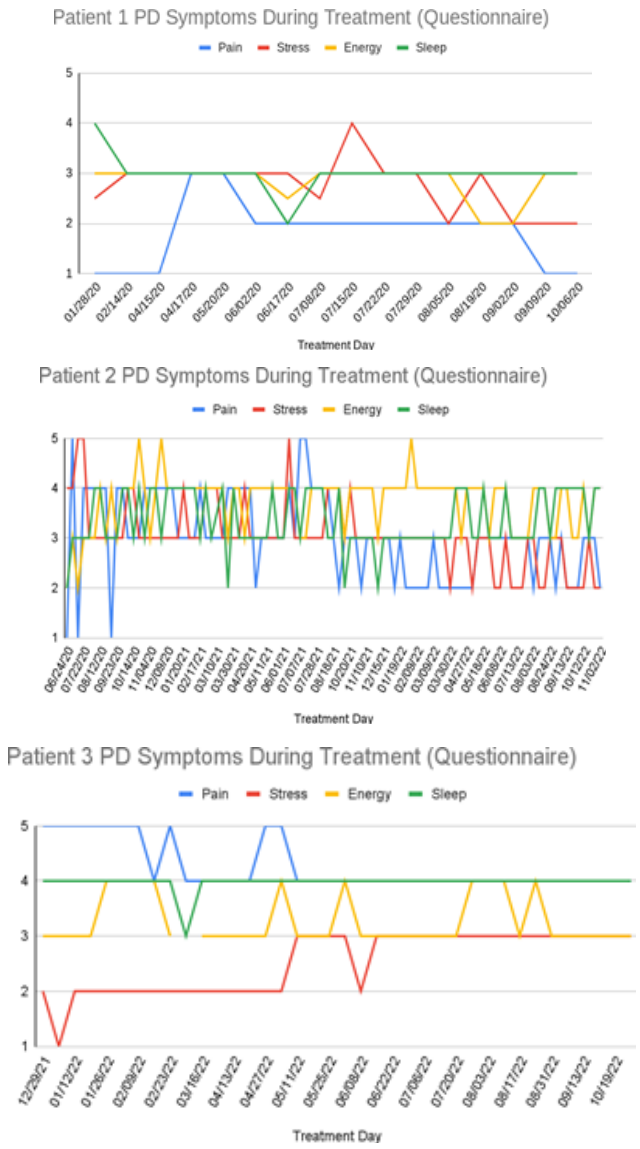
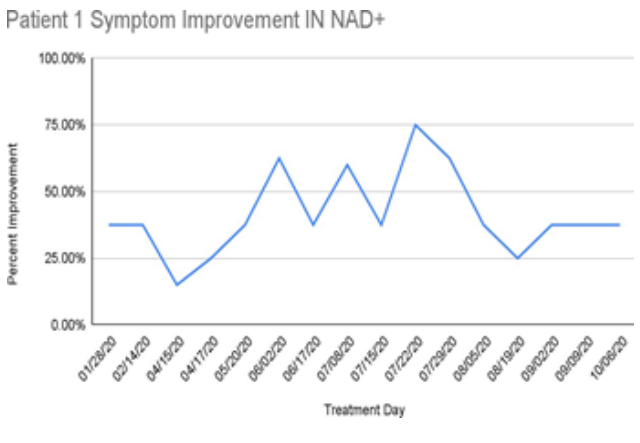


Figure 1: Self report ratings (1-5 scale) of pain, stress, energy and sleep as a function of time in Patient 1, Patient 2 and Patient 3.



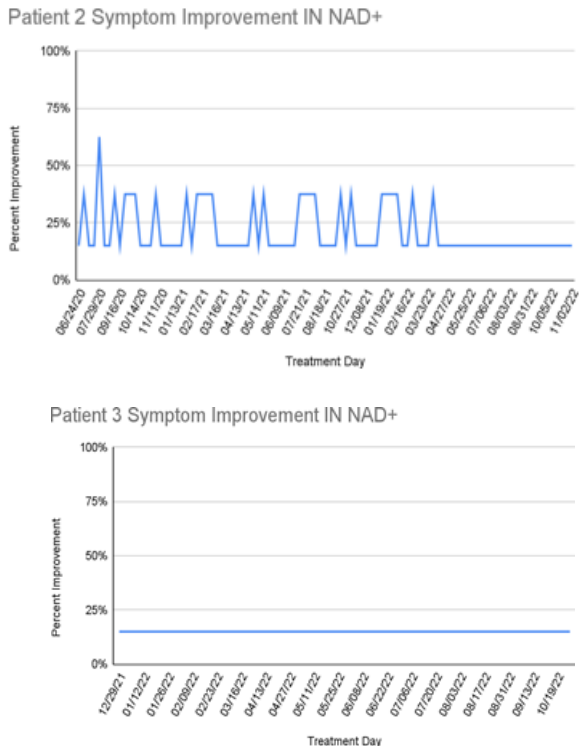


Figure 2: Self report ratings (0-100% scale) of overall symptom improvement as a function of time for Patient 1, Patient 2 and Patient 3.

