Research

Effect of Yoga on the Stress, Anxiety, and Depression of COVID-19-Positive Patients: A Quasi-Randomized Controlled Study

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Abstract

The spread of COVID-19 has resulted in reports of increase in stress, anxiety, and depression across society, especially in people who have tested positive for COVID-19, which affects their mental health and well-being. This article reports a quasi-randomized controlled study conducted in the COVID wards of a hospital to examine the efficacy of add-on yoga intervention in reducing stress, anxiety, and depression in COVID-affected patients under quarantine. The peripheral capillary oxygen saturation level and heart rate of the COVID-19-affected patients were also measured. A total of 62 COVID-19-positive patients participated in the study. The participants were randomized into a control group (n = 31), which received conventional medical treatment alone, and a yoga intervention group (n = 31), which received 50 minutes of yoga intervention along with the conventional medical treatment. Standardized Hospital Anxiety and Depression Scale, Generalized Anxiety Disorder–7 Item, Patient Health Questionnaire–9, and Perceived Stress Scale were administered at the beginning and end of the quarantine period. A significant decrease in stress, anxiety, and depression was observed in the patients who undertook the add-on yoga intervention. There was also a significant decrease in anxiety in the control group, but the intervention group had a larger decrease compared to the control group. Further significant improvements in oxygen saturation and heart rate levels were observed in the group of patients who were practicing yoga, but no significant improvement was observed in the control group. Findings of this study suggest that yoga intervention can be an effective add-on practice in reducing stress, anxiety, and depression levels of COVID-19 patients. *Sharma et al. Int J Yoga Therapy 2022(32). doi: 10.17761/2022-D-22-00013.*

Keywords: Yoga, COVID-19, stress, anxiety, depression, SPO_2, heart rate

Abbreviations Used
COPD = Chronic Obstructive Pulmonary Disease
COVID-19 = Coronavirus disease
GAD-7 = Generalized Anxiety Disorder–7 Item
HADS = Hospital Anxiety and Depression Scale
HR = Heart rate
PHQ-9 = Patient Health Questionnaire–9
PSS-10 = Perceived Stress Scale
PTSD = Posttraumatic Stress Disorder
RT-PCR = Reverse Transcription Polymerase Chain Reaction
SARS = Severe Acute Respiratory Syndrome
SD = Standard Deviation
SPO_2 = Peripheral Capillary Oxygen Saturation

Introduction

Coronavirus disease (COVID-19) caused by the SARS-CoV-2 virus has spread at a rapid rate after its first outbreak in the city of Wuhan in the Hubei province of China in December 2019. This disease is characterized by acute respiratory distress syndrome, deterioration of lung function, dyspnea, and bilateral pneumonia accompanied by fever.[1,2]

As the number of coronavirus cases has increased, there has been an increase in fear of getting infected from the virus and possible death. This has contributed to increases in stress, anxiety, and depression, with a rapid fall in overall mental health.[3]

Studies have also shown deteriorating mental health conditions in COVID-19-positive patients.[4–6] Affected people showed a higher level of anxiety, depression, and fear of passing the contagion to their family members compared to unaffected people.[5] In one study, 402 adult COVID-19 survivors showed self-rated psychopathological symptoms of posttraumatic stress disorder (PTSD), depression, anxiety, insomnia, and obsessive-compulsive behavior.[6] Similar negative psychological effects were previously reported in survivors of severe acute respiratory syndrome (SARS).[7] It has been also observed that during the quarantine period, patients reported negative psychological symptoms including anxiety, depression, posttraumatic stress, confusion, and anger.[8]

The deterioration in mental health is also likely to contribute to further weakening of the immune system, leading to increase in the risk of acute respiratory infections and thus decreasing the blood's peripheral capillary oxygen saturation (SPO_2) level.[9–11] There is growing evidence that psychological and physiological stress disrupts autonomic balance as assessed through heart rate variability,[12] and the imbalance manifests in a range of somatic and mental health issues.[13] On the other hand, management of psychological distress may help in maintaining autonomic balance and blood oxygen homeostasis, critical for recovery from COVID-19.[14] Therefore, along with conventional medical treatment, there is also a need for intervention programs that could reduce the adverse psychological effects of COVID-19 infection and maintain the general well-being of COVID-19-positive patients.

