SHORT ARTICLE

Yoga Intervention and Sleep Quality in Asymptomatic COVID-19 Cases: Insights from a Tertiary Care Center in Central India

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CITATION

Raghuwanshi B, Dubey DC, Bramhachari S, Chauhan S. Yoga Intervention and Sleep Quality in Asymptomatic COVID-19 Cases: Insights from a Tertiary Care Center in Central India. Indian J Comm Health. 2024;36(6):873-878. https://doi.org/10.47203/IJCH.2024.v36i06.022

ARTICLE CYCLE

Received: 30/05/2024; Accepted: 12/12/2024; Published: 31/12/2024

ABSTRACT

Background: The COVID-19 pandemic posed significant challenges globally, with asymptomatic carriers forming a notable proportion and concerns regarding isolation resulting in stress and sleep disturbances. This study aimed to assess the efficacy of tele-based yoga interventions in improving sleep patterns among asymptomatic COVID-19 patients. **Material and Methods**: A pre-and-post- study design was employed, implementing structured breathing exercises and mindful meditation via telemedicine to evaluate their impact on sleep quality. Participants consisted of asymptomatic individuals aged 18 to 85 years who tested positive for COVID-19. Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI) before and after a fourteen-day tele-based yoga program. **Results**: Analysis of 86 participants revealed a pre-intervention mean global PSQI score of 10.22 ± 2.22, indicating poor sleep quality. Following the intervention, the mean global PSQI score improved to 5.99 ± 1.81. Subgroup analysis demonstrated significant enhancements in various sleep domains, including subjective sleep quality, sleep latency, and sleep disturbances. **Discussion**: The findings suggest efficacy of yoga interventions in ameliorating sleep quality in patients with sleep disturbances among asymptomatic COVID-19 patients. Tele-based yoga interventions showed promise in improving sleep patterns among asymptomatic COVID-19 patients. Further research is warranted to investigate long-term effects and refine intervention strategies for optimal sleep management.

KEYWORDS

COVID-19; Asymptomatic Patients; Telemedicine; Yoga Nidra; Sleep Quality; Pittsburgh Sleep Quality Index (PSQI); Structured Breathing Exercises; Mindful Meditation; Pandemic

INTRODUCTION

The severe outbreak of the SARS Coronavirus illness (COVID-19) was classified as a PHEIC (Public Health Emergency of International Concern) by the World Health Organization (WHO) (1). The new coronavirus SARS-Cov-2, a positive-sense single-stranded RNA virus, became the cause of this illness. (2). With the aid of a spike (S) protein, this virus enters human host cells via the receptor angiotensin-converting enzyme 2 (ACE2) (3). A significant percentage of patients with mild to moderate symptoms experienced sudden deterioration, requiring hospitalization (4). Common symptoms included exhaustion, dyspnoea, insomnia, anxiety, depression, reduced lung capacity, cognitive impairment, loss of taste, anosmia, dry cough, and fever (5). Aerosols, touch, the digestive tract, and respiratory droplets are the transmission routes. (6) Around 80% of COVID-19 patients had mild to moderate symptoms and recovered without special treatment. During India's first wave, 85.7% were symptomatic, and 14.3% were asymptomatic (7). An asymptomatic patient may develop symptoms or remain a carrier (1).

Yoga is the science of healthy living, fostering harmony between body, mind, and consciousness, as emphasized by the AYUSH Ministry (8).

AYUSH therapies—Ayurveda, Yoga, Naturopathy, Unani, Siddha, and Homeopathy—are recommended by India's Ministry of AYUSH as supportive treatments for COVID-19 (9). Yoga has proven beneficial for asymptomatic cases and in reducing COVID-19 severity, complementing traditional treatments to lower infection rates (10). The primary goal of the research was to evaluate the effectiveness of tele-based comprehensive, structured breathing exercises and mindful meditation as yoga intervention and its impact on sleep quality and impairment in quarantined patients as a COVID-19 asymptomatic patient adjunct

MATERIAL & METHODS

Study design: This was a pre-post study, which examined the outcome of sleep quality and impairment in participants before and after introducing structured breathing exercises and mindful meditation intervention.

