

Effects of Prana Mudra and Nadi Shodhan Pranayama on Sleep Quality and Academic Stress Amongst Female Students Living in Hostel

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Abstract—Female students living in hostels often encounter elevated levels of stress due to academic pressures and lifestyle adjustments, which can adversely affect their sleep quality and overall well-being. Yoga, an ancient Indian discipline promoting holistic living, offers effective tools for managing such challenges. Maharshi Patanjali's system of Ashtanga Yoga, particularly the practice of Pranayama, emphasizes the regulation of breath to harmonize the mind and body.

The study employed a pretest-posttest control group design over 30 days, from 31st October to 1st December 2023. Participants were randomly divided into study and control groups. The intervention included a 2-minute prayer in a meditative posture, 5 minutes of Prana Mudra, 5 minutes of Nadi Shodhan Pranayama, and 3 minutes of self-observation.

This research work assessed how 15 minutes of Nadi Shodhan Pranayama and Prana Mudra before bedtime, repeated for 30 days, affected sleep quality and academic stress in female hostel residents. The data was collected with the help of Pittsburgh sleep quality index (PSQI) and Academic Stress Scale (ASS).

The findings of the study showed that the intervention improved sleep quality and reduced academic stress, suggesting these practices can benefit female students' well-being when incorporated into daily routines.

Index Terms—Pranayama, Sleep Quality, Stress, Yoga

I. Introduction

Yoga originates from the Sanskrit root “Yuj”, which means *union, to unite, or to connect*. It signifies the union of the individual consciousness with the supreme consciousness. More than just a physical practice, yoga is a philosophy of life and a state of inner awareness. It teaches us to return to ourselves, to discover our boundaries, and gradually expand them—allowing us to truly relax into our authentic self and connect with our inner being.

The ultimate aim of yoga is to attain Samadhi, or spiritual enlightenment. This path is systematically outlined by Maharshi Patanjali in the Yoga Sutras, where he presents the *Ashtanga Yoga* or the eight limbs of yoga:

1. Yama – ethical restraints (Ahimsa, Satya, Asteya, Brahmacharya, Aparigraha)
2. Niyama – personal observances (Saucha, Santosha, Tapas, Swadhyaya, Ishwarpranidhan)
3. Asana – physical postures
4. Pranayama – breath control
5. Pratyahara – withdrawal of senses

6. Dharana – concentration
7. Dhyana – meditation
8. Samadhi – ultimate bliss

Among these, Pranayama holds a vital place. Defined by Patanjali as “*Tasmin sati śvāsa-prāśvāsayor gati-vicchedaḥ prāṇāyāmaḥ*”, Pranayama involves the regulation of inhalation and exhalation, including breath retention. Similarly, the Hatha Yoga Pradipika, a classical yogic text by Swami Swatmarama, highlights the deep connection between breath (Prana) and the mind (Chitta), stating: “*When the breath moves, the mind moves. When the breath is still, the mind is still. Hence, one should restrain the breath.*”

Nadi Shodhan Pranayama, also known as *alternate nostril breathing*, is a key technique aimed at cleansing the Nadis (energy channels) in the body. It plays a significant role in balancing the autonomic nervous system, reducing stress, enhancing concentration, and improving respiratory function. This technique is detailed in yogic texts like *Hatha Yoga Pradipika*, *Siva Samhita*, and *Light on Pranayama*.

Another important yogic practice is Mudra, particularly emphasized in the third chapter of the *Gheranda Samhita*. Prana Mudra, among the most powerful mudras, activates the body's vital energy. It is formed by touching the tips of the ring and little fingers to the tip of the thumb, thereby balancing the elements of earth, water, and fire within the body. Prana Mudra is known to calm inner conflict, elevate mood, and enhance mental clarity.

In today's fast-paced world—especially within hostel environments where academic pressure and social stress intersect—issues like sleep disturbances and chronic stress are increasingly common. This study seeks to explore the therapeutic potential of ancient yogic practices, focusing specifically on Prana Mudra and Nadi Shodhan Pranayama, in addressing these modern-day challenges and enhancing overall well-being.