In a recent paper, yoga was argued to be an effective strategy for healthy adults to self-manage stress-related problems and well-being during COVID-19 lockdown.[15] Yoga is an ancient Indian mind-body technique that includes physical training through yogic postures *(asana),* regulation of breath through breath-control techniques *(pranayama),* and regulation of the mind through the practices of all eight limbs of yoga, from the ethical precepts of the *yamas* and *niyamas* to *samadhi* (complete meditative absorption).[16] Several systematic reviews and meta-analyses have suggested that yoga training has a positive effect on lung function and can be used as an adjunct therapy in people with chronic obstructive pulmonary disease (COPD)[17,18] and asthma.[19] Some recent reports have also proposed that yoga can provide a complementary therapy in the battle against the novel coronavirus, influencing both physical as well as mental well-being.[20–26]

The beneficial effects of yoga on mental health have been comprehensively reported in earlier studies.[27] A recent pilot study has shown the potential of combined yoga and naturopathy treatment for relieving anxiety and depression of COVID-19-affected people.[24] Evidence from previous studies suggests a benefit of consistent practice of yoga and pranayama for relaxation of both mind and body: The practice is argued to activate the parasympathetic nervous system and relieve anxiety and stress.[28] It is also suggested that a regular practice of yoga improves the blood oxygen level[29] and heart rate variability.[30] Considering all of these beneficial effects, yoga protocols have been developed for public use and intervention for COVID-19-affected people in India.[31]

Although many reports have suggested that yoga can be used as a complementary or alternative therapy for improving mental health, very few investigations have been reported on the effects of yoga on stress, anxiety, and depression experienced by COVID-19-positive patients during their quarantine in the hospital. There is also limited evidence for the effects of yoga on the oxygen saturation levels of COVID-19-positive patients. Hence, the present study was conducted with two main objectives: (1) to study the effect of add-on yoga intervention on stress, anxiety, and depression of COVID-19-positive patients; and (2) to study the effect of add-on yoga intervention on SPO_2 and heart rate (HR) of COVID-19-positive patients.

Methods

Study Design and Setting

The study was conducted at the district hospital of Bhilwara, Rajasthan, India, on COVID-19-positive patients quarantined in the hospital's COVID-19 wards between November 23, 2020, and January 18, 2021. For the purpose of this study, the COVID-patients were divided into a control group and yoga intervention group following a quasi-randomization technique. The control group consisted of COVID-19-positive patients remaining on their usual conventional medical treatment provided by the hospital during the quarantine, whereas the yoga intervention group received yoga along with their conventional medical treatment.

Ethical approval for the study was obtained from the ethical committee of Rajmata Vijayaraje Scindia Medical College, Bhilwara, Rajasthan (RVRS/Acad./2020/128). The study followed the guidelines of the Declaration of Helsinki.[32] Signed informed consent was obtained from all patients, and their personal information was kept confidential.

Participants

The participants were recruited based on the following inclusion criteria:

1. confirmed COVID-19 positive patients diagnosed with reverse transcription polymerase chain reaction (RT-PCR) and antibody tests, with mild to moderate symptoms as described by Indian Council for Medical Research and World Health Organization guidelines[33,34];
2. age between 18 and 70 years;
3. willingness to participate by providing signed consent;
4. no serious comorbidities;
5. completion of at least 5 days' quarantine after the positive RT-PCR test; and
6. no "serious stage" COVID-19 symptoms.

Of the 132 confirmed COVID-19-positive patients admitted and quarantined in the hospital, 62 patients who fulfilled the inclusion criteria were enrolled in the study. Of the total patients enrolled for the study, 50 were male and 12 were female. Their age ranged between 20 and 70 years (mean 51.53, standard deviation [SD] 12.13). Demographic details are given in Table 1.

