www.ijarp.com ISSN 2456-9992 Page: 01-11

International Journal Advanced Research Publications

Research Article

Volume: 02
Issue: 08

EFFECTS OF PRANAYAMA COMBINED WITH OCCUPATIONAL THERAPY INTERVENTION IN PATIENTS WITH PARKINSON'S DISEASE

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Article Received: 28 June 2026, Article Revised: 18 July 2026, Published on: 06 August 2026

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Doi: https://doi-doi.org/101555/ijarp.4745

ABSTRACT

Background: Parkinson's Disease (PD) is a progressive neurodegenerative disorder of the extrapyramidal system characterised by tremor, bradykinesia, and rigidity. The chronic and disabling nature of the condition leads to increased psychological stress and a reduced quality of life (QOL). Pranayama, or controlled breathing exercises, increases parasympathetic activity and reduces sympathetic activity, thereby helping to reduce stress, while Occupational Therapy (OT) improves functional performance and QOL in individuals with Parkinson's Disease.

Objective: To study the effectiveness of Pranayama combined with Occupational Therapy on perceived stress and quality of life in patients with idiopathic Parkinson's Disease.

Methods: A prospective randomized controlled study was conducted on 30 mild to moderate (Hoehn and Yahr stages 1–3) idiopathic Parkinson's Disease patients aged 40–70 years. Participants were allocated into a control group (n = 15) receiving conventional Occupational Therapy and an experimental group (n = 15) receiving Pranayama (Anulom-Vilom and Kapalbhati) along with conventional Occupational Therapy over an eight-week period. Perceived stress and quality of life were assessed before and after the intervention using the Perceived Stress Scale (PSS) and the WHOQOL-BREF questionnaire. Data were analysed using the paired t-test.

Results: Both groups demonstrated significant improvement in quality of life across all domains of the WHOQOL-BREF. However, the reduction in perceived stress was statistically significant only in the experimental group, indicating that the combined effect of

Pranayama and Occupational Therapy was more effective in reducing stress. The psychological domain showed markedly greater improvement in the experimental group compared with the control group.

Conclusion: Occupational Therapy combined with Pranayama is effective in reducing perceived stress and improving the quality of life in patients with idiopathic Parkinson's Disease. Occupational Therapy alone also improved quality of life but was not sufficient to significantly reduce stress levels. Incorporating Pranayama into rehabilitation programmes may enhance psychological well-being and overall quality of life in Parkinson's Disease.

KEYWORDS: Parkinson's Disease, Pranayama, Occupational Therapy, Perceived Stress, Quality of Life, WHOQOL-BREF, Anulom-Vilom, Kapalbhati, Rehabilitation.

1. INTRODUCTION

Parkinson's Disease is a progressive extrapyramidal system disorder that affects movement, with an age of onset in middle or late adulthood. The three cardinal signs of Parkinson's Disease are tremor, bradykinesia, and rigidity. Other symptoms may include impaired posture and balance, slow slurred speech, loss of automatic movements, depression, fatigue, cognitive impairment, sleep disturbances, and micrographia. The commonest cause of the disease is the loss of dopamine-producing neurons, which leads to abnormal brain activity and results in impaired movement and other symptoms.

It is an age-related neurodegenerative disorder affecting a large number of individuals worldwide. The appearance of Lewy-body-like inclusions in nigro-striatal terminals may 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 α-synuclein, a loss of normal function of this protein together with a toxic effect of altered forms of the mutant protein is proposed to promote the accumulation of dopamine in the cytoplasm, resulting in oxidative stress and the onset of neurodegenerative changes.

Although Parkinson's Disease was first described more than two hundred years ago, only recently has the intricate nature of the functional deficits it entails, and its neurobiological causes begun to be understood. Despite advances in the understanding of its pathophysiology and numerous developments in the pharmaceutical industry, various motor and non-motor symptoms remain refractory to treatment with currently available drugs or surgical procedures, and they continue to pose a challenge for clinicians worldwide.