II. Methodology

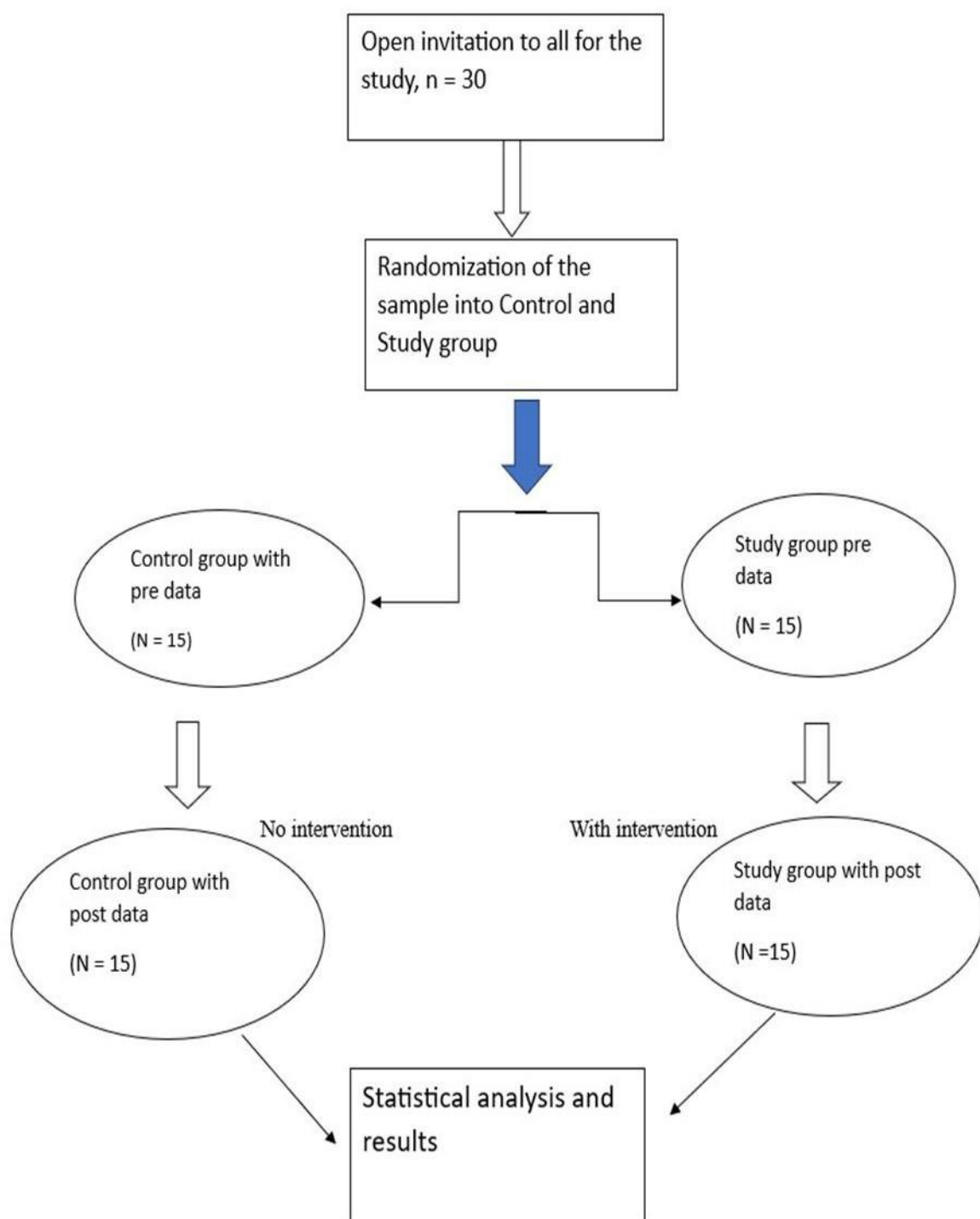
2.1 Research design

The research adopted a pretest-post-test control group design to assess the impact of Prana Mudra and Nadi Shodhan Pranayama on sleep quality and academic stress. This experimental study was conducted over a 30-day period, from October 31, 2023, to December 1, 2023. Participants were randomly assigned to two groups: an intervention group and a control group. The intervention group, consisting of 15 participants, practiced pranayama and mudra for 15 minutes daily over the four-weeks period. In contrast, the control group, also comprising 15 participants, received no intervention during the same time frame. The Pittsburgh Sleep Quality Index (PSQI) and Academic Stress Scale (ASS) were used as the pre- and post-assessment tool to evaluate changes in sleep quality and academic stress levels.

