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# Improving work life balance among female educationists during the COVID-19 lockdown

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**Abstract**.
**BACKGROUND:** The entire education industry switched from offline to online modes as a result of the coronavirus outbreak. Numerous teachers who were diagnosed with musculoskeletal, psychological, and other neurodegenerative diseases have reported increased exhaustion, lack of sleep, a decline in quality of life (QoL), a decrease in physical activity, and excessive stress from online classes during the COVID-19 lockdown, especially women.
**OBJECTIVE:** The aim of this study is to evaluate the effectiveness of three-modal exercise on fatigue, sleep, QoL as well as to determine the relationship between age, disease severity, disease stage and working years with women diagnosed with Parkinson's disease (PD).
**METHODS:** In this randomized controlled trial, 44 female educators in stages I–II with PD who were between the ages of 40 and 60 volunteered. For a total of 36 sessions over the course of six weeks, Group A received a three-modal fitness program through online video sessions, whereas Group B received Nordic walking. The outcome measures included the Fatigue Severity Scale, Parkinson's Disease Sleep Scale, and Parkinson's Disease Quality of Life Questionnaire-39.
**RESULTS:** Age, Hoehn and Yahr scale, working years, and PD in years did not correlate with each other ($p > 0.50$). The three-modal exercise experimental Group A showed statistically significant improvement in QoL (p 0.001), sleep (p 0.001), and fatigue (p 0.001).
**CONCLUSION:** Women in the field of education who participated in a three-modal exercise programme for PD reported a significant improvement in their level of exhaustion, sleep patterns, and quality of life.

Keywords: Female, school teachers, exercise, Parkinson's disease, insomnia

## 1. Introduction

Due to the precautionary measures adopted by the government during the coronavirus outbreak, such as social distancing, work from home, and home quarantine for those who were affected, around the globe people have been forced to adjust to a sedentary lifestyle. This caused the whole education sector to switch from traditional classroom instruction to online learning [1]. The abrupt switch to online mode has significantly increased the effort for female educators who are also handling careers and household responsibilities. As they want to maintain a healthy work-life balance, they are also taking extra precautions during the pandemic. Most of the women reported a decline in their general well-being as a result of having more daily duties [2].

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Despite the fact that males have a 29.1% better work-life balance than women do globally, Korea found a rise in the incidence of unhealthy work-life balance. In comparison to other European nations, the lowest rate of poor work-life balance was found in Scandinavian nations (11%), the highest rate was found in the Soviet Union (26.0%), while women made up 23.2% of the population in southern Europe [3].

When work-life balance is not achieved, employees experience conflict of emotions, which lead to health issues globally and is a significant threat to the global economy. An unbalanced work-life has caused irregular sleep patterns, an increase in fatigue, and the adoption of a sedentary lifestyle with a poor diet [4]. The 2015 European Working Conditions Survey (EWCS) revealed a clear correlation between poor work-life balance and poor self-reported health, with working women experiencing the effects more than their working male colleagues [5].

According to a Malaysian study, women outweigh men in the field of teaching because women tend to exhibit good traits like honesty, originality, problem-solving skills, and patience. The highest level of achievement in the teaching profession calls for these abilities. The survey found that women's contributions to the nation's economic and social development are greatly required, but they also confront a number of challenges in balancing their families and careers [6].

Another problem the country has is teacher retention because the country needs long-term experience and teacher development to the fullest extent possible at the national level in order to dominate the global economy. Teachers who have more than 20 years of experience in the field perform didactically poorly and are more prone to attrition; this may also be brought on by illness and decreased productivity [7].

Women who work in education have described experiencing physical, psychological, and emotional issues that have a negative impact on their health. They also show neurodegenerative disorders such as Parkinson's disease (PD), so we should be cautious of that as well [8]. The odds ratio for teachers was reported as OR = 2.50, 95% CI 1.67–3.75 which revealed greater risks of getting PD among educators with a female predominance in this category. PD was associated with teaching, the pattern of relationship pointed to respiratory tract infections [8, 9].