Table 1. Study Participants

Variable	Experimental Group (*n* = 31)	Control Group (*n* = 31)
Mean age (y)	49.41 ± 12.51	53.64 ± 11.55
Age range (y)	20–68	32–70
Male/female	28/3	22/9
Marital status	All married	All married
Employment		
Employed	30	24
Homemaker	1	7
Residence		
Urban/city	14	13
Semi-urban/town	14	9
Village	3	9
Education		
Never went to school	2	4
Up to high school	8	5
Intermediate (10 + 2)	10	5
Graduate (university)	2	9
Postgraduate	9	7
Doctoral	0	1
Monthly income (rupees)		
< 20,000	20	14
20,000–40,000	6	12
> 40,000	5	5

Randomization

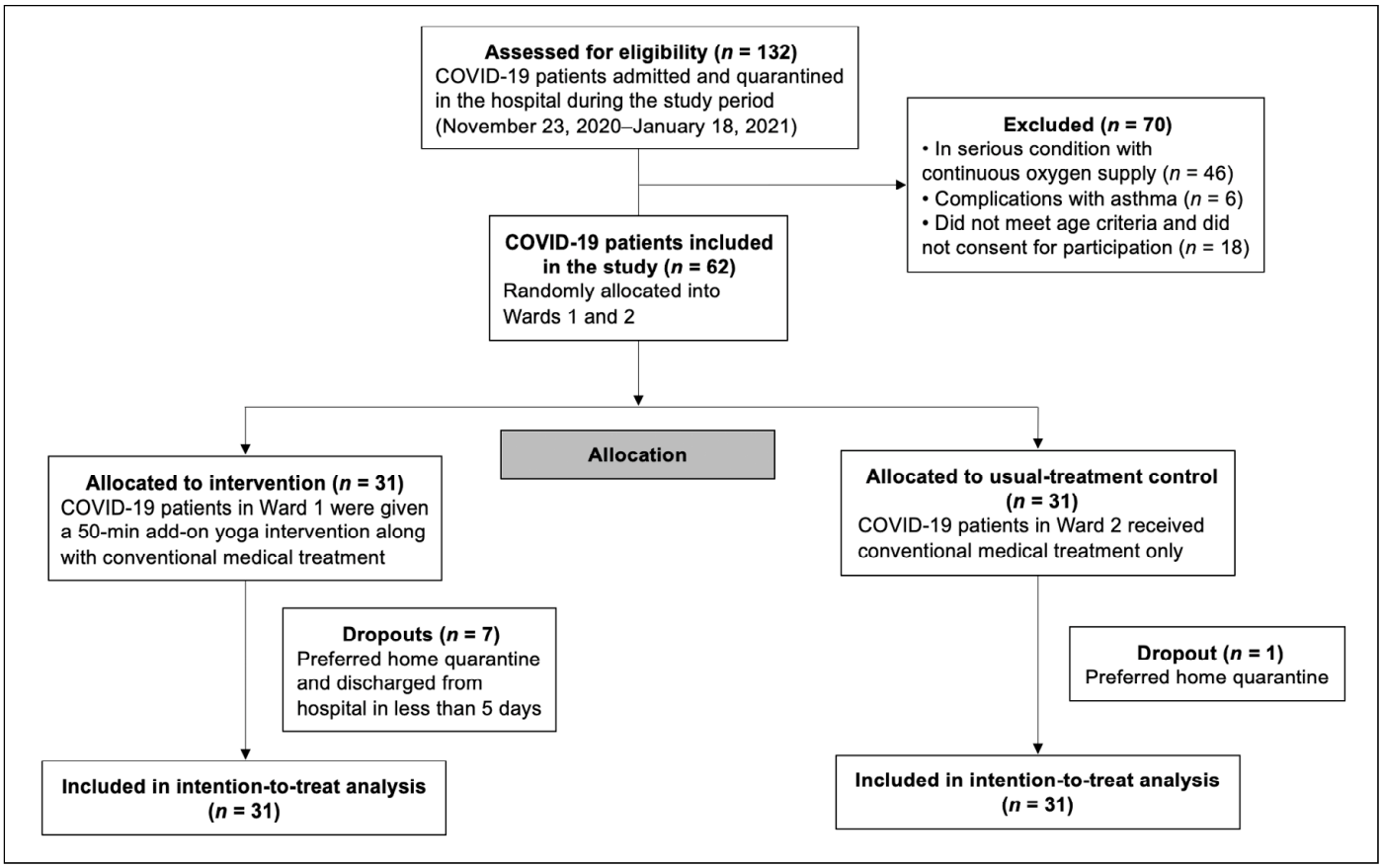
Two hospital wards were allocated for people with mild to moderate COVID-19 symptoms. Each ward had a 32-bed capacity. Of the 132 COVID-19-positive patients admitted and quarantined in the hospital during the study period, 62 patients who fulfilled the inclusion criteria were included in the study and randomly allocated into Wards 1 and 2 following a quasi-randomization method based on their sequence of entry. Based on the intent to maintain an equal capacity in both wards, the staff of the hospital allocated new patients to either ward. Patients approaching the hospital with either mild or moderate symptoms were allocated to the ward that had an empty bed without any bias. The staff responsible for allocating the new patients to one of the two wards worked in 8-hour shifts and had no information about the yoga intervention. The patients allocated to Ward 1 were given an add-on yoga intervention along with their conventional medical treatment after obtaining their due consent for participation. Patients in Ward 2 received the conventional medical treatment alone (control group). The recruitment and allocation process were blind to both patients and the hospital's ward-allocating staff. The complete ward-allocation procedure is shown in Figure 1.

