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The Effect of 3-week's Yoga therapy program on clinical outcomes in patients with Parkinson's disease

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ABSTRACT

Background: Parkinson's disease, according to the WHO, has a variety of non-motor side effects in addition to its motor symptoms (cognitive impairment, mental health disorders, pain, and other sensory disturbances). The progression of these symptoms and their implications affects functioning and quality of life greatly, resulting in high rates of impairment and care demands, as well as stress and strain on caregivers. **Material & Methods:** A total of 31 PD patients were included in this investigation. The Integrated Approach of Yoga Therapy was applied to all patients who met the inclusion criteria (IAYT). Parameters were taken twice, once on the day of admission and other when they were leaving the residence on completion of the program. Data was evaluated using a pre-test and post-test design. **Dependent Variable:** Pulse rate, Respiratory rate, Systolic Blood Pressure, Diastolic Blood Pressure, Breath Holding time and BMI. **Results:** A total of 31 subjects participated in the study 31 subjects completed the study. After 21 days of integrated Yoga therapy program, it showed that significant reduction in ($P < 0.05$) in Systolic and diastolic Blood pressure, respiratory rate and significant improvement is seen in breath holding time (BHT), but there were no changes in BMI ($P > 0.05$). **Conclusion:** The three-week yoga programmed was able to dramatically enhance clinical results in Parkinson's disease and self-reported medication reduction without aggravating symptoms.

Key words: Parkinson disease (PD), integrated approach of yoga therapy (IAYT), Motor symptoms, behavioral symptoms, neuropsychiatric symptoms, conventional therapy.

INTRODUCTION

Parkinson's disease, according to the WHO, has a variety of non-motor side effects in addition to its motor symptoms (cognitive impairment, mental health disorders, pain, and other sensory disturbances). Dyskinesias and dystonias are painful, uncontrollable muscle contractions that cause involuntary movements (dyskinesias), which have a negative impact on mobility and speech as well as many other

aspects of daily life. Each person has a unique set of Parkinson's disease symptoms. Bradykinesia, stiffness, tremors, increasing postural instability, and muscular weakness are frequent symptoms.^[1] The advancement of these symptoms and their implications affects functioning and quality of life greatly, resulting in high rates of impairment and care demands, as well as stress and strain on caregivers.^[2] Parkinson's disease (PD) is a neurodegenerative disease characterized by the loss of pigmented neurons in the substantia nigra, resulting in decreased dopamine availability in brain areas that aid and govern coordinated movement.^[3] In Parkinson's disease, 70-80% of dopamine-producing cells eventually degrade and die, a process known as neurodegeneration. This might assist in explaining why so many Parkinson's patients have non-motor symptoms. Although Parkinson's is defined as a movement disorder, it is also associated with a wide range of behavioral, neuropsychiatric, and physical symptoms that can impact quality of life. These can occur at any point, even before motor symptoms are recognized.^[4] Age is a risk factor for Parkinson's

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disease, but younger people can still be affected. Men suffer more than women. Several studies have found that environmental variables such as pesticides, air pollution, and industrial solvents may increase the incidence of Parkinson's disease. A new study published in the European Journal of Preventive Cardiology has found that age, smoking and a lack of physical activity are the three strongest factors associated with Parkinson's.^[5] Although the majority of persons with Parkinson's disease develop the symptoms beyond the age of 60, around 5% to 10% develop the disease before the age of 50. Early-onset Parkinson's disease is usually inherited, although not always, and some types have been related to particular gene alterations.^[6] As the U.S. and global populations age, the number of persons with Parkinson's disease (PD) might quadruple between 2005 and 2030^[7], with more than 40 million people worldwide suffering from the disease by 2020.^[8]

According to the 2015 Global Burden of Disease Study, the prevalence of Parkinson's disease was estimated to be at 6.2 million individuals globally. However, this figure might be much higher because many people go undetected. As the incidence of Parkinson's disease grows with age and people live longer lives, the prevalence of Parkinson's disease is expected to climb drastically in the future. According to the Global Burden of Disease Study 2015, there may be almost 13 million people with Parkinson's disease by 2040.^[4] It is hypothesized that bradykinesia and physical constraints of the vertebral spine generate pulmonary dysfunction.^[9] Compromised pulmonary function may also impact activities of daily living (ADLs) and physical function, as well as decrease exercise tolerance, resulting in tiredness and lowering QOL.^[10] Pulmonary dysfunction is one of the primary causes of death and morbidity in people with Parkinson's disease.^[9] Reduced strength, conditioning, and exercise capacity all lead to lower exercise self-efficacy, activity, and motor function deterioration.^[11] The deterioration of movement function, as well as the resulting loss in quality of life (QoL), needs the development of therapies to address these deficits.^[12] Smooth, coordinated automatic movements are hindered in

