Original Article

Effect of Meditation and Breathing Exercises on the Well-being of Patients with SARS-CoV-2 Infection under Institutional Isolation: A Randomized Control Trial

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ABSTRACT

Objectives: The corona virus disease-19 (COVID-19) pandemic has affected every domain of human health be it physical or mental. The uncertainty of disease progression in patients with SARS-CoV-2 infection can lead to major psychological and psychiatric concerns that should not be overlooked. The interventions should be directed to the vulnerable population to help them mitigate the stress and anxiety caused by the infection and isolation. We evaluated the effect of meditation and breathing exercises on the well-being of patients with SARS-CoV-2 infection under institutional isolation.

Materials and Methods: We conducted a randomized control trial on 84 subjects, 18 years and above, asymptomatic, or mildly symptomatic SARS-CoV-2 infected patients under institutional isolation. Subjects were randomly and equally divided into a control group and interventional group. We measured the depression, anxiety, and stress levels as well as quality of sleep in patients after 7 days of meditation and breathing exercises in the intervention group versus standard care in the control group.

Results: Meditation and breathing exercises had a statistically significant effect on the depression level ($P < 0.001$), stress level ($P = 0.004$), and the quality of sleep [trouble falling asleep ($P = 0.007$), trouble staying asleep ($P = 0.004$), and feel tired after waking up in the morning ($P = 0.003$)]. Further, the positive effect of intervention on the level of anxiety in patients under isolation was also observed; however, the difference was not found to be statistically significant ($P = 0.528$).

Conclusion: Meditation and breathing exercises have positive effects on depression, stress levels, and quality of sleep in COVID-19 positive patients under strict institutional isolation.

Keywords: SARS-CoV-2, COVID-19, Meditation, Stress, Anxiety, Depression, Sleep

INTRODUCTION

Emerging and re-emerging pathogens have been a burden on global public health and affect all the domains, physical, and mental as well as social well-being of an individual. At the end of December 2019, a cluster of unexplained cases of pneumonia emerged in Wuhan, China.[1] The disease caused by a novel coronavirus was named corona virus disease-19 (COVID-19) by the World Health Organization in February 2020.[2] To contain, the spread of infection lockdown was declared in various parts of the world which led to confinement and isolation of individuals. The uncertainty of future, social isolation, and risk of infection can lead to generalized anxiety, symptoms of depression and reduced sleep quality both in the general population as well as healthcare workers.[3]

To prevent the undesirable effects of social seclusion, early psychological interventions should be directed toward the vulnerable population. The domain of mental health should not be overlooked during any phase of pandemic management. The traditional practices of Ayurveda and Yoga can be used as a complementary therapy for the management of such issues.[4] Various non-pharmacological measures for mental relaxation can be utilized to curb the negative effects of isolation in COVID-19 infected patients. Various studies have inscribed the use of yogic breathing techniques in the form of pranayama to improve lung function and exercise tolerance.[5,6]

Meditation practice has also been implicated to influence the virus-specific immune response leading to reduced inflammatory markers[7] and its effect on management of anxiety, depressive disorders, and insomnia cannot be understated.[8,9]

We conducted this randomized control trial to assess the effect of meditation and breathing exercises in the form of pranayama (Nadi shodhan/Anulom vilom) on depression, anxiety, stress levels, and quality of sleep in asymptomatic or mildly symptomatic COVID-19 infected patients kept under strict institutional isolation.

MATERIALS AND METHODS

This randomized control trial was undertaken in asymptomatic to mildly symptomatic COVID-19 infected patients aged 18–70 years, under strict institutional isolation after approval from the Institutional Ethics Committee (IEC-437/22.05.2020). Written informed consent was taken from all patients. The funders played no role in the design, conduct, or reporting of this study.

Study design and participants

To assess the effect of meditation and breathing exercises on the well-being of COVID-19 infected patients, we compared the levels of depression, anxiety, stress, and quality of sleep after 7 days controlled breathing program in form of Anulom vilom/Nadi shodhan to standard care control intervention in subjects under strict institutional isolation in a tertiary care centre. A total of 84 subjects were recruited in the study. Subjects in the intervention group received video-guided meditation and pranayama employing a video sent to them on electronic media (WhatsApp). Reinforcement and encouragement to perform meditation for at least 5–10 min 3 times a day for 7 days were done under observation of the investigator. Apart from this, both the groups received the usual standard of care followed by our institute for asymptomatic to mildly symptomatic COVID-19 infected patients. Outcomes were measured at the end of 7 days of intervention.

Sample size calculation

Our sample size calculation was based on the primary outcome of depression. Previously researchers have established significant improvement in anxiety and depression levels using controlled breathing techniques in hospitalized COPD patients.[10] Using their data on depression score, the minimum required sample size with 80% power and a 5% level of significance was 84 patients with 42 each in intervention and control group.