To overcome these problems, patients increasingly seek complementary and integrative health-care options. Their concerns include the cost associated with current treatment strategies and the side effects associated with medication. Integrative treatment options are generally lower in cost, carry minimal physical and emotional risk, and allow patients to participate actively in their own treatment. Parkinson's Disease medication has also been associated with on-off phenomena, leading to periods of motor immobility and exacerbation of motor symptoms. The unpredictable and debilitating nature of the symptoms, combined with the inability to halt or slow disease progression, can lead to severe psychological stress and can affect the quality of life of patients.

Pranayama, that is, controlled breathing exercises, increases parasympathetic activity and reduces sympathetic activity, thereby helping to reduce stress. Occupational Therapy treatment focusing on tone, posture, balance, self-care, adaptations, and functional training helps to improve the quality of life of Parkinson's Disease patients. Physical activities such as exercise are known to decrease oxidative stress, delay the decline in motor functioning, and improve mood. However, aerobic or resistance-based exercises often require regular safety monitoring and depend on equipment. Relaxation and breathing techniques utilise awareness of breathing rate, rhythm, and volume, and are commonly used to minimise physiological responses to stress, possibly by increasing the parasympathetic response. Together, Yoga, Pranayama, and meditation address many of the molecular and pathogenetic mechanisms contributing to the development of Parkinson's Disease, offering hope for managing this debilitating condition through a multitude of approaches.

Therefore, the present study aims to evaluate the effectiveness of Pranayama combined with Occupational Therapy on perceived stress and quality of life in individuals with idiopathic Parkinson's Disease. The findings may contribute to the existing body of knowledge regarding conservative and integrative management strategies and provide valuable insights into the role of Pranayama in enhancing psychological well-being and improving quality of life.

2. Need of the Study

The chronic and progressive nature of Parkinson's Disease not only affects the quality of life of patients but also leads to increased stress levels. Pranayama has been used in Indian tradition since ancient times for relaxation of the mind. A review of the literature reveals that there is insufficient evidence-based research on the effects of Pranayama on stress and, consequently, on quality of life. The purpose of this study was to examine the effectiveness

of Pranayama combined with Occupational Therapy on stress and quality of life in patients with idiopathic Parkinson's Disease.

3. Aim and Objectives

3.1 Aim of the Study

To study the effectiveness of Pranayama combined with Occupational Therapy on stress and quality of life in patients with idiopathic Parkinson's Disease.

3.2 Objectives of the Study

- To reduce perceived stress in Parkinson's Disease patients and thereby improve quality of life.
- To compare pre-intervention and post-intervention stress and quality of life scores between the control and experimental groups.

3.3 Hypothesis

Null Hypothesis (H0): Pranayama breathing combined with conventional Occupational Therapy does not affect quality of life and perceived stress in Parkinson's Disease.

Alternate Hypothesis (H1): Pranayama breathing combined with conventional Occupational Therapy has a significant effect on quality of life and perceived stress in patients with Parkinson's Disease.

4. METHODOLOGY

Study Design: A prospective randomized controlled study was employed to evaluate the effectiveness of Pranayama combined with Occupational Therapy on stress and quality of life in patients with idiopathic Parkinson's Disease.

Study Setting

The study was conducted in the Occupational Therapy department of a tertiary care hospital.

Sample Size and Sampling Method

A sample size of 30 was calculated using an online sample size calculator, based on an average population of Parkinson's Disease patients visiting the tertiary hospital, with a margin of error of 3%, a Z-score of 1.96 at the 95% confidence level, and a standard deviation of 0.5. By the odd-even method, 15 patients each were placed in the control and experimental groups.

Age Group

Participants aged between 40 and 70 years were included in the study.

Study Duration

The total duration of the study was 8 weeks.

Variables

Pranayama was the independent variable, and perceived stress was the dependent variable.

4.1 Inclusion Criteria

- Individuals aged between 40 and 70 years.
- Both male and female participants.
- Mild to moderate idiopathic Parkinson's Disease (Hoehn and Yahr stages 1–3).
- Patients who were on regular medication.
- Individuals willing to participate and provide informed consent.

4.2 Exclusion Criteria

- Patients with cognitive impairment.
- Any other significant medical or neurological condition.
- Presence of psychiatric disease.