those with Parkinson's disease. Rerouting motor commands through higher cortical areas is one strategy to offset this loss of automaticity.^[13] One study found that those with Parkinson's disease had a slower commencement time and a reduced amplitude of these anticipatory postural adjustments, which can be rectified by deep brain stimulation.^[14] Nonmotor symptoms of Parkinson's disease include cognitive deterioration, impaired concentration, depression, anxiety, and sleep disruption.^[15] Although drugs can reduce the course of this condition, they tend to become ineffective with time. Between 35% and 50% of people with Parkinson's disease are depressed. Depression and anxiety can be caused by living with a chronic illness, as well as by the breakdown of brain circuits and/or neurotransmitters that occur in Parkinson's disease. Depression can negatively affect energy levels, concentration and decision making, sleep, and perceived quality of life.^[19] Pharmacotherapy in PD can also cause motor irregularities, disorientation, memory issues, and psychological disorders.^[16] Therefore, non-pharmacological therapies may be necessary to address fall risk and secondary problems of immobility.^[17] The extra psychosocial effects of Yoga are especially significant for disease management and QoL in people with Parkinson's disease, as they are frequently unaddressed by standard dopaminergic medication. Given this, there is an urgent need for alternative therapy to improve function and quality of life in people with Parkinson's disease.^[18] In healthy persons, Yoga has been found to increase muscle strength and endurance, muscle power, flexibility, balance and coordination, and health-related functions.^[7] Yoga is a mind-body intervention that includes physical practices (*Asanas*), breathing methods (*Pranayama*), meditation and relaxation techniques, and other modalities. Yoga practice improves memory, stress, depression, and anxiety as well as increases overall well-being in healthy people, potentially due to higher cortisol levels.^[19]

Yoga is a well-known supplementary and alternative medicine method across the world. Yoga has been shown in studies to provide a variety of health

advantages for a variety of clinical ailments.^[20] The adaptability of yoga to people of varying abilities are crucial for this group, which is experiencing growing mobility challenges. These programmers have improved stress, mood, sleep, pain, mobility, problem solving, memory, and seizure management^[10] gait, tiredness, quality of life, and physical function in people with a variety of neurological diseases.^[20] *Yoga*-based therapy may potentially reduce the risk of falling and improve quality of life in those suffering from musculoskeletal disorders.^[22] In this study, *Yoga* improved depression, anxiety, exhaustion, and pain in those with chronic pain, whereas it had a substantial influence on QOL, fatigue, and cognition in people with multiple sclerosis. These findings suggest a continued study of *Yoga* for increasing QOL in those with Parkinson's disease.^[21] In inactive older people, 8 weeks of Iyengar *Yoga* improves respiratory function, blood pressure, and aspects of mental well-being. Aerobic exercise training has been demonstrated to enhance cardiorespiratory fitness, particularly pulmonary function parameters, rate of perceived effort, and exercise tolerance in Parkinson's disease.^[23] Mind-body treatments that target both psychological and physical well-being include meditation, relaxation, breath training, yoga, and tai chi. These procedures create changes in the brain during EEG and neuroimaging examinations and have a positive influence on blood pressure, heart rate, respiration rate, and blood glucose levels. A 12-week yoga intervention significantly improved motor Unified Parkinson's Disease Rating Scale (UPDRS) scores, balance function, flexibility, posture, and locomotion compared to a control group that received no intervention, according to one pilot research.^[24] In an RCT, participants with Parkinson's disease who practiced yoga reported increased energy and noticeable tremor reduction that lasted for many hours afterward, as well as more relaxation with less weariness, good social interaction development, improved overall mood, and paying more attention to body signals and QoL. Two members of a yoga group reported using fewer medications as their symptoms improved.^[25] In this study, we are investigating how a

3-week residential yoga program affects the clinical outcomes of PD patients.

MATERIAL AND METHODS

A total of 31 PD patients were included in this investigation. Purposive sampling was adopted to choose research participants from the SVYASA Yoga University's Arogyadhama Neurology department. Those with a Parkinson's diagnosis, of either sex, and between the ages of 41 and 82, Hoehn & Yahr Classification of Disability^[26,27] stage 1-2 participants who were able to walk for at least 50 feet with or without an assistive device and who could get up and down from the floor with little assistance were invited to participate in this open clinical trial with a pre- and post-test design. Participants were disqualified if they met any of the following criteria: stage more than 3 on the Hoehn & Yahr Classification of Disability, age greater than 82, deterioration in immunological function, such as pneumonia or systemic infection, progressive degenerative disease other than PD, spinal fusion or other orthopedic surgery during the previous six months, mental disease/psychosis, such as dementia, greater than minimum help needed for walking and transfers, inability to keep regular schedules and those who were already undergoing yoga training elsewhere within the past year were not a part of this study. The number of potential participants who were examined for eligibility was recorded to provide an indicator of the yoga program's desirability.^[28] The Integrated Approach of *Yoga* Therapy was applied to all patients who met the inclusion criteria (IAYT). All 31 subjects provided their verbal or written consent. Clinical outcomes like Blood Pressure, Respiratory rate, Pulse rate, Breath Holding Time and BMI were measured.