The technique of pranayama (Anulom vilom/ Nadi shodhan)

A specific type of controlled breathing in Yoga, it involves breathing slowly through alternate nostrils.[11] It is done sitting in a meditative posture preferably sukhasana or padmasana. The spine is kept upright.

- The right hand is placed on the right nostril and left-hand rests on the left knee
- Airflow from the right nostril is obstructed by pressing hard on the right side
- This is followed by taking a deep breath from the left nostril
- Hold inhaled breath for few seconds
- Release finger from the right nostril which will allow exhaling air from it. While doing, so the left nostril is shut with the help of ring and little finger
- Exhalation process should be slow and for a longer duration than inhalation
- The same process is repeated with inhalation from the right nostril and exhalation from the left one
- This completes one round of Anulom vilom. The whole process can be repeated for 8–10 times.

Data collection

The data were collected using a structured questionnaire which included demographic variables (age, gender, and educational qualification), number of days since isolation, questions to assess the level of depression, anxiety, stress, and quality of sleep. The tool used in our study is freely accessible.

Outcome measures

DASS21

The depression, anxiety, and stress test[12,13] include 21 Likert type questions. The available options for questions include 0: Did not apply to me at all, 1: Applied to me to some degree or some of the time, 2: Applied to me to a considerable degree or good part of the time, and 3: Applied to me very much or most of the time. The scores for different dimensions are obtained through the sum of scores on answers to items corresponding to each of the factors. The scores obtained are multiplied by a factor of two for the final scores. The answers are categorized to classify depression, anxiety, and stress as no symptoms, mild, moderate, severe, and extremely severe. A score of ≤9 for depression, seven for anxiety, and 14 for stress is considered normal.

Quality of sleep

Quality of sleep was assessed using the same Likert scale as DASS21. The questions asked to assess sleep were related to domains of initiation, maintenance, and adequacy of sleep. This included trouble falling asleep, trouble staying asleep, and feeling tired after waking up in the morning, respectively.

Statistical analysis

All the data were collected and recorded over the Microsoft Excel sheet for Windows and further analysed using STATA version 14.2 (StataCorp LP, College Station, TX, USA) was

used for the statistical analysis. Categorical variables were presented in the form of number (frequency) and continuous variables as mean (± standard deviation) and/or median (interquartile range). To find association between categorical variables, Chi-square test or Fisher's exact test was used. To compare the continuous variables between the two groups, *t*-test or Wilcoxon ranked sum test was used. $P < 0.05$ was considered statistically significant.

RESULTS

A total of 84 asymptomatic to mildly symptomatic COVID-19 positive patients (equally divided into control and intervention group) participated in the study. Participants were recruited from June 2020 to July 2020. The mean age was 34.52 (±9.46) years in the intervention group and 36.48 (±10.47) years in the control group (0.372). [Table 1] shows the baseline characteristics of the study participants. The majority of the patients were males with equal distribution between the control and intervention groups ($P = 0.815$). The most of the patients were educated till secondary level in both the groups and no association of education qualification was with the groups ($P = 0.355$). [Table 2] and [Table 3] show the effect of the intervention on depression, anxiety, stress levels, and quality of sleep. The positive effect of intervention was observed in depression and stress level and difference was seen significant between the control and intervention group with regard to depression ($P < 0.001$) and stress levels ($P = 0.004$). Further, the quality of sleep [trouble falling asleep ($P = 0.007$), trouble staying asleep ($P = 0.004$), and feel tired after waking up in the morning ($P = 0.003$)] were also better in the intervention group. Whereas, the effect of meditation on the improvement of level of anxiety in patients under isolation was not found to be statistically significant ($P = 0.528$). The number of days since isolation was also significantly lower in intervention group as

compared to the control group ($P < 0.001$). This might have been due to the positive effect of the intervention.

Further subgroup analysis was done for each group separately and outcome measures were compared for age (<35/≥35), gender, and educational qualification. We did not find any significant difference of outcome measures in relation to demographic variables in each of the group.

DISCUSSION

The objective of this study was to assess the effect of meditation and breathing exercises in form of pranayama (Anulom vilom) on depression, anxiety, stress levels, and quality of sleep in asymptomatic to mildly symptomatic

Table 1: Baseline characteristics of participants [mean ±SD or *n* (percentage)].