Study Participants: The study, conducted during the COVID-19 pandemic from January 2020 to February 2021 at AIIMS Bhopal, included COVID-19 RT-PCR-positive, asymptomatic patients under quarantine.

Inclusion Criteria: COVID-19 RT-PCR-positive asymptomatic patients aged 18–85 with disturbed sleep, who consented to participate in the study, were included, with no gender restrictions.

Exclusion criteria included individuals with mental or physical disabilities, limited mobility, recent surgery, pregnancy, or severe co-morbid conditions (e.g., uncontrolled diabetes, hypertension, heart disease, COPD).

Assessment tool: An extensive self-report tool for assessing sleep quality and impairment is the widely used Pittsburgh Sleep Quality Index (PSQI). (PSQI) is a self-rated tool used to evaluate sleep disruptions and quality. The PSQI consists of 19 items combined into seven component scores that assess aspects of sleep: subjective quality, habitual efficiency, latency, length, disruption, use of sleep aids, and dysfunction during the day. A cutoff score of five separates people with "good" from "poor" sleep, and these component values can be added up to give a global PSQI score. Higher scores indicate greater sleep impairment.(11)

The Pittsburgh Sleep Quality Index (PSQI) and an accompanying consent form were filled out by study participants before and after intervention. The intervention included an integrated tele-based intervention comprising breathing exercises, pranayama, and mindful meditation.

This tele-based yoga program included a 15-minute pre-recorded video in which the yoga instructor led the patients through each of the practices above in Hindi, a common instruction medium. The intervention was given to the yoga group in our study for 30 minutes each day for fourteen days.

Data collection and Outcome measures

Every outcome measure was evaluated at the beginning and the end of the fourteen-day intervention. The PSQI questionnaires were administered. The end measures were sleep quality and impairment by PSQI. Two timelines of data collection were used: one before the start of the intervention and the other following the conclusion of fourteen days of YOGA (post-intervention).

Sample Size Calculation: Due to the COVID-19 waves, calculating the sample size was challenging. Initially, 100 patients were selected from 300 enrollees. After dropouts, 86 individuals remained for analysis.

Sampling method: The purposive sampling method was selected to recruit participants according to the participants' pre-determined inclusion and exclusion criteria.

Statistical Analysis: Using appropriate tools, data was examined using MS Office -Xcel Using the Student paired t test. Data distribution was examined through comparisons between pre and post-intervention groups. The MS Office -Excel was used to analyze the sample's demographic data, including gender, age range, population, education, occupation, and medical history.

Ethical clearance: The study has been approved by the Institute Human Ethics Committee. This study was carried out within acceptable ethical norms. (IHEC-LOP/2021/EF0240 dated 04 June 2021)

RESULTS

Study Participants: The study was conducted during the COVID-19 pandemic from January 2020 to February 2021 at AIIMS BHOPAL, a hospital designated to treat COVID-19 in Bhopal, Madhya Pradesh, India. COVID-19 reverse transcription-polymerase chain reaction (RT-PCR)--positive patients who were confined for quarantine and showed no symptoms were included in the study.

Initially, 300 individuals were screened for the study. Following dropouts and loss to follow-up, 86 patients were the final study participants.

Demographic Characteristics :

The study participants included 86 patients, of which thirty female participants (35.22%)and fifty-six male (65.12%) participants. The majority of patients (N=70) were under 40 years of age, while

14 patients were in the 40–59 years age group, and 2 patients were in the 60 –79 years age group.