Previous research has linked PD to workplace factors subdivided by job titles or exposures, among which higher risks related to work in the agriculture sector, education, and healthcare [10, 11]. As women are more likely to be exposed to infectious agents often in these activities, teaching is the one that better represents the neuro-inflammatory concept of PD etiology [12]. Recent research has found a two-fold increase in all-cause mortality among older women, with a male to female incidence ratio of 2:1 [13–15].

Some individuals suffering from cancer and multiple sclerosis lose their professional paths, lose the will to work again after their recovery, feel socially excluded, and abandon their jobs since money was not a priority [16, 17]. This is particularly true for women who received a PD diagnosis during the height of their careers. Hence it is necessary to design a structured rehabilitation program to improve work integration and daily activities among women diagnosed with PD.

For every five years of oral contraceptive use, the risk of developing PD increased by 20%, and a sedentary lifestyle may cause an estrogen level imbalance in women with PD [18–20]. Many studies have been done on the motor symptoms where the participants were predominantly men which were generalized over women also, but recent studies have emphasized the difference in the occurrence of non-motor and motor symptoms in males and females. Women have been shown to have a later disease onset with a higher prevalence of dyskinesia, fatigue, sleep deprivation, and depression [21].

Women have an 80% wearing off complication of the levodopa therapy [22], fatigue (62.78%) which is reported as tiredness or exhaustion is reported to be a multi-factorial symptom with anxiety, depression, deprived sleep (84.02%), excessive day time sleepiness was more prevalent in women than compared to men [23], identifying these non-motor symptoms can help in refining the "telling and discussion" of the issues which are associated with quality of life (QoL), disease progression, therapeutic decisions and responses obtained differently from men and women when subjected to exercises.

According to empirical investigations, during the COVID-19 lockdown, 70% of people were physically inactive, which led to a 40% increase in fatigue, depression, and sleeping disorders in people with PD. Although the pandemic lockdown has halted many healthcare systems, it has also ushered in a new era of tele-rehabilitation [24]. Technology use and video conferencing are synchronized. Tele-rehabilitation has been developed as a method of delivering therapy in this study, which was undertaken during the lock-

down. Described as a recent advancement in medical and paramedical systems, tele-rehabilitation is a collection of methods and strategies designed to provide rehabilitation at a distance using virtual technologies [25].

Exercise guidelines should be prescribed differently for both genders, a deviation from routine protocol should be observed because of the onset of PD, primary symptoms, and hormonal dysfunction that are shown in women with PD are different. Strength training has shown to improve muscle strength, endurance, increased fat-free mass, balance, functional mobility, and walking economy in adults [26]. The lower extremity strength that was assessed in recent studies showed that the reaction times and maximum isometric force values were different between both lower extremities in women. This is due to posture and balance impairments [27]. Studies have shown that women's spine and balance flexibility is lower than men's, and that flexibility exercises can be more beneficial [28]. Alternative modalities such as Nordic walking, Tai Chi, Tango dance, virtual reality, and traditional exercises can also be a choice of treatment [29–32].

This study aims to administer the three-modal exercise program through tele-rehabilitation to reduce fatigue, sleep, and improve QoL among women teachers with PD, thus enhancing the work-life balance. The objectives of this study are to analyze the correlation between the age, disease severity, disease stage, and working years among women with PD. The other objective is to find the impact of 3–Modal exercise on fatigue, sleep, and QoL.

## 2. Methods

This prospective randomized controlled trial was conducted at Saveetha Hospitals, SIMATS, India with 44 women teachers with a clinical diagnosis of idiopathic PD through tele-rehabilitation during the pandemic lockdown. While administering the 1-hour protocol we ensured that the participants were accompanied by one caregiver willing to come every day. The SMCH Institutional Ethics Committee approved the study protocol (no. 005/06/2021/IEC/SMCH). Informed consent was obtained from all participants through Google Forms.

Using the sigma plot software version 14.5, sample size was computed to detect the 0.5 minimum effect size, a power of 80% with 5% type I error. With 22 individuals in each group, the projected sample size was 44 people. A Google Form outlining the study was sent to each participant inviting them to take part.

