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Effects of Yoga therapy in teaching oral hygiene practice and tooth brushing skills in patients with Parkinson's disease: A qualitative study

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Abstract:

BACKGROUND: Parkinson's disease is a chronic neurodegenerative disorder associated with heterogeneous symptoms. Though it is characterized by means of four distinct motor symptoms such as resting tremors, muscular rigidity, bradykinesia, and postural instability. These patients also have deficits in fine motor skills while performing simple tasks such as brushing their own teeth, taking bath, remembering small details, and writing skills. The study aimed to qualitatively evaluate the effectiveness of Yoga therapy in teaching oral hygiene practice and subsequently, on tooth brushing skills in patients who were diagnosed with Parkinson's disease.

MATERIALS AND METHODS: This qualitative study was conducted on 100 patients diagnosed with Parkinson's disease. Institutional ethical committee permission was obtained prior to commencing the study. Written informed consent was obtained from patients or their caregivers before conducting this study. Detailed clinical history was recorded and gender characteristics were noted down. In the present study, there were 67 female and 33 male participants. Yoga exercises were taught to Parkinson's patients by a qualified yoga instructor. Improvements in toothbrushing skills were noted down by a single operator and oral hygiene status was analyzed using gingival index and plaque index on follow-up durations at 1, 2, 3, and 6 months. Yoga exercises comprised of warming up, stretching, yoga breathing exercises or pranayama, and/or relaxation process. Statistical analysis was performed by use of IBM SPSS Version 20.0. (IBM Corp., Armonk, NY) software designed for Windows. Intra-group comparison between categorical variables was done by statistical test-paired student 't-test'.

RESULTS: On comparing plaque indices, the mean \pm SD plaque index at 1st, 2nd, 3rd, and 6th months were 1.89 ± 0.02 , 1.72 ± 0.01 , 1.42 ± 0.12 , and 0.56 ± 0.02 , respectively. Mean \pm SD gingival index scores at 1st month, 2nd month, 3rd month, and 6th-month durations, scores were 1.76 ± 0.06 , 1.57 ± 0.12 , 1.23 ± 0.02 , and 0.76 ± 0.01 , respectively. Statistical significance difference was noted on comparing the indices scores.

CONCLUSION: Yoga practice has been shown to improve toothbrushing skills and oral hygiene in Parkinson's disease patients.

Keywords:

Motor, oral hygiene, Parkinson's, skills, tooth-brushing

Introduction

According to World Health Organization (W.H.O.), Parkinson's disease manifests

with different non-motor side-effects along with motor symptoms such as pain, impairment in cognition, and disorders affecting mental health among various other

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disturbances of sensory nerves. Dyskinesias (involuntary muscle movements) as well as dystonias comprise painful and uncontrollable contractions of muscles. Dyskinesias have a negative influence on mobility as well as patterns of speech that influence different aspects of day-to-day life. Any particular person affected by Parkinson's disease presents with unique symptoms. The most frequently seen symptoms include bradykinesia, tremors, stiffness, gradual increase in postural instability, and weakness of muscles.^[1]

Any progression in the symptoms of this disease greatly affects one's functioning as well as the quality of life. This may lead to high physical impairment, an increase in demand for health care along with an increase in mental stress with physical strain on health caregivers.^[2]

Parkinson's disease is a neurodegenerative disorder that is characterized by a decrease in pigmented types of neurons in the substantia nigra. This results in a decrease in levels of dopamine in areas of the brain that govern the coordination of movements.^[3] Parkinson's disease is characterized by degradation as well as the death of approximately 70% to 80% of neurons that produce dopamine in a process which is termed 'neuro-degeneration'. This also explains the non-motor nerve-related symptoms in patients who are diagnosed with Parkinson's disease.

Although Parkinson's is defined as primarily a 'movement-related disorder and is also associated with a broad range of symptoms related to behavior, physical, and neuro-psychiatry. It can also influence one's quality of life. These symptoms can appear before the onset of motor neural symptoms.^[4] Age is a significantly associated risk-related factor in Parkinson's disease, although its affliction among young individuals can be seen. Males are found to be affected more by Parkinson's disease compared to women. Also, Parkinson's disease has been found to be associated with environmental factors, for example, exposure to pesticides, pollution, and exposure to industrial-based solvents. According to the European Journal of Preventive Cardiology, there are three strong factors that may be associated with Parkinson's disease; namely, age, the habit of smoking as well as less physical activity.^[5]