The mean age of the participants in the intervention and control groups was 49.41 ± 12.51 years and 53.64 ± 11.55 years, respectively, and the age difference between the two groups was not statistically significant ($p = 0.172$).

Intervention

The intervention group received an add-on yoga intervention consisting of daily yoga sessions along with the conventional allopathic medical treatment given by the hospital. The 50-minute yoga sessions were conducted from 8:00 to 8:50 am every morning by a well-qualified yoga teacher who had obtained a 2-year postgraduate degree (MA) in yoga therapy. The sessions included prayer, practice of asana, pranayama, meditation, yoga nidra (guided meditation often translated as "yogic sleep"), and counseling on health and hygiene. The add-on yoga intervention was derived from the yoga protocol released by the Ministry of AYUSH, Government of India, for COVID-19 patients[31] (Table 2). In addition to the practices mentioned in the AYUSH yoga protocol, a 30-minute yoga nidra was also administered twice a week. The yoga intervention was given live throughout the length of the patients' hospital quarantine, which ranged from 5 to 18 days. Their daily attendance was recorded in an attendance register by the yoga teacher. The patients in the control group received only the conventional medical treatment given by the hospital.

Figure 1. Recruitment Allocation and Analysis Process



Assessment Methods

Assessment of the COVID-19-positive patients' stress, anxiety, and depression was done using standardized psychological scales. Physiological assessment of SPO_2 and HR was done using a BPL Smart Oxy-04 pulse oximeter. The details of the psychological scales and physiological measures used in the present study are described below.

Hospital Anxiety and Depression Scale (HADS)

HADS is a 14-item self-assessment scale that assesses anxiety and depression in significantly ill people in a clinical setting.[35] HADS-14 includes 7 questions for anxiety and 7 questions for depression. The items on this scale rate the severity of anxiety and depression with four options (0–3). The anxiety and depression scores can be categorized clinically as normal (0–7), mild (8–10), moderate (11–14), and severe (15–21). Previous study has reported the Cronbach's alpha ranging from 0.82–0.83 for this scale.[36] Permission was sought for the use of the Indian-adapted Hindi version of the scale for this study. The Hindi version has been validated for Indian settings.[37]

Generalized Anxiety Disorder Scale–7 Item (GAD-7)

GAD-7 is an instrument consisting of 7 items for assessing the severity of generalized anxiety disorder.[38] It has been validated for primary care patients as well as the general population.[39] GAD-7 shows excellent internal consistency and good test-retest reliability.[40] The Cronbach's alpha ranges from 0.83–0.93.[41] This scale has been used in the Indian setting for assessing anxiety as well.[28,40]

Patient Health Questionnaire–9 (PHQ-9)

PHQ-9 is a common screening tool designed to detect depression according to DSM-IV criteria.[42] It is a reliable and valid measure of depression severity. The PHQ-9 measures two stable depression factors (cognitive-affective and somatic) within the palliative care population,[43] with internal consistency (Cronbach's alpha) ranging from 0.82–0.91 in a previous study.[44] This tool has been used in clinical as well as research settings. PHQ-9 is a brief, 9-item depression module of the full PHQ. As a depression severity measure, the PHQ-9 score can range from 0–27 because each of the 9 items can be scored from 0–3. This scale has been used in Indian settings in research for diagnosis of common mental disorders.[45]

Perceived Stress Scale (PSS-10)

PSS-10 is a 10-item scale widely used as a self-report for assessing the perception of stress in clinical and nonclinical settings.[46] The scale has high internal consistency and