4.3 Outcome Measures

Primary Outcome Measures

- Perceived Stress Scale (PSS)
- WHOQOL-BREF Quality of Life Questionnaire

The WHOQOL-BREF is a self-administered quality of life questionnaire consisting of four domains: physical health, psychological health, social relationships, and environment. Each item is scored from 1 to 5 on a five-point ordinal scale, and the scores are transformed linearly to a 0–100 scale. The Perceived Stress Scale is a classic self-administered instrument in which each item is scored from 0 to 4, with total scores ranging from 0 to 40; higher scores indicate greater perceived stress.

4.4 Materials Required

- WHOQOL-BREF questionnaire
- Perceived Stress Scale (PSS)
- Yoga mats
- Assessment forms
- Pen and stationery

4.5 Procedure and Treatment Protocol

Prior to commencement of the study, ethical clearance was obtained and written informed consent was taken from all participants who satisfied the inclusion and exclusion criteria.

Baseline assessment was performed using the Perceived Stress Scale and the WHOQOL-BREF questionnaire.

The total treatment protocol was of eight weeks' duration. Pranayama, namely Anulom-Vilom and Kapalbhati, was advised for five minutes each in the early morning on an empty stomach during the first two weeks, followed by ten, fifteen, and twenty minutes in the successive two-week periods until the end of the eighth week. Anulom-Vilom involves holding one nostril closed while inhaling through the other, then closing the opposite nostril and repeating the process. Kapalbhati is a breathing technique involving powerful rapid exhalations followed by short passive inhalations.

Conventional Occupational Therapy consisted of tone normalisation, maintenance of range of motion, energy conservation techniques, fatigue management, coordination, bed mobility, transfers, balance training, self-care training, and home-modification advice. Occupational Therapy sessions were conducted for thirty minutes twice a week at the Occupational Therapy centre, together with a caretaker-supervised home exercise programme performed daily. The control group received conventional Occupational Therapy alone, while the experimental group received both Pranayama and conventional Occupational Therapy. The relevant safe-practice guidelines for Pranayama were followed throughout the study.

4.6 Statistical Analysis

Data obtained from the study were entered into a master data sheet and analysed using appropriate statistical software. Descriptive statistics such as mean and standard deviation were used to summarise the outcome measures. The paired t-test was used to compare pre-test and post-test scores of the Perceived Stress Scale and the WHOQOL-BREF questionnaire in both groups. Results were presented using tables and graphical representations, and the level of statistical significance was interpreted against critical t-values from the t-table.

5. Data Analysis

Table 1.0: Transformed Domain Scores of the WHOQOL-BREF Questionnaire.

Domain	Control Pre	Control Post	Experimental Pre	Experimental Post
Physical	44.80	65.13	35.67	68.60
Psychological	34.45	53.26	27.80	63.87
Social	62.40	79.66	50.67	72.68
Environmental	46.00	58.67	40.40	54.14

Table 1.0 presents the pre-test and post-test mean transformed scores of the four domains of the WHOQOL-BREF questionnaire in the control and experimental groups. In both groups,

the mean scores of all domains — physical, psychological, social, and environmental — improved after the intervention. The psychological domain showed the greatest improvement in the experimental group, increasing from 27.80 to 63.87, compared with an increase from 34.45 to 53.26 in the control group, indicating that the addition of Pranayama produced a markedly greater improvement in the psychological aspect of quality of life.

Table 2.0: Pre-Test and Post-Test Perceived Stress Scale (PSS) Scores of Both Groups.

Control Pre	Control Post	Experimental Pre	Experimental Post
26.67	17.74	26.93	14.00

Table 2.0 presents the mean pre-test and post-test Perceived Stress Scale scores of both groups. The mean stress score of the control group decreased from 26.67 to 17.74, while the experimental group showed a greater reduction from 26.93 to 14.00. This indicates a more pronounced reduction in perceived stress in the experimental group, which received Pranayama in addition to Occupational Therapy.

Table 3.0: Paired t-Test Values of the Perceived Stress Scale.

Outcome Measure	Control Group	Experimental Group
PSS	0.97	1.36

Table 4.0: Paired t-Test Values of the Domains of the WHOQOL-BREF Questionnaire.