Though most individuals suffering from Parkinson's disease present with symptoms above 60 years of age, roughly 5% - 10% of individuals develop Parkinson's disease before 50 years of age. 'Early-onset' variety of Parkinson's disease is genetically inherited, although sometimes it may be associated with alterations in genes.^[6]

It has been hypothesized that in Parkinson's disease, bradykinesia as well as morphological constraints related to the vertebral spine are responsible for pulmonary dysfunctioning.^[4] Compromised functioning of the pulmonary system might impact activities associated with day-to-day life. Also, a decrease in exercise-related tolerance results in fatigue as well as a lowering of Quality of Life.^[6]

Dysfunctioning of the Pulmonary system is an important and main reason for death along with morbidity in individuals diagnosed with Parkinson's disease.^[4] Loss of physical strength, systemic conditioning along with a reduction in exercising capacity lead to lowered exercise efficacy, physical activity as well as deterioration of motor neural function.^[5]

Progressively deteriorating bodily movements and physical functions eventually result in a decrease in one's quality of life. These require developing various types of physical therapies for addressing all such physical deficits.^[7] In Parkinson's disease, the smoothness and coordination between autonomic movements are hampered in patients. Rerouting of motor nerve-associated commands via higher areas in the brain cortex can be one of the strategies that can be employed for offsetting the loss in automatic neural coordination-related activities.^[6]

Individuals suffering from Parkinson's disease typically have a slow time of commencement and decreased amplitude of anticipatory adjustments in one's postures. These are rectified by means of deeper stimulation of the brain.^[8]

Non-motor symptoms related to Parkinson's disease are deterioration in cognitive activities, impairment in focus or concentration, the onset of depression, anxious mood, and disruption of sleep.^[9] Approximately 35% to 50% of individuals with Parkinson's disease suffer from depression. Both depression as well as anxiety may be the result of the chronicity of this illness alongside the breaking down of brain neural circuits and neurotransmitters that are seen in Parkinson's disease.

Depression negatively affects an individual's levels of energy, the ability for concentrate as well as their ability to make decisions, patterns of sleep as well as the quality of life.^[10] Utilization of pharmacotherapy in Parkinson's disease results in irregularities of the motor nervous system, disorientation, issues related to memory as well as psychological diseases.^[11] Thus, the use of non-pharmacological methods might be important for addressing the risk of falls as well as secondary issues related to immobilization.^[12]

Extra-psychosocial effectiveness of Yoga is significant for the management of this disease along with improving quality of life or QoL in patients suffering from Parkinson's disease. These aspects of managing Parkinson's disease are usually not addressed using the standard use of dopaminergic medications hence; there is a pressing requirement for an alternative mode of therapy for improving neural function as well as the quality of life for subjects who are diagnosed with Parkinson's disease.^[13]

Yoga increases muscle strength as well as endurance, power of muscles, flexibility, and balancing ability as well as coordination, and health-associated functions. Yogais an intervention involving both mind and body which includes physical postures or *Asanas*, breathing techniques or *Pranayama*, techniques for meditation as well as relaxation besides other practices. Practice of Yoga significantly results in improvements in memory, levels of stress, depression-associated anxiety along with an increase in overall general well-being among healthy individuals, mainly because of the generation of high levels of cortisol.^[13]

Yoga is a known method that acts as a supplementary as well as alternative means around the world. Studies have proven the beneficial effects of Yoga on the overall health of a person. Hence, this study was designed with the aim to qualitatively study Yoga therapy for teaching oral hygiene practice and toothbrushing skills in patients with Parkinson's disease.

Materials and Methods

Study design and setting

This was a comparative study conducted on patients who were diagnosed with Parkinson's disease. Institutional ethical committee permission was obtained prior to commencing the study (IEC/PD/2020/E). Written informed consent was obtained from patients or their caregivers before conducting this study.

Study participants and sampling

A total of 100 patients was included in this study after acquiring informed consent. Inclusion criteria for this study were a) Patients aged between 45 to 70 years who were diagnosed with Parkinson's disease, b) patients who had the ability for understanding and follow instructions, c) patients who were not participants in any previous similar study or intervention program and d) patients who were not utilizing any type of technique or intervention at the time of the study in order to improve their skills in toothbrushing or oral hygiene. Exclusion criteria for the study were a) Patients suffering from any other neurological deficit, b) Patients with co-morbid conditions such as epileptic seizures, c) those who were incapable of following instructions, and d) those patients of Parkinson's disease whom informed consent could not be obtained.