The volunteers who showed their interest were selected based on the selection criteria. The inclusion criteria were: women who are working as teachers (any field), who are in stages I and II of the Hoehn Yahr scale, age between 40 – 60 years, with stable response to levodopa, all subjects who reported exhaustion had a minimum Fatigue Severity Scale (FSS) score of 4 (the cutoff for extreme fatigue), were able to walk at least 10 feet on their own or with assistance, and had stable systemic illnesses. Participants who had undergone recent surgery, severe vestibular abnormalities, musculoskeletal ailments, or serious cardiovascular diseases, uncontrolled dyskinesia induced by medication, and involvement in other trials were excluded from the study [33–35].

### *2.1. Outcome measures*

#### *2.1.1. Primary outcome measure*

FSS [36] is a patient-reported subjective tool to assess the severity of fatigue. It takes about 5 minutes to administer the scale. The items were scored on a 7-point Likert scale. Where 1 to 7 is strongly agree to strongly disagree where the minimum score is 9 and the maximum score is 63. The higher the score, the greater the fatigue.

The Parkinson's Disease Sleep Scale (PDSS) [37] is a visual analog scale with 15 common complaints associated with disturbance in the sleep pattern. Responses are marked according to the severity on the 10 cm line, which takes around 10–20 minutes.

#### *2.1.2. Secondary outcome measure*

The Parkinson's Disease Quality of Life Questionnaire-39 (PDQ-39) [38] is patient-reported outcome measure to assess the disease-specific health-related quality of life (HRQoL), it includes the eight dimensions of QoL, functioning, and well-being. It includes 39-MCQs and with a 5-point ordinal scoring. Scoring shows 0 is never to 4 is always, this questionnaire takes around 10–20 minutes to complete.

### *2.2. Interventions*

Each group involved 22 females. Groups A and B underwent three modal exercise programs and Nordic walking respectively. Both groups performed for 1hr per day for days a week with a total of 36 sessions with tele-rehabilitation [34, 35]. To determine

the schedules for therapeutic sessions, a telephone interview was conducted. Participants completed a thorough physical therapy neurological examination the day before the sessions, and their attending certified physiotherapist provided them with a session link. This communication was used for the entire six-week period. They were also educated on the camera positioning, distance from which they can communicate and hear instructions, making them comfortable in operating the gadgets, and the patients were given a phone number which was available to attend to their queries and remind them of the sessions [32].

The warm-up and cool down exercises were done for 5 minutes for both groups. The therapists provided prerecorded exercises, these exercises were shared on the online session and patients performed with the therapist's verbal instructions during the session. Frequent rests were included to avoid exercise-induced fatigue.

The experimental/intervention group followed 40 mins of three modal exercise program [33] where cardiovascular, balance, and strengthening exercises were included within COVID-19 precautions. Cardiovascular involved gait training inside the house or community, which was progressed with motor and cognitive dual tasks. Strengthening exercises involved the upper and lower extremity and trunk exercises, including balance exercises, static/dynamic exercises, and oculomotor exercises. These exercises were designed based on ACSM guidelines [31] that were proposed for the geriatric population. The principal investigator reviewed the progression of exercise by assessing the HR max, strength and balance by pulse oximeter 1 RM, timed-up and go test respectively at the end of every two weeks.

In the Nordic walking group [21], the participants initially trained one session indoors to get accustomed to walking with poles or sticks and then taken outdoors with the help of their caregiver for the 40-minute session. Therapists emphasized on arm swing and limb synchronization, with as assisted metronome beat. The HR was monitored by pulse oximeter and the heart rate was maintained at 60% to 80% of HR reserve depending upon the participant's age. The participants were given adequate rest whenever they felt tired.

### *2.3. Statistical analysis*

Using the sigma plot 13 program, all statistical analyses on outcome measures were carried out. In order to evaluate the effectiveness and efficiency of the data, descriptive statistics were used. We calculated the proportion of subjects who attended at least 70% of the entire sessions to assess adherence.

## 3. Results

Table 1 shows the demographic characteristics of female PD in the experimental and control group. Age, H/Y scale, duration of PD in years, and years of working were the same in the baseline test. Table 2 shows the pre-test and post-test of Group A. For the FSS, the median value pre-test is 49.091 and the post-test is 25.091, the standard deviation of pre-test value is 7.958 and the post-test value is 7.164, standard error of pre-test value is 1.697 and the post-test is 1.527, t-value is 10.063. There is a statistical significance in the post-test treatment ($p = <0.001$).