Table 2. Yoga Intervention[a]

Section	Practice	Practice Duration (min)	Total Duration (min)
Beginning	Prayer	1	1
Joint-loosening practices *(sukshma vyayama)*	Neck movement	2	9
	Shoulder movement	2	
	Trunk movement	2	
	Knee-joint movements	3	
Yoga asana	**Standing asana**		15
	Tadasana (mountain)	1	
	Padahastasana (forward bend)	1	
	Ardha chakrasana (half-wheel posture)	1	
	Trikonasana (triangle)	2	
	Seated asana		
	Vajrasana (thunderbolt)	2	
	Ustrasana (camel)	1	
	Shashankasana (hare)	2	
	Lying asana		
	Uttanpadasana (raised-legs)	1	
	Ardha halasana (half-plow)	1	
	Savasana (corpse)	3	
Pranayama	*Anuloma viloma* (alternate-nostril breathing)	5	15
	Bhramari (bee breath)	3	
	Slow *ujjayi* (victorious breath)	5	
	OM chanting	2	
Meditation	Breath awareness	5	5
Conclusion	Counseling on health and hygiene and ending prayer	5	5

Yoga practices may be viewed at https://youtu.be/3PBGNlAxxg0

test-retest reliability.[46] Its items measure the degree to which a situation is stressful on a 5-point Likert scale ranging from 0–4 (0 = never, 1 = almost never, 2 = sometimes, 3 = fairly often, 4 = very often). The Cronbach's alpha for this scale has been found to be 0.754.[47] This scale has also been previously used in Indian settings for the assessment of stress.[48]

Oxygen Saturation and Heart Rate

For assessing both SPO_2 and HR, a pulse oximeter instrument was used. The pulse oximeter is a small clamp-like device placed on the index fingertip.

Data Collection and Analysis

Data on the stress, anxiety, and depression of the COVID-19 patients were collected using the psychological scales of the HADS, GAD-7, PHQ-9, and Perceived Stress Scale (PSS-10). All of these scales, along with a demographic profile and consent form, were prepared in printed booklet form and given to intervention and control-group patients to complete at the time of admission to the hospital and at the time of discharge. The physiological data on SPO_2 and HR was collected every morning between 9:30 and 10:30 am by clamping a pulse oximeter onto the tip of each patient's index finger for 2 minutes during supine relaxation.

The statistical analysis was done in four steps using SPSS software (v. 26.0). In the first step, baseline comparison was done between the intervention and control groups. The second step was a paired-sample *t* test of the pre–post data of the intervention and control groups. In the third step, the pre–post differences of scores on selected scales were compared for control and intervention groups. The fourth step compared an independent *t* test between the mean post intervention scores of the intervention and control groups.

The initial criteria for analysis were set for the participants who had completed a quarantine period of at least 5 days in the hospital ward. In the present study, there were a total 8 dropouts: Seven patients dropped out of the yoga intervention group and one patient dropped out of the control group, as they preferred home quarantine and were discharged from the hospital within fewer than 5 days. We used the intent-to-treat analysis with the last-observation-carried-forward method to carry forward the last observation of the dropouts for their post intervention scores.[49] The intent-to-treat analysis method includes all patients randomly assigned to the intervention and control groups for analysis, regardless of their adherence with the entry criteria or subsequent withdrawal or premature dropout from the treatment they received.[49,50] Before the *t* test, the test for homogeneity was carried out by Levene's test for equality of variances for the variables of both groups, which were found

Table 3. Baseline Comparison Between Yoga Intervention and Control Groups

	Baseline Assessment (Mean ± SD)			
Measure	Yoga Intervention Group	Control Group	*t* Value	*p* Value
GAD-7	11.84 ± 3.78	13.61 ± 3.43	–1.935	0.058
PHQ-9	12.13 ± 3.76	13.45 ± 3.45	–1.443	0.154
HADS depression	9.29 ± 3.26	9.39 ± 2.03	–0.140	0.889
HADS anxiety	10.74 ± 4.04	11.32 ± 2.77	–0.660	0.512
PSS-10	24.42 ± 7.10	26.03 ± 5.32	–1.012	0.316
SPO_2	93.13 ± 4.15	93.52 ± 3.51	–0.397	0.693
HR	81.94 ± 12.61	83.10 ± 12.62	–0.362	0.718

GAD-7 = Generalized Anxiety Disorder–7 Item; HADS = Hospital Anxiety and Depression Scale; HR = heart rate; PHQ-9 = Patient Health Questionnaire–9; PSS-10 = Perceived Stress Scale; SD = standard deviation; SPO_2 = peripheral capillary oxygen saturation.

to be homogenous ($p > 0.05$). Then, the Shapiro-Wilk test was performed to determine whether the variables followed a normal distribution, which was found to be the case ($p > 0.05$).