Table 1 displays the overall PSQI scores and the participants' PSQI scores for each component. The participants included COVID-19-positive asymptomatic patients at AIIMS Bhopal. A total PSQI ranges from 0 to 13 (<5 for "good sleep quality" and ≥5 for "poor sleep quality"). The mean ± SD total PSQI score in the pre-intervention group was 10.22 ± 2.22. The mean ± SD total PSQI score in the post-intervention group was 5.99 ± 1.81, indicating low-quality sleep. Sleep latency had the highest mean score across all components in the pre-intervention group, indicating a significant prevalence of Sleep latency among participants. Subjective Sleep quality had the highest mean score across all components in the post-intervention group, indicating a substantial prevalence of Subjective Sleep quality disturbance among participants. 95% of participants did not utilize sleeping drugs, as seen by the lowest score obtained for this category. The post-intervention group's score improved but stayed above five, with higher values denoting lower sleep quality. A cumulative PSQI score of greater than five is used as the screening criterion for sleep disorders.

Table 1 Pittsburgh Sleep Quality Index Scores; Descriptive Statistics (N=86)

M±SD Pre-Intervention	M±SD Post-Intervention	Min~Max Pre Intervention	Min~Max Post Intervention
Global PSQI score (total score)			
10.22 ± 2.22	5.99 ± 1.81	6~16	0~ 9
Comp. 1: subjective sleep quality			
1.78 ± 0.81	1.22± 0.90	1~3	0~2
Comp. 2: sleep latency			
1.62 ± 0.55	1.07 ± 0.40	1~3	0~2
Comp. 3: sleep duration			
1.94 ± 0.97	1.03 ± 0.25	1~3	0~2
Comp. 4: habitual sleep efficiency			
1.83 ± 0.41	1.03 ± 0.18	1~3	1~2
Comp. 5: sleep disturbances			
1.81 ± 0.44	0.81 ± 0.44	1~3	0~2
Comp. 6: use of sleeping medications			
0.24 ± 0.50	0.12 ± 0.35	0~2	0~2
Comp. 7: daytime dysfunction			
1.00 ± 0.81	0.70 ± 0.81	0~3	0~3

PSQI=Pittsburgh Sleep Quality Index; Comp.=Component.

Figure 1 and 2 show the distribution of the global PSQI score in the pre-intervention and post Intervention group and displays the proportion of responses (0– 3) for each domain, with "0" denoting lack of sleep problems in that domain and "3" highly problematic. Across each domain (y-axis), the stacked bars represent each response, and each bar's length represents the proportion of responses.

Figure 1: Relative frequency of Pre-Intervention PSQI component response to sleep domains

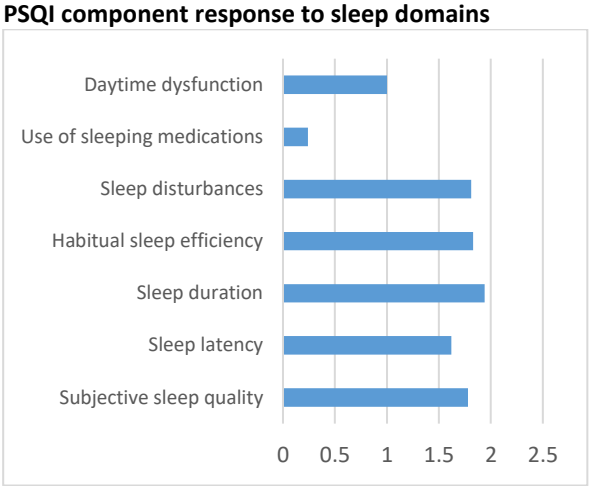
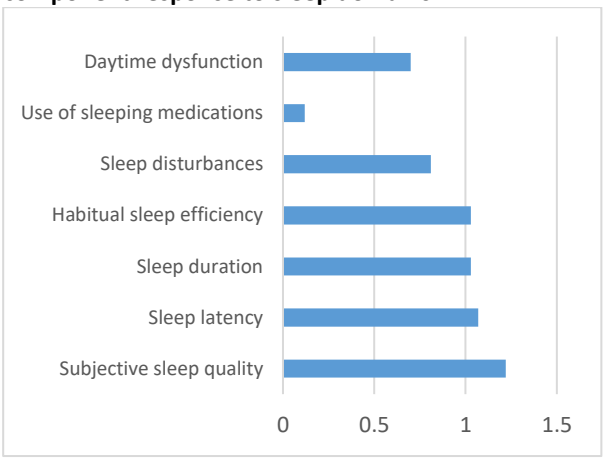


