



## Short Communication

# Effect of Bhramari Pranayama intervention on stress, anxiety, depression and sleep quality among COVID 19 patients in home isolation



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## ARTICLE INFO

## Article history:

Received 11 June 2021

Received in revised form

28 September 2021

Accepted 27 May 2022

Available online 6 June 2022

## Keywords:

COVID-19

Isolation

Yoga

Pranayama

Stress

Depression

Sleep quality

## ABSTRACT

**Background:** COVID-19 outbreak is considered to be a major public health concern as it has a negative impact on the patient's psychological health. In addition, patients under home isolation might be more panic and in stress. In this study, we examined the effect of Bhramari Pranayama (Bhr.P) intervention on patients' psychological distress during home isolation.

**Methods:** Ninety-two asymptomatic COVID-19 patients were recruited from the host hospital and willing patients who satisfied the inclusion criteria (n = 42) were selected for the study. The patients were given Bhr.P intervention (20 min) through online for 15 days. Participants were assessed with Depression Anxiety and Stress Scale-21 (DASS-21), Pittsburgh Sleep Quality Index (PSQI), and Quality of life (WHOQOL-BREF) at baseline and post-intervention.

**Results:** Bhr.P practice has shown a significant (P < 0.05) reduction in DASS-21 score of depression, anxiety and stress. In addition, the patients stated significant improvement in quality of sleep (PSQI; p < 0.05) and quality of life (WHOQOL-BREF; p < 0.05) after the intervention.

**Conclusion:** Our findings indicate that Bhr.P intervention had a positive impact on psychological health as well as quality of sleep among the COVID-19 patients during home isolation. However, it needs to be confirmed by multi-site randomized controlled trials.

**Clinical trial registration:** CTRI/2021/04/032845.

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## 1. Introduction

The COVID-19 pandemic has become a global crisis and impact has been profound on every individual as well as health care system [1]. More than 40 million people worldwide have been reported to suffer from COVID-19 till date and about ninety thousand positive cases are reported from India alone on a daily basis [2]. This has led to an increase of more than 3.6 million cases under morbidity, 0.25

million cases for mortality and reported fatality being 32 per million cases. The most common cause of mortality in COVID-19 has widely been reported to be acute respiratory failure and cytokine storm [3]. Though antiviral drugs and respiratory therapies are being used, there are several ongoing clinical trials on alternative medicines for development of new therapies but, till date there is no evidence of any effective or specific treatment for COVID-19 [4,5]. Besides hospitalization for symptomatic patients, asymptomatic patients are admitted in dedicated Covid care centers (DCC) and advised for self-quarantined for home isolation. Due to the huge surge in the symptomatic case with acute respiratory distress syndrome (ARDS) and shortage of bed occupancy in medical care

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Peer review under responsibility of Transdisciplinary University, Bangalore.

centers, most of the patients with mild symptoms were requested to stay in DCC or home isolation. Based on a previous survey, it was reported that half of the patients with COVID 19 had psychological distress associated with poor sleep quality, moderate level of stress and depression [6]. Whereas patients in home confinement are reported to have an additional stress and anxiety due to the absence of medical care team to provide health support [7]. Presences of these psychological issues in turn affect their sleeping patterns and lower the quality of life. These kind adverse effects of mental stress can be tackled with yoga techniques such as pranayama (breathing exercise) which improves vagal tone that is essential to maintain the calm mind [8,9]. Breathing exercise in various conditions has been reported to improve quality of life, reduce mental health problems such as stress, anxiety & depression [10–12]. One such breathing exercise is Bhramari Pranayama (Humming bee breathing of low-pitch character) which has shown to reduce stress by controlling the cardiovascular reactivity in healthy volunteers [13,14]. So the present study aimed to assess the effect of Bhramari pranayama (Bhr.P) for the patients diagnosed with COVID 19 during home isolation.

## 2. Methods

### 2.1. Type of study

The current study is a quasi-experimental study (pre-post design) which has been registered with Clinical Trial Registry, India (CTRI/2021/04/032845). The study was conducted after getting institutional ethical committee clearance (SMC/IEC/2020/08/041).