Table 3 shows the FSS for Group B. The median values for pre-test are 52.500 and post-test are 44.000, the 25% pre-test is 45.750 and post-test is 38.250, the 75% pre-test is 56.250 and post-test is 48.250, z-value is – 4.021. Group B showed minimal changes statistically but not significant enough when compared to Group A.

Table 4 shows the PDQ-39 within Group A with pre-test median values as 66.00 and post-test as 34.500, 25 % of pre-test is 49.000 and the post-test is 30.750, 75% of pre-test value is 78.250 and post-test value is 42.000, z-value is – 4.108. Group A shows statistically significant changes in the PDQ-39 ($p = <0.001$). In Group B, median pre-test and post-test values are 64.000 and 58.500, 25% of pre-test and post-test values are 49.750 and 45.000, 75% of pre-test and post-test values are 78.000 and 68.750, z – value is – 4.114, there is a minimal statistical significance but not as much as Group A ($p = <0.001$).

Table 5 shows the PDSS within Group A with pre-test median values as 110.00 and post-test as 44.000, 25% of pre-test value is 90.750 and the post-test is 32.750, 75% of pre-test value is 56.000 and post-test value is 130.500, z-value is – 4.076. Group A shows statistically significant changes ($p = <0.001$). In Group B, median pre-test and post-test values are 102.500 and 89.000, 25% of pre-test and post-test values are 92.000 and 78.000, 75% of pre-test and post-test values are 130.500 and 98.000, z-value is – 4.109, there is statistical significance but not as much as Group A ($p = <0.001$).

Table 6 shows the pre-test median values of Groups A and B as 50.500 and 52.500, 25% for Groups A and

Table 1
Demographic data descriptive statistics for Groups A and B

| Variables | Groups | N | Mean | SD | SE | Range | Median | 25% | 75% |
|---|---|---|---|---|---|---|---|---|---|
| Age | Group A | 22 | 52.227 | 6.332 | 1.350 | 42–60 | 55.000 | 46.500 | 57.250 |
| | Group B | 22 | 53.591 | 5.096 | 1.086 | 45–63 | 55.000 | 50.500 | 57.250 |
| H/Y scale | Group A | 22 | 1.636 | 0.492 | 0.105 | 1–2 | 2.000 | 1.000 | 2.000 |
| | Group B | 22 | 1.545 | 0.510 | 0.109 | 1–2 | 2.000 | 1.000 | 2.000 |
| PD in tears | Group A | 22 | 8.177 | 2.533 | 0.540 | 5–14.6 | 7.650 | 6.300 | 10.000 |
| | Group B | 22 | 7.995 | 2.576 | 0.562 | 4.3–15.9 | 7.600 | 6.100 | 9.650 |
| Years of working | Group A | 22 | 20.414 | 7.979 | 1.701 | 8–32 | 19.000 | 13.000 | 28.650 |
| | Group B | 22 | 21.959 | 6.982 | 1.489 | 10–32 | 21.500 | 15.225 | 28.125 |

Table 2
FSS within Group A pre- and post-test

| FSS | N | Mean | SD | SE | t | df | *P* value |
|---|---|---|---|---|---|---|---|
| Pre-test | 22 | 49.091 | 7.958 | 1.697 | 10.063 | 21 | (*P* = <0.001) |
| Post-test | 22 | 25.091 | 7.164 | 1.527 | | | |

Table 3
FSS within Group B pre- and post-test

| FSS | N | Median | 25% | 75% | z-value | *P* value |
|---|---|---|---|---|---|---|
| Pre-test | 22 | 52.500 | 45.750 | 56.250 | –4.021 | *P* = <0.001 |
| Post-test | 22 | 44.000 | 38.250 | 48.250 | | |

Table 4
PDQ within Groups A and B pre- and post-test

| Groups | PDQ-39 | N | Median | 25% | 75% | z-value | *P* value |
|---|---|---|---|---|---|---|---|
| Group A | Pre-test | 22 | 66.000 | 49.000 | 78.250 | –4.108 | *P* = <0.001 |
| | Post-test | 22 | 34.500 | 30.750 | 42.000 | | |
| Group B | Pre-test | 22 | 64.000 | 49.750 | 78.000 | –4.114 | *P* = <0.001 |
| | Post-test | 22 | 58.500 | 45.000 | 68.750 | | |