Figure 2: Relative frequency of Post Intervention component response to sleep domains



The Pre-intervention group vs. Post-intervention group 0median (IQR) for each domain is estimated. Median (IQR): indicates the median value (the middle value when all values are ordered) for each domain, along with the interquartile range (IQR), which measures the spread of the data. The IQR is the range between the 25th and 75th percentiles. For subjective sleep quality, the median score was 2 (IQR: 2). The median (IQR) scores for other components were as follows: sleep latency, 2 (1); sleep duration, 1.5 (1); habitual sleep efficiency, 2 (1); sleep disturbances, 2 (1); use of sleep medication, 0 (0); and daytime dysfunction, 1 (0). The PQSI components range from 0 to 3. Except for sleep medication use, which is not indicated by these scores because most patients in this study population did not take sleep drugs, all of the study population had some trouble sleeping. Although the postintervention group's sleep has improved, it is still insufficient, as shown by a total PSQI score greater than 5.

Table 2 displays the proportion of responses (0–3) for the Sleep Duration domain, with "0" denoting lack of sleep problems in that domain and "3" highly problematic. Sleep components with a larger proportion of higher scores were sleep duration disturbances, with (43.7 %) having severe sleep disturbance in the preintervention group, and this improved in the postintervention group, with 90.8 % having moderate sleep disturbance in the post-intervention group (Table 3).

Table 2: Component score of sleep duration pre and post-intervention

Sleep Duration	Pre Intervention		Post Intervention	
Score	Frequency	Percent	Frequency	Percent
0	0	0	2	2.3
1	43	49.4	79	90.8
2	5	5.7	5	5.7
3	38	43.7	0	0
Total	86	98.9	86	98.9

The COVID-19-positive asymptomatic patients were under quarantine and self-reported varying levels of sleep problems across all sleep domains. The proportion of these patients reporting any indication of sleep problems (at least somewhat) was significantly higher in the preintervention group, with 100% of patients reporting problems in sleep disturbance compared to those in the post-intervention group. Study results demonstrated that quarantined COVID-19-positive asymptomatic patients were reported as poor sleepers (total PSQI>5). No significant effects of age group were found to be associated with the severity of sleep difficulties ("poor" vs. "good" sleepers;). The severity of sleep difficulties did not significantly differ across genders. However, postintervention PSQI improved in 38.3% of patients, but the majority still had a PSQI of > 5 associated with the severity of sleep difficulties ("poor" vs. "good" sleepers;).

DISCUSSION

This study sought to characterize the PSQI users' overall sleep quality, sleep patterns, and degree of sleep issues. Our findings revealed that, in comparison to 37% of an adult population living in an urban area who used the PSQI. (12) and the majority, 71.5% of quarantined COVID-19-positive patients (13), had poor sleep quality (also known as "poor sleepers"). Stress brought on by the COVID-19 Pandemic and the isolation that comes with quarantine could be a part of the general lack of sleep.

The preintervention group's mean global PSQI score was 10.22 (SD = 2.22). Nevertheless, even with the postintervention group's improvement in global PSQI, the global PSQI for the current sample remained higher than 5 ~5.99 (SD = 1.81).

The PSQI, designed to assess self-reported sleep behaviors across a broad range of individuals, is ideal for analyzing adult sleep patterns. The participants' PSQI scores were consistent with those from studies using the Japanese version, showing low daytime dysfunction and higher scores for subjective sleep quality, latency, duration, habitual sleep deficiency, and disturbances (14).

According to the results above, the PSQI score for COVID-19-positive individuals under quarantine was 10.22 ± 2.22 in the pre-intervention group and 5.99 ± 1.81 in the post-intervention group. Compared to Wu and Wei's 100% report (15), which was less than Cheng et al.'s 30% report (16), those with scores over five accounted for 100% in Wu and Wei's study. While investigations on the sleep state of COVID-19-positive patients in quarantine during the COVID-19 pandemic have yielded varying conclusions, our study has a larger sample size than those described in previous works. Compared to people who are COVID-19 negative and are not in quarantine, patients who are COVID-19 positive have a greater prevalence of sleep disturbances.