### 2.2. Patients recruitment

All the patients (n = 60) who were at COVID-19 home care program of the institute during the month May–June 2021 was contacted over the phone to get their willingness to participate in the study. Only those patients (n = 40) who showed interest and fulfilled the inclusion criteria of the study were enrolled. Each participant was contacted personally and given proper instructions regarding the Zoom meeting and time schedule for Pranayama practice. On Day 0, an orientation program was conducted through Zoom meeting and importance of Yoga and its practice was taught by the Yoga physician. The baseline data was collected on the same day using google forms guided by the invigilators. The patients practiced Pranayama for a duration of 15 days and on Day 16 post data was collected.

### 2.3. Eligibility criteria

#### 2.3.1. Inclusion criteria

The patients who were under home care program of the host institute, who met the diagnostic criteria of COVID-19 and asymptomatic were included for the study. All adult patients  $\geq 18$  years and  $\leq 60$  years of age who agreed to participate in the trial with a mobile communication, internet facility, and able to independently cooperate with doctors in online program were selected and consent was obtained at the time of recruitment.

#### 2.3.2. Exclusion criteria

The patients who were at moderate to critical stage according to the fourth edition of guideline were not included into the study [15]. The patients with already existing acute respiratory diseases not caused by COVID-19, asthmatic patients, heart disease, cognitive impairments and pregnant women were excluded. Explicit non-willingness to be a part of the trial study and who were not

able to follow yoga protocol or not able to cooperate with doctors for the survey or interventions were also not included.

### 2.4. Interventions

Bhramari Pranayama (Bhr.P) was demonstrated to the patients by a qualified yoga and naturopathy physician using video based online platform (Zoom) [16]. All the patients were requested to follow the online intervention under the supervision of trained Yoga physician. The instructions were also given in local language (Tamil) for better understanding for the patients.

#### 2.4.1. Bhramari Pranayama

The participants were made to sit in a comfortable position with eyes closed. They were also instructed to close both ears using their index fingers. The subjects were instructed to concentrate on their breathing pattern and maximum inhalation through both the nostrils followed by maximum exhalation. During exhalation, the subject was asked to chant the word “Mmmm” in such a way that the humming bee sound brought vibration in their laryngeal walls. We requested the patients to report their difficulties and progress during the intervention.

#### 2.4.2. Duration of practice

The patients did Pranayama practice for 15 consecutive days under the supervision of Yoga physician. They practiced Pranayama for a duration of 20 min twice a day. Preferably patients joined the Zoom meeting for practice around 6.00–7.00 am in the morning and 6.00–7.00 pm in the evening. The Bhramari pranayama was done for a duration of 20 min which approximately includes 20 cycles of Pranayama practice. Each cycle of practice was done at a rate of 3–6 breaths/minute, followed by 2-min rest [17].

### 2.5. Outcome measures

All the parameters were assessed using electronic questionnaire using Google form and all the responses will promptly verified by the research team for the accuracy. The outcome measures were depression, anxiety, stress (Depression Anxiety and Stress Scale-21 [DASS-21]) [18], sleep quality (Pittsburgh Sleep Quality Index-PSQI) [19] and overall quality of life (WHOQOL-BREF) [20]. All the patients were instructed to fill the questionnaires at baseline (Day 0) and after the intervention (Day 16). Daily attendance and duration of the practice for each participant were noted separately in a log book.

### 2.6. Statistical analysis

For statistical analysis, R statistical software (Version 4.0.2) was used. All statistical tests used a two-sided test, with  $P < 0.05$  indicating that the difference is statistically significant. Continuous variable was compared using paired t test, and categorical data was compared using chi-square test or exact probability method. Normality of data was tested using Kolmogorov-Smirnov test and based on the results appropriate statistical test was used. Cronbach's alpha was computed for the internal reliability scores for each scale [21].