Results

As discussed in the analysis section above, the first step was to compare the baseline data (at the time of admission in the hospital) between intervention and control groups. No significant difference in mean scores was observed for GAD-7, PHQ-9, HADS, PSS-10, or SPO_2 and HR levels (all $p > 0.05$), as shown in Table 3.

In the second step of analysis, a paired-sample *t* test of the pre-post data from both groups was done to compare the mean differences between baseline and post intervention scores. The yoga intervention group showed a significant difference in the mean scores for GAD-7, HADS, PHQ-9, and PSS-10 scales (all $p < 0.001$), indicating reduced stress, anxiety, and depression in the yoga intervention group. The mean pre–post scores of SPO_2 and HR also showed statistically significant improvement ($p < 0.05$) in the yoga intervention group compared with baseline scores.

The control group also showed a statistically significant pre–post difference in the mean score for GAD-7, HADS (anxiety), and PHQ-9 ($p < 0.05$). However, the pre-post mean scores on depression (HADS) and perceived stress (PSS-10) did not show any significant reduction in the control group (both $p > 0.05$). This may imply that conventional medical treatment does not affect the depression and perceived stress of COVID-19-positive patients as positively as the yoga intervention. Furthermore, there was no significant change in the mean SPO_2 and HR scores from baseline in the control group ($p > 0.05$) (Table 4). This may imply that the breathing exercises in the yoga intervention group helped to develop higher oxygen levels and positively affect the heart functioning.

In the third step of analysis, the magnitude of reduction (i.e., pre–post differences) of scores of anxiety, depression, and stress on the scales of GAD-7, PHQ-9, HADS, and PSS-10 was compared between the intervention and control groups. For this analysis, the pre-minus-post differences were first calculated for all scales of both the groups; then, an independent *t* test was applied to find the statistical differences between the two.

Table 4. Pre–Post Comparison of Mean Scores in the Yoga Intervention and Control Groups

	Yoga Intervention Group (Mean ± SD)				Control Group (Mean ± SD)			
Measure	Pre	Post	*t* Value	*p* Value	Pre	Post	*t* Value	*p* Value
GAD-7	11.84 ±3.78	5.13 ± 3.93	6.767	0.000**	13.61 ± 3.43	11.10 ± 2.80	3.594	0.001**
PHQ-9	12.13 ±3.76	5.42 ±4.01	7.856	0.000**	13.45 ± 3.45	11.58 ± 4.30	2.160	0.039*
HADS depression	9.29 ± 3.26	4.58 ± 2.55	6.370	0.000**	9.39 ± 2.03	9.48 ± 1.80	–0.186	0.853
HADS anxiety	10.74 ± 4.04	5.23 ± 2.14	6.569	0.000**	11.32 ± 2.77	9.32 ± 2.18	3.521	0.001**
PSS-10	24.42 ± 7.10	13.74 ± 4.97	8.058	0.000**	26.03 ± 5.32	23.74 ± 4.53	1.792	0.083
SPO_2	93.13 ± 4.15	95.32 ± 4.05	–2.318	0.027*	93.52 ± 3.51	94.68 ± 3.66	–1.637	0.112
HR	81.94 ± 12.61	92.02 ± 11.35	–3.096	0.004**	83.10 ± 12.62	87.58 ± 11.63	–1.653	0.109

*$p < 0.05$.
**$p < 0.01$.
GAD-7 = Generalized Anxiety Disorder–7 Item; HADS = Hospital Anxiety and Depression Scale; HR = heart rate; PHQ-9 = Patient Health Questionnaire–9; PSS-10 = Perceived Stress Scale; SD = standard deviation; SPO_2 = peripheral capillary oxygen saturation.