Intervention

During the course of the three-week residential programme, IAYT interventions were given to individuals in the experimental group on a daily basis. The respondents received a daily schedule outlining all of the *Yoga* practices they would engage in while they were there. The integrated approach to *Yoga* therapy (IAYT) technique was developed by Swami

Vivekananda Yoga Anusandhana Samsthana (S-VYASA). The IAYT method, based on the *Pancha Kosa* concept, incorporates diverse yogic practices at each level to aid patients with various conditions in coping with their challenges.^[30] *Annamaya Kosa's* practises included the following: *Asana*, Diet, *Sithilikarana Vyayama*. The *Pranamaya Kosha* practices included-Breathing exercises and *Pranayama*. The practices of *Manomaya Kosha* included: Cyclic meditation, Om meditation, Mind sound resonance technique (MSRT) and Devotional sessions. The *Vijnanamaya Kosha* Practices include: Lectures and *Yogic* counselling using yogic concepts. The IAYT is a holistic programme, and the patient's capacity to collaborate with and integrate the available components may allow for the greatest outcomes. It aids in dealing with day-to-day stresses using a variety of *Yogic* practices that employ the notion of "successive stimulations followed by gradual relaxation and rest" to repair imbalances, enhance "mastery over the mind," and harmonize disturbances at each of the five levels (*Pancha Kosa*) [29,30]. The aim of IAYT was to "help the patients" reach each of their "layers of existence" (*Panch Kosas*), through the therapy process. The unique feature of the IAYT was the need to integrate the principles of yoga therapy in the counseling sessions during the treatment process, to enable patients to understand the process and goal of the IAYT. The counseling is offered by the PC (psychoeducation, supportive therapy) and YT (yogic counseling).^[31]

Outcome Measures

Parameters were collected on day first. The participants reported twice for giving their data before joining the yoga practice and before leaving the residence. When patients appeared for parameter checking, they were asked to first sit and relax for 5-10 mins and normalize their breathing and heart rate. After which their Blood pressure was measured with the help of a sphygmomanometer, heart rate with a stethoscope, Respiratory rate through abdominal movements, Breath holding time with help of *Bhramari Pranayama*. Height and weight were measured on the day of admission with the help of a stadiometer and

weighing scale respectively. BMI was calculated using the standard BMI formula.

Data Collection

Data was collected on day first. The participants gave their data before joining the yoga practice and before leaving the *Prashanti Kutiram*, between Friday 3 pm to 5 pm and Thursday 9 am to 11 am, timing was kept fixed for all the participants for the whole duration of study, all the participants practiced yoga therapy under the section- A therapist as per their time schedule. The participants reported twice for giving their data which is based on before and after the yoga practice module.

Data Analysis

All variables were as a mean \pm standard deviation. Statistical significance was set up at $p < 0.05$, and all the analysis was performed using R-Studio.

RESULTS

A total of 31 subjects participated in the study 31 subjects completed the study, which was conducted at the end of 21 days program; Mean values and standard deviation for the values were calculated. After 21 days of integrated Yoga therapy program, it showed that significant reduction in ($P < 0.05$) in Systolic and diastolic Blood pressure, respiratory rate and significant improvement is seen in breath holding time (BHT), but there were no changes in BMI ($P > 0.05$). [Table 1].

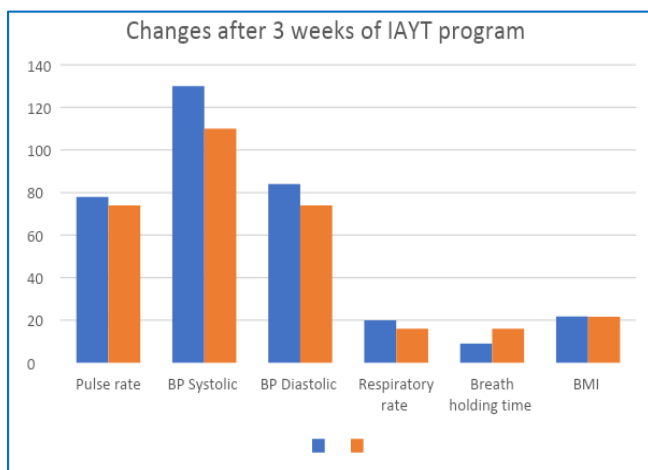
Table 1: Changes after three weeks of IAYT intervention