Table 5
PDSS within Groups A and B pre- and post-test

| Groups | PDSS | N | Median | 25% | 75% | z-value | *P* value |
|---|---|---|---|---|---|---|---|
| Group A | Pre-test | 22 | 110.000 | 90.750 | 131.250 | –4.076 | *P* = <0.001 |
| | Post-test | 22 | 44.000 | 32.750 | 56.000 | | |
| Group B | Pre-test | 22 | 102.500 | 92.000 | 130.500 | –4.109 | *P* = <0.001 |
| | Post-test | 22 | 89.000 | 78.000 | 98.000 | | |

B is 40.750 and 45.750, 75% is 56.000 and 56.250, the *p*-value is 0.488. The post-test median values for Groups A and B are 26.000 and 44.000, 25% of Groups A and B values are 20.500 and 38.250, 75% of Groups A and B values are 31.000 and 48.250 with $p = <0.001$, which is the statistical significance in the post-test Group A.

Table 7 shows the pre-test median values of Groups A and B as 66.00 and 54.000, 25% for Groups A and B is 49.000 and 49.750, 75% is 78.000 and 78.250, the *p*-value is 0.869. The post-test median values for Groups A and B are 34.500 and 58.500, 25% of Groups A and B values are 30.750 and 45.000, 75% of Groups A and B values are 42.000 and 68.750 with $p = <0.001$ which the statistical significance in the post-test Group A.

Table 8 shows the pre-test median values of Groups A and B as 110.000 and 102.500, 25% for Groups A and B is 90.750 and 92.000, 75% is 131.250 and 130.500, the *p*-value is 0.832. The post-test median values for Groups A and B are 44.000 and 89.000, 25% of Groups A and B values are 32.750 and 78.000, 75% of Groups A and B values are 56.000 and 98.000 with $p = <0.001$, which is the statistical significance in the post-test Group A.

Table 9 shows the correlation analyses values between the Hoehn and Yahr scale, total years of working as teachers, and duration of the disease when

Table 6
FSS between Groups A and B pre- and post-test

| Test | FSS | N | Median | 25% | 75% | *P* value |
|---|---|---|---|---|---|---|
| Pre-test | Group A | 22 | 50.500 | 40.750 | 56.000 | $P = 0.488$ |
| | Group B | 22 | 52.500 | 45.750 | 56.250 | |
| Post-test | Group A | 22 | 28.000 | 20.500 | 31.000 | $P = <0.001$ |
| | Group B | 22 | 44.000 | 38.250 | 48.250 | |

Table 7
PDQ-39 between Groups A and B pre- and post-test

| Test | PDQ-39 | N | Median | 25% | 75% | *P* value |
|---|---|---|---|---|---|---|
| Pre-test | Group A | 22 | 66.000 | 49.000 | 78.250 | $P = 0.869$ |
| | Group B | 22 | 64.000 | 49.750 | 78.000 | |
| Post-test | Group A | 22 | 34.500 | 30.750 | 42.000 | $P = <0.001$ |
| | Group B | 22 | 58.500 | 45.000 | 68.750 | |

Table 8
PDSS between Groups A and B pre- and post-test

| Test | PDSS | N | Median | 25% | 75% | *P* value |
|---|---|---|---|---|---|---|
| Pre-test | Group A | 22 | 110.000 | 90.750 | 131.250 | $P = 0.832$ |
| | Group B | 22 | 102.500 | 92.000 | 130.500 | |
| Post-test | Group A | 22 | 44.000 | 32.750 | 56.000 | $P = <0.001$ |
| | Group B | 22 | 89.000 | 78.000 | 98.000 | |

Table 9
Correlation between the variables

| Variables | Groups | Number of samples | Correlation coefficient | *P* Value |
|---|---|---|---|---|
| H/Y scale vs. total years of working | Group A | 22 | –0.0908 | 0.688 |
| | Group B | 22 | –0.110 | 0.627 |
| H/Y scale vs. duration of disease | Group A | 22 | 0.243 | 0.288 |
| | Group B | 22 | 0.493 | 0.0197 |

the *p*-value comparing the correlation between H/Y scale and total years of working of both groups is 0.688 and 0.627. H/Y scale and duration of disease of both groups are 0.288 and 0.0197 respectively where the above pairs tend to be greater than 0.050 which shows there is no significant relationship between the variables.