Table 5. Pre–Post Differences Between Yoga Intervention and Control Groups

	Pre-Post Difference (Mean ± SD)			
Measure	Yoga Intervention Group	Control Group	*t* Value	*p* Value
GAD-7	6.71 ± 5.52	2.52 ± 3.89	3.455	0.001**
PHQ-9	6.71 ± 4.76	1.87 ± 4.82	3.978	0.000**
HADS depression	4.71 ± 4.12	–0.10 ± 2.89	5.320	0.000**
HADS anxiety	5.52 ± 4.68	2.00 ± 3.16	3.468	0.001**
PSS-10	10.68 ± 7.38	2.29 ± 7.11	4.556	0.000**
SPO_2	–2.19 ± 5.27	–1.16 ± 3.95	–0.873	0.386
HR	–10.13 ± 18.21	–4.48 ± 15.09	–1.328	0.189

**$p < 0.01$.

GAD-7 = Generalized Anxiety Disorder–7 Item; HADS = Hospital Anxiety and Depression Scale; HR = heart rate; PHQ-9 = Patient Health Questionnaire–9; PSS-10 = Perceived Stress Scale; SD = standard deviation; SPO_2 = peripheral capillary oxygen saturation.

Table 6. Postintervention Comparison Between Yoga Intervention and Control Groups

	Postintervention Assessment (Mean ± SD)			
Measure	Yoga Intervention Group	Control Group	*t* Value	*p* Value
GAD-7	5.13 ± 3.93	11.10 ± 2.80	–6.888	0.000**
PHQ-9	5.42 ±4.01	11.58 ± 4.30	–5.834	0.000**
HADS depression	4.58 ± 2.55	9.48 ± 1.81	–8.731	0.000**
HADS anxiety	5.23 ± 2.14	9.32 ± 2.18	–7.464	0.000**
PSS-10	13.74 ± 4.97	23.74 ± 4.53	–8.282	0.000**
SPO_2	95.32 ± 4.05	94.68 ± 3.66	0.658	0.513
HR	92.06 ± 11.35	87.58 ± 11.63	1.536	0.130

**$p < 0.01$.

GAD-7 = Generalized Anxiety Disorder–7 Item; HADS = Hospital Anxiety and Depression Scale; HR = heart rate; PHQ-9 = Patient Health Questionnaire–9; PSS-10 = Perceived Stress Scale; SD = standard deviation; SPO_2 = peripheral capillary oxygen saturation.

As seen in Table 5, anxiety, depression, and stress on the GAD-7, HADS, PHQ-9, and PSS-10 scales showed a significantly higher mean reduction in the yoga intervention group compared to the control group (all $p < 0.01$). However, the changes in SPO_2 and HR were not statistically significant.

In the fourth step, an independent-sample *t* test revealed a statistically significant difference between the post intervention mean scores of the intervention and control groups for GAD-7, PHQ-9, HADS, and PSS-10 (all $p < 0.01$), with lower mean scores for stress, anxiety, and depression for the yoga intervention group compared to the control group (Table 6). However, a postintervention comparison between the yoga intervention and control groups showed no statistically significant differences in the post mean scores of SPO_2 or HR (both $p > 0.05$).

The attendance and adherence of the COVID-19 patients practicing yoga was 100%. They practiced yoga daily during the quarantine period along with the yoga teacher in live classes.

Discussion

This study investigated the efficacy of an add-on yoga intervention on stress, anxiety, depression, SPO_2, and HR levels of hospitalized COVID-19-positive patients. In the present study, yoga intervention along with conventional treatment resulted in a significantly larger decrease in stress, anxiety, and depression scores from baseline assessment compared to the control group, which received only conventional treatment. The baseline comparison between the two groups for anxiety, depression, stress, SPO_2, and HR showed no significant group differences. The baseline similarity between the groups suggests that the quasi-randomization was reasonable and that the observed group differences in pre–post mean scores were related to the effect of the yoga intervention rather than confounding factors.[51] The result of this study is in line with the results of a previous study in which the combined intervention of yoga and naturopathy treatment showed decreased depression and anxiety in COVID-19-positive people.[24]

Effect of Add-on Yoga Intervention on Stress, Anxiety, and Depression

It is noteworthy that the baseline mean scores for both intervention and control groups were classified as moderate to high for stress, anxiety, and depression, without any significant group differences, as shown in Table 3. However, the analysis in Tables 4 to 6 shows a greater reduction of stress, anxiety, and depression in the yoga intervention group compared to the control group. Analysis also shows that the pre–post difference in the anxiety level was significant for both intervention as well as control groups.