Demographic characteristics

Detailed clinical histories were recorded and gender characteristics were noted down. In the present study, there were 67 female and 33 male participants.

Yoga was taught to the patients by a trained yoga instructor in a stepwise manner [Table 1] and any improvement in toothbrushing skills was recorded by a single observer by means of examining the improvement in oral hygiene status by studying gingival index and plaque index at durations of 1, 2, 3 and 6 months.

Yoga lessons were imparted to the study participants by certified and experienced Yoga practitioners. Yoga lessons comprised of warming up, stretching, yoga breathing exercises, or pranayama, and relaxation process.

Statistical analysis

Statistical analysis was done by using IBM SPSS Version 20.0. (IBM Corp., Armonk, NY) software for statistics designed for Windows. Intra-group comparison

Table 1: Table demonstrating various exercises incorporated in Yoga protocol for studied patients

	1 st week	2 nd week	3 rd week	4 th week	5 th week
Breathing related yoga exercises	Diaphragm assisted breathing	Breathing in 3 parts	Audible breathing	Extended exhaling exercises	Alternate breathing from nostrils
Relaxation Exercises	Target oriented relaxation	Guided images	Affirmative relaxation	Breathing exercises	Mindfulness
Yoga postures practiced	Mountain Lion Lotus position Downward facing Dog Leg extensions Warrior pose I and II Arms across chest posture Dhanurasana Child pose				

between categorical variables was done by use of paired student T-test.

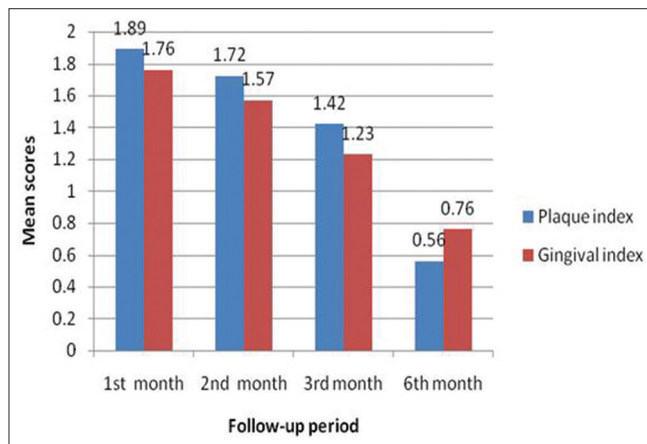
Results and Observations

On comparing plaque indices, it was observed that the mean \pm SD plaque index in 1st month was 1.89 ± 0.02 , in 2nd month was 1.72 ± 0.01 , in 3rd month was 1.42 ± 0.12 and in 6th month was 0.56 ± 0.02 . on the intra-group comparison, a statistically significant *P* value of 0.05 was obtained [Table 2, Graph 1].

On the other hand, on comparing mean \pm SD gingival index scores, it was observed that at 1st month, 2nd month, 3rd month, and 6th-month durations, scores were 1.76 ± 0.06 , 1.57 ± 0.12 , 1.23 ± 0.02 and 0.76 ± 0.01 , respectively. On statistical comparison, a statistical significance of 0.05 was obtained [Table 2, Graph 1].

Discussion

Parkinson's disease is an age-related neurodegenerative disease affecting more than ten million individuals across the world. Though Parkinson's disease has a complex pathophysiology, oxidative stress plays a major role in a progressive reduction in the numbers of dopaminergic neurons in the substantia nigra portion of the human brain.^[14] 'Oxidative stress' can be defined as 'disturbances in balance between production of free radicals or reactive oxygen species and anti-oxidative defense'. It takes place due to alterations in the equilibrium during the synthesis of reactive oxygen species as well as anti-oxidative processes within one's body.^[15]



Graph 1: Graph showing mean values of plaque and gingival indices

Table 2: Table demonstrating mean plaque and gingival indices scores following Yoga practice in Parkinson's disease

Variables	Index Scores (mean \pm SD)				<i>P</i>
	First visit (1 st month)	Second visit (2 nd month)	Third visit (3 rd month)	Fourth visit (6 th month)	
Plaque index	1.89 \pm 0.02	1.72 \pm 0.01	1.42 \pm 0.12	0.56 \pm 0.02	0.05
Gingival index	1.76 \pm 0.06	1.57 \pm 0.12	1.23 \pm 0.02	0.76 \pm 0.01	0.05