## 3. Results

### 3.1. Patients characteristics

Forty two patients under home isolation were enrolled in the study. Of the total participants, 40 patients completed the assessment before and after the intervention. The average age of the

patients was 39 years and majority of them were male 70%. Approximately half of patients were married (57%) and had education level of primary, secondary school and degree. Baseline characteristics of the study population are presented in Table 1. All the extracted factors of the scales had good internal consistency of  $\geq 0.9$ .

### 3.2. Outcome measures

After the Bhr.P intervention, a significant reduction in mean score of depression, anxiety, stress and total DASS-21 were found ( $p < 0.001$ ) among the patients (Table: 2). In terms of depression, a significant increase in the percentage of patients who had no depression symptom was found after the intervention ( $p = 0.04$ ). Though the percentage of patients with mild, moderate and severe depression were reduced after the intervention, it was statistically insignificant ( $p > 0.05$ ). A significant increase in the percentage of patients who had no anxiety ( $p = 0.02$ ), had mild ( $p = 0.001$ ), had moderate anxiety symptoms ( $p = 0.01$ ) and significant decrease in percentage of patients had severe anxiety symptoms ( $p = 0.04$ ) were observed after the intervention. Whereas for stress, a significant decrease in percentage of patients who had moderate stress symptom was observed after the intervention ( $p = 0.01$ ). A trend of improvement in mean scores of QoL for physical domain ( $p = 0.04$ ), psychological domain ( $p = 0.01$ ), social domain ( $p = 0.01$ ) and environmental domain ( $p = 0.02$ ) were found to be statistically significant after the Bhr.P intervention. PSQI score for quality of sleep also reduced significantly ( $p = 0.03$ ) after the intervention among the patients (see Table 3).

### 3.3. Safety observation

No adverse effects were seen in patients practicing Bhr.P pranayama.

## 4. Discussion

To our knowledge, this is the first study that examines the effect of pranayama (Bhr.P) intervention on COVID-19 patients under home isolation, in terms of stress, depression, anxiety and quality of sleep. Our findings highlight the impact of Bhr.P intervention in improving the psychological health for patients with COVID-19. Similar effects have been found in previous studies on COVID-19

**Table 2**  
Comparison of DASS-21 indicators before and after Bhr.P intervention.

Variables	Before intervention	After intervention	P value [95% CI]
Total DASS-21 (mean, SD)	47.70 (9.20)	29.42 (7.85)	0.0001 <sup>a</sup> [14.47 to 22.09]
Depression scale (mean, SD)	12.40 (4.52)	9.26 (3.50)	0.002 <sup>a</sup> [1.42 to 4.86]
Anxiety scale(mean, SD)	16.72 (4.20)	10.72 (4.70)	0.04 <sup>a</sup> [4.02 to 7.98]
Stress scale (mean, SD)	17.80 (6.4)	11.40 (5.22)	0.01 <sup>a</sup> [4.58 to 9.58]
Depression level (n, %)			
Normal (0–9)	14 (35)	21 (52.5)	0.04 <sup>b</sup>
Mild (10–13)	16 (40)	11 (27.5)	0.22 <sup>b</sup>
Moderate (14–20)	8 (20)	3 (0.75)	0.18 <sup>b</sup>
Severe (>21)	2 (0.5)	0	0.82 <sup>b</sup>
Anxiety level (n, %)			
Normal (0–7)	7 (17.5)	13 (32.5)	0.02 <sup>b</sup>
Mild (8,9)	4 (1)	16 (40)	0.001 <sup>b</sup>
Moderate (10–14)	13 (32.5)	5 (12.5)	0.01 <sup>b</sup>
Severe (>15)	16 (40)	7 (17.5)	0.04 <sup>b</sup>
Stress level (n, %)			
Normal (0–14)	16 (40)	19 (47.5)	0.38 <sup>b</sup>
Mild (15–18)	14 (35)	11 (27.5)	0.45 <sup>b</sup>
Moderate (19–25)	16 (40)	9 (22.5)	0.01 <sup>b</sup>
Severe (>26)	4 (1)	1 (0.25)	0.21 <sup>b</sup>

<sup>a</sup> Two sided paired t- test to examine the mean differences between baseline and after intervention.