Variables	3 Weeks of IAYT program (N=31)		P-Value
	Pre	Post	
Pulse rate	78 \pm 8.0	74 \pm 4.9	0.09
BP Systolic	130 \pm 19.5	110 \pm 10.7	0.05*
BP Diastolic	84 \pm 11.3	74 \pm 8.4	0.02**
Respiratory rate	20 \pm 3.9	16 \pm 2.4	0.00***

Breath holding time	9 ± 4.2	16 ± 3.1	0.00***
BMI	21.8 ± 4.3	21.6 ± 4.1	0.1

*Significant at $P < 0.05$, ** significant at $P < 0.01$, ***significant at $P < 0.00$ (paired sample test and Wilcoxon Signed Ranks Test)

Graph 1: Changes after three weeks of IAYT intervention



DISCUSSION

This study set out to determine whether a 3-week residential *Yoga* programme had any positive effects on patients with Parkinson's disease in terms of their clinical outcomes. The completion of this programme was linked to a substantial improvement in systolic and diastolic pressure, respiratory rate, breath holding duration, and general health without affecting BMI. The following are the advantages of the yoga techniques used in the intervention: (1) *Asana*: A firm, pleasant position that stabilizes the body and fully massages the internal organs to give them a profound state of relaxation. As a result, the body's organs begin to work harmoniously and the mind feels at ease. (2) Diet: A simple vegetarian diet (*Sattvic* diet), which promotes mental calmness and preserves internal balance in both the body and the mind, is advised. (3) Exercises for loosening up: Reduces joint stiffness, fortifies body muscles, and boosts physical endurance. (4) Breathing exercises: Improves breath awareness, clears the lungs, adjusts breathing rhythm, and expands lung capacity. (5) *Pranayama*: Restores

autonomic balance by slowing the breath and calming the mind. (6) Cyclic meditation: Consists of repeated stimulations and relaxations; (7) *Om* meditation and mind sound resonance technique (MSRT) for enhancing awareness and soothing the mind and body; and (8) Devotional sessions: Offers better self-awareness, lower stress, a calmer state of mind, enhanced self-compassion, and a more upbeat attitude. *Yoga* enhances awareness through the integration of breathing, cognitive control, and relaxation, perhaps enabling a Parkinson's disease patient to access higher cortical regions while moving. When paired with relaxation and breathing, *Yoga* poses and stretches improve spine and limb flexibility while also enhancing muscular relaxation. Several *Yoga* postures involve balance, such as those that include postural alignment and breathing while progressing from bilateral to single-leg stance.^[32] People with chronic conditions who practise yoga report feeling less depressed, worn out, and better overall. As yogic breathing techniques quickly lower blood pressure in healthy people, they also help to improve respiratory pressure.^[33] *Yoga* helps persons with Parkinson's disease improve their motor skills. This may be explained in part by improvements in balance, strength, posture, and gait. Because Parkinson's disease is progressing, yoga as an alternative therapy may give a strategy to preserve wellbeing and possibly quality of life.^[28] *Yoga* in a group setting offers social interaction, learning, support from others, and the opportunity to share comparable experiences. As a result, in addition to the physical benefits of *Yoga*, the impacts of sociability and self-efficacy are probable paths for improved QoL in patients with Parkinson's disease. *Yoga* also emphasizes the need for greater self-assurance and less social withdrawal, which is crucial since it may indicate greater illness acceptance in Parkinson's disease. *Yoga* may have a calming effect by directly boosting parasympathetic output and shifting away from autonomic arousal via vagus nerve stimulation. *Yoga* may help Parkinson's disease patients feel better physically, mentally, and emotionally by enhancing parasympathetic dopamine beta-hydroxylase activity, which reduces pain, discomfort, and perceived stress.^[34] *Yoga*, in example,

provided an alternative treatment method for some of the reversible factors regulating motor performance. This is important because increased physical health may facilitate better mental health and independent living. Although there is not enough research to provide solid scientific backing for the use of *Yoga* in Parkinson's disease, there is also no evidence that it is harmful. *Yoga* can help with fewer side effects than conventional pharmaceutical treatments and may improve quality of life (QoL) through improved function, both of which are essential for the effective management of Parkinson's disease.^[35]

CONCLUSION

The three-week *Yoga* programme was able to dramatically enhance clinical results in Parkinson's disease and self-reported medication reduction without aggravating symptoms. As a result, in addition to conventional therapy, *Yoga* can play an important complementary role in the safe treatment and self-management of Parkinson's disease. *Yoga* knowledge is used to execute other everyday tasks with greater conscious thought and awareness, allowing for safer choices and reducing the adverse effects of drugs and the condition itself. As a result, *yoga* may be a safe, cost-effective, lifestyle, and non-pharmacological strategy in the treatment of Parkinson's disease.^[16]

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