

## Importance of Traditional Indian Practices of Yoga, Pranayama and Meditation as Adjuvant Therapy for Parkinson's Disease Patients - A Review

Nagalakshmi CS<sup>1\*</sup>, Santhosh NU<sup>2</sup>

<sup>1</sup>Professor and Head, Department of Biochemistry, Sri Siddhartha Institute of Medical Sciences and Research Centre, T Begur, Nelamangala Taluk, Bangalore Rural, Karnataka, India

<sup>2</sup>Consultant Neurosurgeon (Endovascular), Aster CMI Hospital, Sahakarnagar, Hebbal, Bangalore North, Karnataka, India

\*Corresponding author: Nagalakshmi CS, Professor and Head, Department of Biochemistry, Sri Siddhartha Institute of Medical Sciences and Research Centre, T Begur, Nelamangala, Bangalore Rural, Karnataka, India. Tel: 09241852058; Email: nagu.smile@gmail.com

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### Abstract

Parkinson's disease (PD), a neurodegenerative disorder, is characterized by appearance of Lewy-body-like inclusions in Nigro-striatal terminals, which finally ends up with reactive gliosis and cell death. In its familial forms, a loss of normal function of  $\alpha$ -synuclein, as well as toxic effects of its mutated form, finally leading on to oxidative stress has been discussed. Several motor and non-motor symptoms of PD still continue to offer a challenge to PD patients as well as Neurologists, since no such treatment is as yet available, which would cure or even slow its progression.

Physical exercise is known to improvise the oxidative stress, motor functioning and mood. However, it requires regular monitoring and is equipment-dependent. Further, controlling body balance is a complex process requiring an integration of brain as well as multiple body systems. Yoga is one such intervention which works on the principle that the union of spirit and mind with exercise would bring about body balance, thus ensuring healing. Meditation practices incorporate self-observation of mental activity & attentional focus training. While the relaxation and breathing techniques include awareness of breathing rate, rhythm and volume.

For patients with clinical diagnosis of mild to moderate Parkinson's Disease (Hoehn & Yahr stages I-III), a composite program of Yoga, Meditation and Pranayama, each session lasting for 45 minutes has been proposed. These are known to be feasible, significant and relevant to PD, which can improve the speed of movement, muscle strength and power. All these practices can reinforce both physical and mental well-being of PD patients, thereby enhancing quality of their lives.

**Keywords:** Yoga; Meditation; Parkinson's disease; Complementary therapy; Alternate therapy; Quality of life; Alpha-Synuclein; Dopamine; Oxidative stress

### Parkinson's Disease - Current Scenario

Parkinson's disease, is an age-related neurodegenerative disorder that affects approximately 1 million persons in the US alone. The appearance of Lewy-body-like inclusions in Nigro-striatal terminals might be followed by retrograde degeneration, further accumulation of aggregated proteins in nigral cell bodies and, finally, reactive gliosis and cell death. In familial forms of Parkinson's disease, linked to mutations in  $\alpha$ -synuclein, it is proposed that a loss of normal function of this protein, as well as a toxic effect of altered forms of the mutant protein, promote the accumulation of dopamine in cytoplasm. This would result in oxidative stress, leading to the onset of Neurodegenerative changes [1].

Although Parkinson's disease was first elaborately described more than two hundred years ago, it's only recently that we have started to understand the intricate nature of functional deficits it entails or its neurobiological causes. Though the basic chemistry and the recent research has escalated our knowledge and understanding of the Patho-

physiology of Parkinson's disease and numerous developments have taken place in the Pharma industry, various motor and non-motor symptoms of Parkinson's disease still remain refractory to treatment with currently available drugs or surgical procedures and they continue to offer a challenge for Neurologists and Neurosurgeons worldwide [1].

In an attempt to overcome these problems, patients are in search of complementary and integrative health care options. Their added concerns include: cost associated with current treatment strategies and the side effects associated with drugs. Integrative health treatment options are generally lower in cost, have minimal physical & emotional risks, and allow people to indulge themselves actively in their treatment [2,3]. Thus, an imminent challenging task for researchers & academicians will now be to investigate on, to develop and to validate such alternate forms of therapies which will complement the beneficial effects produced by medical and surgical treatments [4].

Physical activities such as exercise are known to decrease oxidative stress [5,6], delay the decline in motor functioning [5,7] and improve mood [5,8]. However, aerobic or resistance-based exercises require regular safety monitoring, and most of them are dependent on equipment. Further, controlling body balance is a complex process requiring an integration of brain and multiple body systems [2,9]. Yoga is one such well-established intervention capable of effectively connecting the body and mind [2,10-12].

## Yoga

Yoga is an ancient Indian mind-body approach [13] based on the principle that the union of spirit and mind with exercise brings about body balance and ensures healing [14,5]. Because of the active mind-body component, yoga may be more therapeutic than traditional exercise [2,15-19]. During yoga, the mind is encouraged to focus on what is occurring in the body and where the body is in space, increasing both awareness and proprioception.