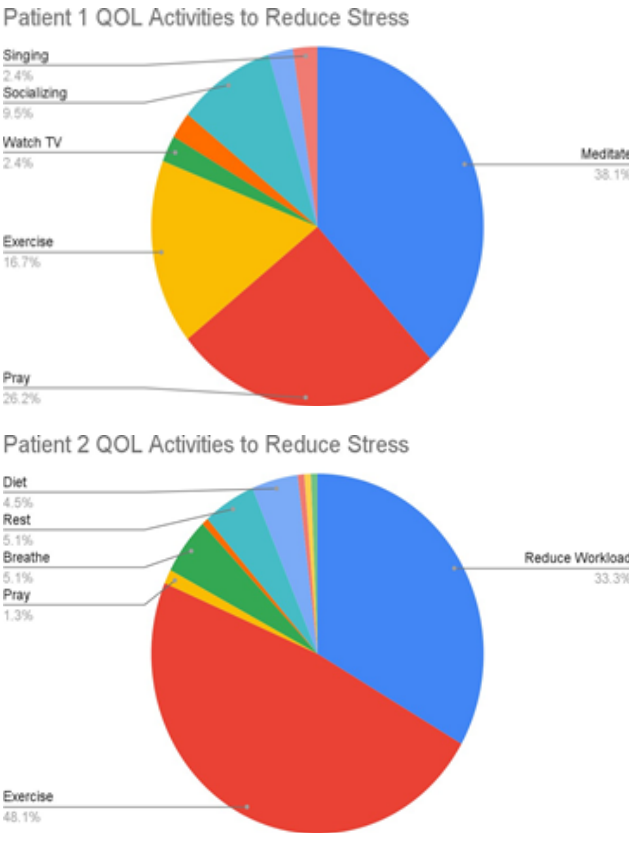


Figure 3: Self report Quality of Life activities (reported as % of total) to reduce stress for Patient 1, Patient 2 and Patient 3. Activities included meditation, prayer, exercise, diet, rest, watching T.V., socializing, singing, breathing, reducing workload, and sleep.

Previous research

It is important to note that the use of NAD+ as a treatment intervention for symptoms associated with PD is an area of ongoing research, and there are few publications that address the role of NAD+ in PD. However, the findings of this study do coincide with other similar studies on the effectiveness of NAD+ supplementation in this patient population. For example, in a case study examining a patient with PD who was administered NAD+ intravenously, following the IV NAD+ 8-day treatment protocol, the patient showed significant improvement, becoming "nearly asymptomatic," [4]. Over the course of treatment, hand tremors decreased, and visual hallucinations were absent during certain treatment days. Comparatively, in the initial IV NAD+ treatment protocol within this case study, tremors were found to have decreased by 50% in patients 1 and 3. In addition, collaborative efforts with physicians specializing in the use of NAD+ sphenocath/sphenopalatine ganglion block protocols resulted in effective treatment and management of migraine headache pain, suggesting that IN NAD+ is an effective strategy for management of symptoms associated with these conditions [4-7].

Limitations and Challenges

One limitation of this study pertains to the patient self-report data on symptom improvement. Under the category of "Symptom Improvement" within the patient self-report forms analyzed within this study, patients were not given the option to select "0%" to indicate no improvement. The absence of this response category may limit the accuracy of the reported improvements and could potentially underestimate the full spectrum of treatment effects. Future research should consider incorporating a comprehensive range of response options to generate a more accurate scale of patient improvement. In addition, the 2-year follow-up occurred during the COVID-19 pandemic, which could likely contribute to the stress levels and exacerbation of symptoms associated with PD. Patient 2 underwent a surgery in the middle of the IN NAD+ treatment, which is likely correlational to the increase in both pain and stress that was present during the timeframe of 06/01/2021 and 08/18/2021.

Conclusion

In conclusion, preliminary findings from this ongoing study indicate that the use of NAD+ administration protocols for initial

treatment and follow-up show therapeutic potential in alleviating tremors and improving symptoms of pain and cognitive impairments associated with PD. The use of NAD+ in the treatment of PD could be considered a supportive add-on to traditional medications and forms of standard care; however, further studies are needed to determine the effectiveness of NAD+ in this patient population. This research is currently underway, and data collected to date provide an important foundation for future investigations into the role of NAD+ in managing symptoms associated with PD. Additional data and continued follow-up will be necessary to further evaluate the long-term efficacy and therapeutic potential of NAD+ treatment in this patient population.

Acknowledgment

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