Dopaminergic neurons are vulnerable to oxidative stress as the metabolism of dopamine as well as its transportation can influence the production of reactive oxygen species.^[16] Post-mortem analytical studies have demonstrated an excessive synthesis of reactive oxygen and nitrogen molecule species along with a decrease in the levels of an anti-oxidant compound, glutathione or GSH, which is a biomarker of oxidative stress within substantia nigra. This is seen as proof of 'oxidative stresses in Parkinson's disease.'^[14]

Any form of exercise is considered to be an inherent component in managing Parkinson's disease as physical activity causes a reduction in oxidative stress by delaying the reduction in motor neural functions and improving in impairment of mood.^[16-18]

The practice of yoga that includes warming exercises help in improving flexibility increases self-awareness, and boosts the circulation of energy all over the body. 'Asanas' are psycho-physiological exercises which that are the basis of integration between mind and body activities. Performing Yoga exercises helps in stretching one's muscles, causes the loosening of stiffened joints, cause promotion of blood circulation, and enhancement of joint mobility as well as a range of movement.^[19] Yoga enhances proprioception and body balance in individuals with Parkinson's disease.^[20]

The practice of Pranayama helps in the alleviation of stress along with enhancement in memory as well as comprehension ability. A combination of asanas (physical exercises) and pranayama (breathing exercises) helps in enhancement as well as maintaining a balance between different physiological functions, thereby helping in reducing emotional issues as well as balancing negative habits and patterns that obstruct the flow of energy within the mind and body as a whole.^[19] Yoga-based interventions have been used as a therapeutic tool in several neurological, psychiatric, and other medical illnesses.^[21]

In the present study, it was seen that there was a statistically significant improvement in plaque and gingival indices from 1st to 6th month following Yoga classes in patients suffering from Parkinson's disease [Table 1].

In a similar study, Eswari *et al.* (2019) reported statistically significant improvement in brushing skills

after undergoing Yoga exercises in autistic spectrum children. They concluded that the practice of Yoga plays a positive role in the enhancement of toothbrushing skills in children diagnosed with autistic spectrum diseases.^[22]

Pranayama helps in the augmentation of strength, stamina, and mental balance. It induces better patterns of sleep by improving blood circulation and energy. It helps in harnessing levels of energy, thus, causing a reduction in hyperactivity which results in improving attention as well as mental focus.^[23,24]

Mengke Ban *et al.*^[25] (2021) in their study evaluated that yoga proved to be beneficial in improving motor skills, balance, and functional mobility, reducing anxiety and depression, and increasing QoL in Parkinson's disease patients.

James-Palmer *et al.* (2022) assessed the safety and feasibility of a synchronous tele-yoga intervention for persons with Parkinson's disease and found it to be safe for individuals with mild to moderate Parkinson's disease and elevated anxiety symptoms.^[26]

Hence, using adjunctive traditional methods such as Yoga exercises that include both physical as well as emotional benefits must be encouraged in disorders that have neurological deficits.

Limitations

The sample size of the present study was limited to 100 therefore the sample size should be increased for better statistical evaluation. Even various toothbrushing methods can be introduced for further evaluation. Similar follow-up studies should be carried out to evaluate the potential of yoga in improving the oral hygiene practice in Parkinson's disease patients.

Conclusion

Patients diagnosed with Parkinson's disease typically show progressive loss of motor functions and neurological functions. There are pharmacological methods available that can be utilized to manage these conditions although these have potentially serious side effects.

The use of traditional methods such as Yoga has been shown to improve physical as well as mental abilities in normal individuals. Hence, use of Yoga can be used as an essential tool in aiding the quality of life of patients suffering from Parkinson's disease and other similar conditions that hamper physical activities. The present study, assessed the effects of toothbrushing skills in patients of Parkinson's disease after Yoga exercises for a period of six months and reported significant improvement in skills of brushing teeth and subsequent,

improvement in oral hygiene status by assessing plaque and gingival indices.

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Conflicts of interest

There are no conflicts of interest.