Interestingly, the post mean scores for the yoga intervention group were interpreted as non-cases of anxiety, stress, and depression, whereas for the control group the corresponding scores were still in a range of moderate to high stress, anxiety, and depression.

Relief from COVID-19 symptoms offered by conventional treatment may have been helpful in reducing stress, anxiety, and depression; however, conventional treatment alone was not enough to alleviate the psychological impacts of the illness. The add-on yoga intervention seems to have given an additional benefit by relaxing patients' minds and bodies. The asana and pranayama practiced during the intervention may have helped in activating the parasympathetic nervous system, in turn, helping to relieve psychological impacts of COVID-19.[52–54]

Previous findings suggest that an individual following a therapy to combat illness will have a better understanding and higher personal control that positively affect the emotional impact of COVID-19.[15] Perhaps the COVID-19 patients in the intervention group felt that the add-on yoga intervention was an effective therapy to cope with COVID-19, which helped both their physical as well as mental health.

Effect of Add-on Yoga Intervention on Oxygen Saturation and Heart Rate

Further analysis of pre–post SPO_2 and HR mean scores revealed a significant improvement in the add-on yoga intervention group from baseline, but there was no corresponding statistically significant improvement in the control group (Table 4). These results are in line with previous findings that showed that slow yoga breathing techniques significantly increased oxygen saturation levels from baseline.[55,56] Another study also suggested increased oxygen saturation and exercise capacity in COPD patients receiving a yoga intervention compared to a control group.[57] It may be argued that the practice of yoga asana and slow-breathing pranayama followed by the intervention group may have helped in improving lung function, thereby enhancing oxygen intake and subsequently SPO_2 levels.

The intergroup postintervention comparison of the SPO_2 and HR data did not show any significant differences. It may be reasoned that the conventional pharmacological treatment also relieves respiratory distress, affecting blood oxygen levels. However, the changes in blood oxygen level are so subtle that even a minute objective improvement by some units may matter a lot from a patient's point of view. The mean improvements in SPO_2 (+2.19) and HR (+10.13) in the yoga intervention group were relatively higher than the mean improvement of SPO_2 (+ 1.16) and HR (+4.48) in the control group. The sample size for this study may have been too small in relation to the effect size to demonstrate any significant differences between the two groups. This may be due to relatively larger variances while making these comparisons. The only significant result for these physiological parameters was an increase in pre–post SPO_2 and HR in the yoga intervention group from baseline that was not seen in the control group. A more sustained and regular practice of yoga for the long term and a larger sample size may have produced significant between-group differences in SPO_2 and HR improvements between the two groups of COVID-19 patients.[29,57]

Limitations

One of the major limitations of this study was that it lacked a true randomization process of allocation. This research did not control the sampling and was dependent on the randomization of the patients' arrival and registration as a naturally occurring incidence. Upon their arrival, patients were allocated to either of the wards depending on the availability of beds. Another important limitation was the small sample size (n = 31 in the intervention group, n = 31 in the control group), as most of the patients admitted were in serious conditions and therefore did not meet eligibility criteria. Additionally, there was an unequal distribution of gender in the sample, with more males than females. This may be because males worked outside their homes more and therefore may have had higher COVID-19 infection rates compared to females. Stratified sampling with an equal number of males and females could have strengthened this study. Another important limitation was the lack of follow-up of the patients after discharge from the hospital. The study also did not account for subjects' previous yoga experiences. Furthermore, there was variation in the quarantine period and subsequently the in-hospital intervention period. This could not be controlled, as patients were discharged from the hospital as soon as they were fully recovered; hence, their quarantine ranged from 5 to 18 days.

Conclusions

The overall findings of this study showed that the add-on yoga intervention was an effective strategy for reducing the stress, anxiety, and depression levels of COVID-19-positive patients compared to only conventional allopathic medical treatment. Overall, add-on yoga intervention appears well-suited to deal with the mental health challenges created by the uncertain times of the COVID-19 pandemic.

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Conflict-of-Interest Statement

The authors declare that no conflict of interest exists.

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