## 4. Discussion

According to findings from a study on work-life balance and workplace health, women were stressed as a result of the imbalance. Their QoL and performance at work were impacted by their exhaustion and lack of energy, which were caused by stress and anxiety [6]. When compared to a prior study involving improving endurance, flexibility, and balance, this experimental study's two distinct therapies were both shown to be similarly successful. The group benefits were statistically significant. Group A received aerobic, balance, and strengthening exercises based on the ACSM guidelines [31] provided for PD patients. The guidelines also followed the gender-based recommendations made in the earlier study [39].

A higher risk of PD was found by Firestone et al. [40] among teaching professionals, which was a clear justification for including the participants who were instructors and had been diagnosed with PD at an early stage. This occupation had been more stressful during the pandemic for the PD teachers due to physical inactivity and excessive online classes which led to fatigue, stress, and depression.

The purpose of the current study was to determine whether age, the H/Y scale, PD in years, and working in years are correlated in any way. However, the findings showed no link between these characteristics, which is inconsistent with the research conducted by Barcia et al. [32].

This study found an increase in trend of improvement in QoL and sleep pattern and reduction in fatigue levels when the participants underwent three

different modes of exercise. This gave them a variety in therapy and different goals to achieve, while the control group underwent only Nordic walking having a mono-routine and this might be the reason of relatively less significant changes compared to the three-modal exercise group.

Early-stage participants were involved because fatigue occurred in the pro-dromal stage and could have been one of the causes of disease progression, stress, anxiety, depression, and sleep disturbances, furthermore adding, women are more susceptible to these non-motor symptoms, especially during the COVID-19 lockdown. The strong, feasible, and reliable scales for fatigue, QoL, and sleep enabled us to explore the benefits of the three-modal exercise program on PD.

Joanna et al. [41] suggested that employment along with participation in robust physiotherapy programs would help in symptom reduction and improving people's QoL with PD this supports our study which improves the QoL by reducing fatigue and improving sleep patterns and also providing good productivity in their profession during the pandemic. The teachers reported to have more energy, motivation, and problem-solving capabilities during online class hours.

A study explaining quarantine and prolonged homestay has reported in increased use of computers and technologies is more suggestive for long hours spent on online classes, meetings, and preparing teaching materials for students which can cause a substantial drop-in physical activity [42]. Therefore, research supporting the use of a three-modal exercise program suggests incorporating a novel multi-component exercise program that can be specifically provided to women teachers who were homebound and diagnosed with PD in its early stages.

In this situation, the well-known health advantages of exercise also contributed to the finding that women educators with PD who were put on a well-planned exercise program were able to manage their workload and combat weariness. This discusses how exercise helps prevent muscular diseases, fight infections, and inflammation [1].

This also allowed a few concepts to be cleared. Working women diagnosed with PD need a different structure program to get integrated with their work during the early stages of PD diagnosis and improve their productivity. Fatigue showed to be the most under-researched symptom among people with PD. Thus this study provided an insight into addressing it from the early stages using a multimodal protocol. These are the strengths of this study.

### *4.1. Limitations and suggestions*

Limitations included the use of just self-reported questionnaires to assess fatigue and sleep. Due to the epidemic and the lack of a reliable internet connection, the study only had a very small number of participants. We recommend the use of quantitative sleep and fatigue outcome measurements. Results of men and women exercise responses should be compared in order to determine whether gender influences on sleep quality.

## 5. Conclusion

The three modes of exercise improved fatigue level, sleep pattern, and QoL. However, women responded well to lower extremity strengthening better than other exercises. Correlation analyses showed all the variables were not affected by each other and that fatigue has already been known to be an independent symptom. Aspiring women diagnosed with PD can maintain a work-life balance, they should inculcate a structured exercise program along with their work schedule which delays the progression of the PD and also increases work productivity and this study proves it.

## Conflict of interest

None to report.

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