References

- Mackenzie IRA. The pathology of Parkinson's disease. *BC Med J* 2001;43:142-7.
- Boland DF, Stacy M. The economic and quality of life burden associated with Parkinson's disease: Focus on symptoms. *Am J Managed Care* 2012;18:S168-75.
- Garber CE, Friedman JH. Effects of fatigue on physical activity and function in patients with Parkinson's disease. *Neurology* 2003;60:1119-24.
- Sabate M, Gonzalez I, Ruperez F, Rodriguez M. Obstructive and restrictive pulmonary dysfunctions in Parkinson's disease. *J Neurol Sci* 1996;138:114-9.
- Ellis T, Boudreau JK, Deangelis TR, Brown LE, Cavanaugh JT, Earhart M, *et al.* Barriers to exercise in people with Parkinson disease. *Physical Ther* 2013;93:628-36.
- Morris ME. Movement disorders in people with Parkinson's disease: A model for physical therapy. *Physical Ther* 2000;80:578-97.
- Ni M, Mooney K, Signorile JF. Controlled pilot study of the effects of power yoga in Parkinson's disease. *Complementary Ther Med* 2016;25:126-31.
- Liu W, McIntire K, Kim SH, Zhang J, Dascalos S. Bilateral subthalamic stimulation improves gait initiation in patients with Parkinson's disease. *Gait Posture* 2006;23:492-8.
- Jankovic J. Parkinson's disease: Clinical features and diagnosis. *J Neurol Neurosurg Psychiatr* 2008;79:368-76.
- Reijnders JS, Ehrt U, Weber WE, Aarsland D, Leentjens AF. A systematic review of prevalence studies of depression in Parkinson's disease. *Mov Disord* 2008;23:183-9.
- Saint-Cyr JA, Taylor AE, Lang AE. Neuropsychological and psychiatric side effects in the treatment of Parkinson's disease. *Neurology* 1993;43(Suppl 6):S47-52.
- Cutson TM, Laub KC, Schenkman M. Pharmacological and nonpharmacological interventions in the treatment of Parkinson's disease. *Phys Ther* 1995;75:363-73.
- Roland KP. Applications of yoga in Parkinson's disease: A systematic literature review. *Res Rev Parkinsonism* 2014;4:1-8.
- Smulders K, Dale ML, Carlson-Kuhta P, Nutt JG, Horak FB. Pharmacological treatment in Parkinson's disease: Effects on gait. *Parkinsonism Relat Disord* 2016;31:3-13.
- Rahal A, Kumar A, Singh V, Yadav B, Tiwari R, Chakraborty S, *et al.* Oxidative stress, prooxidants, and antioxidants: The interplay. *Biomed Res Int* 2014;2014:761264.
- Bloomer RJ, Schilling BK, Karlage RE, Ledoux MS, Pfeiffer RF, Callegari J. Effect of resistance training on blood oxidative stress in Parkinson's disease. *Med Sci Sports Exerc* 2008;40:1385-9.
- Allen NE, Sherrington C, Paul SS, Canning CG. Balance and falls in Parkinson's disease: A meta-analysis of the effect of exercise and motor training. *Mov Disord* 2011;26:1605-15.
- Cruise KE, Bucks RS, Loftus AM, Newton RU, Pegoraro R, Thomas MG. Exercise and Parkinson's: Benefits for cognition and quality of life. *Acta Neurol Scand* 2011;123:13-9.
- Dias V, Junn E, Mouradian MM. The role of oxidative stress in Parkinson's disease. *J Parkinsons Dis* 2013;3:461-91.
- Cherup NP, Strand KL, Lucchi L, Wooten SV, Luca C, Signorile JF.

- Yoga meditation enhances proprioception and balance in individuals diagnosed with Parkinson's disease. *Percept Mot Skills* 2021;128:304-23.
21. Dutta R. Role of yoga in Parkinson's disease-A comprehensive update of the literature. *J Neurosci Neurol Disord* 2020;4:045-8.
 22. Eswari R, Prathima GS, Sanguida A, Ramanathan M, Bhavanani AB, Harikrishnan E. Integrated yoga therapy for teaching toothbrushing skills to children with autism spectrum disorder: A qualitative study of parents' perceptions. *Yoga Mimamsa* 2019;51:43-7.
 23. Ramanathan M, Bhavanani AB. Addressing autism spectrum disorder through yoga as a complementary therapy. *J Basic Clin Appl Health Sci* 2018;2:3-6.
 24. Kenny M. Integrated movement therapy: Yoga-based therapy as a viable and effective intervention for autism spectrum and related disorders. *Inter J Yoga Therap* 2002;12:71-9.
 25. Ban M, Yue X, Dou P, Zhang P. The effects of yoga on patients with Parkinson's disease: A meta-analysis of randomized controlled trials. *Behav Neurol* 2021;2021:5582488.
 26. James-Palmer AM, Daneault J-F. Tele-yoga for the management of Parkinson disease: A safety and feasibility trial. *Digit Health*. 2022;8:20552076221119327. doi: 10.1177/20552076221119327.