According to this study, participants' health and well-being are probably at risk due to poor quality sleep. Overall, the findings suggest that yoga could be helpful for patients in isolation and that PSQI could be beneficial, as the results indicate that the global score and component scores offer useful information as an outcome measure. Several favorable psychometric features of the global score and component scores were revealed. The psychometric qualities of the PSQI discovered in this study must be replicated in subsequent research as an outcome measure to furnish pertinent information.

A significant proportion of the global population, spanning over 170 countries among WHO's 194 Member States, currently embraces various forms of traditional medicine, including herbal remedies, yoga, Ayurveda, acupuncture, acupressure, and indigenous therapies. While the utilization and acknowledgment of traditional medicine in primary health care (PHC) and universal health care (UHC) have steadily increased, India boasts a rich history of traditional medicine practices. Among the prevalent health conditions addressed through traditional medicine in India are joint disorders, neurological ailments, and mental health disorders (17). The Government of India has steadfastly committed to integrating allopathic and traditional medicine systems, facilitating the modernization and amalgamation of traditional medicine into the national healthcare delivery framework.

The COVID-19 pandemic has underscored deficiencies in health coverage within global health systems. Traditional medicines and practices can serve as pivotal assets in bridging these gaps, expediting recovery, and offering avenues for research into novel therapies to combat and manage emerging health threats and crises. Allopathic medical practitioners can undergo brief training in traditional medicine, such as yoga, to ensure their familiarity with and ability to leverage both medical systems effectively. Complemented by India's longstanding commitment to universal and cost-free health care, supported by physicians at the PHC level, the nation is establishing a benchmark for successfully integrating traditional and allopathic medicine systems, thereby enhancing the health and well-being of its population.

This study contributes to the growing body of knowledge on the benefits of yoga for improving sleep quality in asymptomatic COVID-19 patients. It highlights the potential of telemedicine to deliver effective health interventions during periods of isolation. By demonstrating significant improvements in sleep quality, this research supports the integration of yoga into complementary treatment strategies for managing COVID-19-related health issues, providing a foundation for future studies to refine and expand such interventions.

Conclusion

This study aimed to evaluate the efficacy of tele-based yoga interventions on sleep quality among asymptomatic COVID-19 patients in a tertiary care centre in central India. The findings suggest that yoga interventions, including structured breathing exercises and mindful meditation, can significantly improve sleep quality.

Recommendation

The study highlights yoga's public health importance as an accessible, non-pharmacological solution for sleep disturbances in asymptomatic COVID-19 patients. With the high prevalence of sleep issues in this group, incorporating yoga into public health strategies could improve well-being and reduce healthcare burdens during pandemics.

Limitation of the Study

The present study has several limitations. The study's sample was self-selected and well-educated, limiting generalizability to broader populations, especially those with lower educational backgrounds. Adherence to the yoga intervention could not be strictly monitored, potentially affecting the results. The absence of a control group prevents definitive conclusions about the intervention's efficacy.

Relevance of the Study

The Government of India is committed to integrating allopathic and traditional medicine to modernize and incorporate traditional practices into the national healthcare system. Key recommendations include ensuring the safety, regulation, and standardization of these practices to foster confidence and fully integrate them into mainstream care. India has a rich tradition of medicine, especially in treating joint, neurological, and mental health disorders. The growing evidence on yoga’s benefits for improving sleep quality in patients underscores its potential, while also highlighting the role of telemedicine in delivering effective health interventions during periods of isolation.

Authors Contribution

All authors have contributed equally.

Financial Support and Sponsorship

Nil

Conflict of Interest

There are no conflict of interest.

Acknowledgement

None

Declaration of Generative AI and AI Assisted Technologies in the Writing Process

The authors haven’t used any generative AI/AI assisted technologies in the writing process.

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