Domain of WHOQOL	Control Group	Experimental Group
Physical	47.73	8.83
Psychological	9.06	17.94
Social	14.62	14.40
Environmental	12.56	15.13

Table 4.0 presents the paired t-test values for the four domains of the WHOQOL-BREF questionnaire in both groups. When the calculated t-values were compared with the critical t-values at 14 degrees of freedom, all domains in both the control and experimental groups exceeded the critical value at P = 0.001, indicating a highly significant improvement in all domains of quality of life following the intervention in both groups.

6. RESULTS

When the calculated t-values of the Perceived Stress Scale for the control group (0.97) and the experimental group (1.36) were compared with the critical t-values at 14 degrees of freedom, the calculated t-value of the control group was lower than the critical value at P = 0.10, whereas the calculated t-value of the experimental group was higher than the critical

value at P = 0.10. This indicates that the combined effect of Pranayama and Occupational Therapy in the experimental group was significant enough to reduce the stress score in Parkinson's Disease patients, whereas Occupational Therapy alone was not.

When the calculated t-values of the WHOQOL-BREF domains for the control group (physical 47.73, psychological 9.06, social 14.62, environmental 12.56) and the experimental group (physical 8.83, psychological 17.94, social 14.40, environmental 15.13) were compared with the critical t-values at 14 degrees of freedom, the calculated t-values of all domains in both groups were higher than the critical values at P = 0.001. This indicates that both Occupational Therapy alone and the combined Pranayama and Occupational Therapy intervention were extremely significant in improving the quality of life of Parkinson's Disease patients.

7. DISCUSSION

The progressive nature of Parkinson's Disease and its associated physical problems lead to a stressful life and a lower quality of life. The present results demonstrated that both Occupational Therapy alone and the combined effect of Occupational Therapy and Pranayama were highly significant in improving the quality of life of Parkinson's Disease patients in both groups. The reduction in stress observed in the experimental group is supported by studies on the physiology of pranayama breathing, which explain that voluntary slow deep breathing functionally resets the autonomic nervous system through stretch-induced inhibitory signals and hyperpolarisation currents. These are propagated through neural and non-neural tissue and synchronise neural elements in the heart, lungs, limbic system, and cortex, shifting the autonomic balance towards parasympathetic dominance and thereby reducing stress levels.

It has been reported that pranayama improves cardiorespiratory function and alters autonomic function. The improvement in quality of life observed in this study is consistent with previous research showing that exercise can benefit the cardiopulmonary, musculoskeletal, and neurological systems, as well as mood and other factors associated with quality of life. The findings of decreased stress and improved quality of life are also supported by earlier studies indicating that yoga and pranayama practice help to improve memory and reduce stress, depression, and anxiety in Parkinson's Disease patients, possibly through improved cortisol regulation.

The results and graphs clearly showed that the mean improvement in all domain scores was significant in both groups, but the psychological domain of the experimental group showed

considerably greater improvement than that of the control group. This suggests that Pranayama has a significant effect on the psychological status of Parkinson's Disease patients. Conversely, the physical domain showed better improvement in the control group than in the experimental group, indicating that Occupational Therapy has a particularly beneficial effect on the physical aspects of the condition, a finding supported by systematic reviews on the effectiveness of Occupational Therapy in Parkinson's Disease.

Overall, the findings support the conclusion that Pranayama combined with Occupational Therapy is effective in reducing stress levels and improving quality of life in Parkinson's Disease patients, while conventional Occupational Therapy alone also produces significant improvement in quality of life.

8. CONCLUSION

The study concluded that Occupational Therapy intervention combined with Pranayama (Anulom-Vilom and Kapalbhati) is effective in reducing perceived stress and improving the quality of life of patients with idiopathic Parkinson's Disease. The study also demonstrated that Occupational Therapy alone improves the quality of life of Parkinson's Disease patients but is not sufficient to significantly reduce stress levels. Therefore, the addition of Pranayama to conventional Occupational Therapy can be recommended as a valuable component of rehabilitation for individuals with Parkinson's Disease.

Limitations

The sample size was small and long-term follow-up was not undertaken. The reduction in perceived stress in the experimental group, although significant, was limited, which may be attributed to the relatively short study protocol.

Future Recommendations

- The study can be conducted on a larger sample size.
- The study can be conducted with a longer follow-up period.

Conflicts of Interest: None.

Funding: Self-funded.

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