Characteristics	Intervention group (N=42)	Control group (N=42)	P value
Age	34.52 (± 9.46)	36.48 (± 10.47)	0.372
Sex			
Male	29 (69.05)	28 (66.67)	0.815
Female	13 (30.95)	14 (33.33)	
Education			
Uneducated	03 (07.10)	05 (11.90)	0.355
Upto 5th standard	06 (14.30)	03 (07.10)	
Upto 10th standard	19 (45.20)	19 (45.20)	
Graduate	08 (19.00)	13 (31.00)	
Postgraduate	06 (14.30)	02 (04.80)	
Number of days since isolation	12.4 (± 2.53)	15.9 (± 5.74)	< 0.001

Table 2: Intervention group versus control group depression, anxiety, stress scores [mean ±SD and median (IQR)].

Characteristics	Intervention group (*n=42*)	Control group (*n=42*)	P value
Depression			
Mean (±SD)	1.81 (± 2.37)	4.67 (± 4.02)	<0.001
Median (IQR)	2 (2)	4 (4)	
Anxiety			
Mean (±SD)	2.14 (± 2.66)	1.81 (± 2.37)	0.528
Median (IQR)	2 (4)	0 (4)	
Stress			
Mean (±SD)	2.71 (± 3.27)	4.52 (± 3.62)	0.004
Median (IQR)	2 (4)	4 (4)	

Table 3: Intervention group versus control group sleep characteristics [*n* (percentage)].

Characteristics	Intervention group (*n=42*)	Control group (*n=42*)	P value
Trouble falling asleep			
0	35 (83.33)	23 (54.76)	0.007
1	06 (14.29)	08 (19.05)	
2	01 (02.38)	09 (21.43)	
3	00 (00.00)	02 (04.76)	
Trouble staying asleep			
0	36 (85.71)	23 (54.76)	0.004
1	06 (14.29)	12 (28.57)	
2	00 (00.00)	05 (11.90)	
3	00 (00.00)	02 (04.76)	
Feel tired after waking up in morning			
0	39 (92.86)	26 (61.9)	0.003
1	03 (07.14)	12 (28.57)	
2	00 (00.00)	03 (07.14)	
3	00 (00.00)	01 (02.38)	

COVID-19 positive patients under strict institutional isolation. Although numerous studies have explored the level of depression, anxiety, stress, and quality of sleep in COVID-19 patients as well as general population during this pandemic, none have investigated the effect of meditation and breathing exercises on these parameters.[5,14,15]

The previous study on the impact of 14 days of self-isolation during COVID-19 pandemic on sleep quality depicted that level of anxiety and stress significantly influences the quality of sleep. They also emphasized the need to improve mental health and sleep which will help in enhancing the immunity and hence the ability to resist infectious diseases.[15] Similarly, another study conducted on the general population identified major mental health burden during COVID-19 pandemic in the form of generalized anxiety disorder, depressive symptoms, and reduced sleep quality.[5]

The result from these studies highlighted the need of integrating some practices to mitigate the negative effects of social isolation on the general well-being of patients. To the best of our knowledge, no previous RCT has assessed the effectiveness of meditation on the well-being of COVID-19 positive patients under strict institutional isolation.

The calmness and equanimity provided by meditation and mindfulness practices cannot be understated. Studies have shown positive results of the yogic breathing program and mindfulness meditation for general well-being and as a treatment approach to insomnia.[16,17] The present study, using the technique of pranayama in the form of "Anulom vilom," found a significant difference between the level of depression, stress, and quality of sleep between intervention and control group. Although, no significant difference was found in the effect of meditation on the level of anxiety between both the groups.

The uncertainty of future and disease progression can cause a great psychological impact on patients. The reactions include emotional stress, maladaptive behaviour, and defensive responses.[17] Therefore, interventions in the form of meditation and breathing exercises merit consideration now rather than later when the negative effects will materialize as a post-traumatic stress disorder.

It has also been seen that pranayama improves lung function,[18] helps to reduce inflammatory markers, and influences virus-specific immune response.[7] Therefore, the unexplored potential of this simple, useful, affordable, and easily available practice needs implementation in the modern era of conventional mainstream medicine.

Limitations

Similar to other studies, this study also had some limitations. At the time of admission, the levels of depression, anxiety, stress, and quality of sleep were not assessed with the presumption that baseline levels were equally distributed in both the groups after randomization as no baseline demographic difference was observed. A follow-up with baseline levels may have helped to analyze the effect of meditation on these parameters in a better way. The study included only asymptomatic or mildly symptomatic patients; therefore, the results cannot be generalized to all patients infected with COVID-19.

CONCLUSION

Our study marks an important step toward the integration of meditation as a complementary therapy to promote general health and well-being in COVID-19 infected patients. Further research may be conducted on the effect of meditation on inflammatory markers, lung function, and clinical outcomes. Moreover, it can be utilized for the mental health upliftment of the most vulnerable population, which is healthcare workers at this arduous time.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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