<sup>b</sup> Proportion tests to examine the differences between baseline and after intervention.

patients with various forms of yoga interventions [12,22–24]. Being first ever study using breathing exercise online (pranayama) for patients in home isolation, it's difficult to compare our findings with earlier yoga studies. As found in previous studies, patients with COVID-19 had experienced severe depression, anxiety, stress symptoms and sleep disturbances [23,25]. In addition, patients in home isolation might have more panic episodes due to absence of health care facilities, and loneliness. These negative emotions might affect their recovery and prolong the treatment period as well. Whereas after 15 days of intervention with Bhr.P, most of the patients reported improvement in these negative emotions and sleep quality. Breathing exercise like Bhr.P help to balance the autonomic nervous system by reducing the sympathetic tone and increase parasympathetic output which can contribute to a reduction of negative emotions such as stress, depression and anxiety in the present study [13,14]. Many patients felt that this online pranayama sessions were feasible, able to follow the module and easy to practice. In addition, these online sessions were helpful for them to alleviate the feeling of loneliness during the treatment period in self-isolation. Being a breathing exercise with a humming sound, we were able to monitor the participant's active involvement during the practice.

**Table 3**  
Comparison of Quality of Life and sleep before and after Bhr.P intervention.

Variables	Before intervention	After intervention	P value [95% CI]
Physical domain QoL	38.98 (8.90)	51.80 (5.83)	0.04 [–16.17 to –9.47]
Psychological domain QoL	35.91 (7.76)	49.82 (5.66)	0.01 [–16.93 to –10.89]
Social domain QoL	41.89 (7.22)	53.98 (8.92)	0.01 [–15.70 to –8.48]
Environmental domain QoL	42.86 (7.56)	54.90 (5.19)	0.02 [–14.93 to –9.15]
PSQI	11.02 (5.18)	7.92 (3.40)	0.03 [1.14 to 5.05]

**Table 1**  
Baseline demographical and clinical Characteristics of participants in this study.

Characteristic	N (%) / Mean (SD) [95% CI]
Age (years)	39.20 (14.60) [34.53–43.86]
Gender	
Male	28 (70)
Female	12 (30)
Marital status	
Married	23 (57)
Unmarried	14 (35)
Divorced	3 (0.75)
Education level	
Degree or above	18 (45)
Secondary level	16 (40)
Primary level	6 (1.5)
Infection status of family members	
Infected	21 (52.5)
Non-infected	19 (47.5)
Clinical symptoms	
Fever	11 (27.5)
Cough	8 (20)
Myalgia	10 (25)
Sore throat	8 (20)

#### 4.1. Limitation

Few limitation encountered by our study were small sample size, single center, and short evaluation period. Lack of control group would be the additional limitation of the present study and our findings won't be generalized to all COVID-19 patients. Further multicenter clinical trials are needed to confirm our results.

#### 5. Conclusion

Present study shows that Bhr.P intervention is an effective technique to manage the depression, anxiety and stress, during COVID-19 home isolation. The findings further support that Bhr.P intervention helped to improve the quality of sleep and general wellbeing during the treatment period. Hence, it could be used as a complementary and alternative therapy to manage the negative emotions during home isolation in COVID-19.

#### Funding

No funding was received for conduct of the trial.

#### Conflict of interest

The authors declare no conflict of interest.

#### Author contributions

Thanalakshmi Jagadeesan, Archana R and Kannan R: Conceptualization, Methodology. Aadhyyanth R Allu, Tamilselvi G and M. Maveeran: Intervention and Data curation. Thanalakshmi Jagadeesan, Archana R and Maheshkumar K: Writing- Original draft preparation. Timsi jain and Kannan R: Supervision, Thanalakshmi Jagadeesan, Archana R and Kannan R: Writing- Reviewing and Editing.

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