The traditional Indian practice of Hatha yoga is gentle in its approach & can be adapted by PD patients who otherwise may not be able to perform strenuous exercise. Hatha yoga is considered the foundation of all other yoga practices and it incorporates: Asanas i.e., stretching and prolonged physical postures which lengthen major muscle groups and activates stretch receptors in muscles, ligaments & joints, leading to improved strength and flexibility [2,20-21]); instructed relaxation; interoception; Pranayama (diaphragmatic breathing technique) & Dhyana (meditation/mindfulness) [2,5,22] and has several documented health benefits, including improvement in functional deficits [23,5,2].

Overall, Yoga can improve mobility, balance, body alignment, functional gait, agility, endurance and emotional well-being [24,2,20-21,25-27]. It can even decrease fall rates in patients with PD. American Parkinson Disease Association (APDA) in fact reports that yoga therapy can visibly reduce tremors and improve steadiness in gait.

To reinforce the above said effects induced by yoga, there are numerous studies quoting the beneficial effects of yoga at the molecular level. They have mentioned that Yoga can counter oxidative stress [28], improve neuro-cognitive function & mood, enhance sensory-motor performance, increase dopamine & serotonin secretion

and reduce cortisol secretion [29]. There is an enhanced release of endogenous dopamine too during Yoga Nidra i.e., Meditation [30,31].

## Meditation

Meditation practices incorporate self-observation of mental activity, attentional focus training, and cultivating an attitude that highlights process rather than content. Concentration type of meditation entails directing one's attention on some intentional process such as repetition of a word/phrase (mantra), or the breath, while Transcendental type of Meditation is a concentration technique and is a registered trademark. Brain changes during meditation have been observed in several EEG and Neuro-imaging studies [32] and there is an evidence for meditation effects on endocrine [33], neurotransmitter [34] and immune system measures [35].

## Relaxation and Breathing Techniques

Relaxation and breathing techniques utilize awareness of breathing rate, rhythm and volume. Most often, breathing techniques are used to minimize physiologic responses to stress, possibly by increasing parasympathetic response [36].

It is therefore a welcoming sign to know that, together, Yoga, Pranayama and Meditation address nearly all the molecular and pathogenetic mechanisms contributing to the development of PD. This offers us a hope to revolutionize the ways in which this debilitating disease can be managed by using a multitude of approaches.

## Certain Specific Yoga modules, Meditation practices and Pranayamas advisable for Parkinson's Disease Patients

For patients with clinical diagnosis of mild to moderate Parkinson's Disease (Hoehn & Yahr stages I-III), a composite program of Yoga, Meditation and Pranayama, each session lasting for 45 minutes has been proposed following focused literature review. These are known to be feasible, significant and relevant to the study participants [37]. Details regarding individual asanas with respect to the number of rounds performed and time duration to complete each asana are hereby mentioned in Table 1.

Sl. No.	Practice (Sanskrit)	Practice (English)	Rounds	Total Time (in minutes)
1	<b>Specific Loosening Practices for Parkinson's disease</b>			
	Griva Shithilikarana	Neck exercises	6	2
	Bhuja Shithilikarana	Shoulder rotation	6	2
2	<b>Specific Breathing Practices for Parkinson's disease</b>			
	Shvasa Kriya	Hands in and out	3	2
	Shvasa Kriya	Hand stretch breathing	3	2
3	<b>Specific Supine Asanas for Parkinson's disease</b>			
	Suptaudarakarshanasana	Folded leg stretches		
		Right side	3	3
Left side		3		

4	<b>Specific Relaxation after Asanas for Parkinson's disease</b>			
	Shavasana	Deep relaxation technique	2	10
5	<b>Specific Pranayama Practices for Parkinson's disease</b>			
	Vibhagya Pranayama	Sectional breathing		4
		Abdominal	3	
		Thoracic	3	
		Shoulder	3	
	Nadi Shuddi	Alternate nostril breathing	18	8
Bhramari Pranayama	Bumble bee chant	5	2	
6	<b>Specific Meditation Practices for Parkinson's disease</b>			
	Nadanusandhana	Sound resonance technique		10
		AA Kara	18	
		UU Kara	18	
		MM Kara	18	
		AUM Kara	18	
			<b>Total time = 45 minutes</b>	

**Table 1:** Specific yoga and meditation module designed for PD patients.

## Conclusion

Yoga, Meditation and Pranayama if performed on a regular basis, can improve the speed of movement, muscle strength and power, which very much is the need of the hour, both for PD patients and their care takers. All these practices can reinforce both physical and mental well-being of PD patients, thereby enhancing quality of their lives.

With the research pacing up on the genetic basis of familial forms of PD, the discovery of trophic factors capable of influencing dopaminergic neurons, development of novel technologies including use of stem cells & viral vectors and various research programs designed to evaluate the effect of various Yogic practices on Clinical, Biochemical and Molecular aspects of Parkinson's Disease, we have every reason to believe that, this crippling disease will surely become a chapter in the history of ancient diseases.

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