The total sample consisted of 30 female students aged between 18 and 25 years, all of whom were living in hostels in Delhi. These participants came from diverse academic backgrounds and voluntarily agreed to take part in the study. All participants met the predefined inclusion criteria, ensuring the reliability and relevance of the sample.

Participants selected for the study were required to be female hostel residents between the ages of 18 and 25, experiencing poor sleep quality and academic stress, and with no prior experience in yoga practices. Additionally, they were required to have been living in the hostel for at least one year. Exclusion criteria included male students, current or former yoga practitioners, individuals who had lived in the hostel for less than a year, and students reporting good sleep quality and no academic stress. Participants falling outside the age bracket of 18 to 25 years were also excluded from the study.

2.2 FLOW CHART OF THE STUDY



2.3 Ethical considerations

Ethical considerations were carefully addressed throughout the study. The ethical approval taken from IFCRC and all participants were fully informed about the procedure, its duration, and the potential benefits of their involvement. They were assured of their right to withdraw from the study at any point without any consequences. Additionally, participants were given clear assurance of confidentiality, and all personal data and responses were kept strictly private and used solely for research purposes.

2.4 Intervention

The intervention was administered regularly over a 30-day period, from October 31, 2023, to December 1, 2023. Each session began with participants seated in a comfortable meditative posture, such as Sukhasana, with hands resting on the knees. The practice commenced with two minutes of prayer and relaxation, where participants stabilized their breath and chanted a mantra: "*Asato Ma Sadgamaya, Tamaso Ma Jyotirgamaya, Mrityor Ma Amritamgamaya.*" This was followed by five minutes of Prana Mudra, where participants brought the tips of the thumb, ring finger, and little finger together on both hands, keeping the other fingers extended while focusing on the breath. The mudra practice aimed to channel internal energy and balance the elements within the body.

Next, participants engaged in five minutes of Nadi Shodhan Pranayama, or alternate nostril breathing. This involved closing the right nostril with the thumb and inhaling through the left, then switching to exhale through the right while closing the left nostril with the index finger. This alternate inhalation and exhalation continued for one week, after which breath retention was gradually introduced and increased weekly. The session concluded with three minutes of self-observation, where participants took natural breaths and mindfully reflected on the subtle internal changes brought about by the practice.

The overall daily practice routine consisted of 15 minutes: 2 minutes of prayer, 5 minutes of Prana Mudra, 5 minutes of Nadi Shodhan Pranayama, and 3 minutes of silent mental observation.

In this study, the dependent variables were sleep quality and academic stress, while the independent variables were the practices of Prana Mudra and Nadi Shodhan Pranayama.

2.5 Data collection tools

Data collection for this study was carried out using two primary tools: Pittsburgh Sleep Quality Index (PSQI) and the Academic Stress Scale (ASS). The PSQI is a widely recognized, self-rated questionnaire developed in 1998 by Buysse and colleagues at the University of Pittsburgh. It is designed to assess sleep quality and disturbances over a one-month period. The PSQI includes seven components: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction. Each component is scored on a scale from 0 to 3, and the global score is obtained by summing the component scores, with a total range from 0 to 21. Lower scores indicate better sleep quality, while a score of 5 or more suggests impaired sleep quality.

To assess academic stress, the Academic Stress Scale (ASS) was used. Developed by the John B. Lacson Foundation Maritime University, this tool consists of 40 items with binary responses (agree or disagree). The questions cover various aspects of academic life, including coursework, examinations, and time management. The cumulative score of the responses reflects the level of academic stress, with lower scores indicating lower levels of stress. The effectiveness of this questionnaire is contingent on accurate self-reporting, and it can be particularly helpful in identifying areas that need attention within academic environments.

The assessment tools used in this study included the PSQI, which has demonstrated reliable test-retest scores (>0.7) and acceptable validity, and the ASS, which is a self-report instrument measuring perceived stress among students.

III. Results

The data were analyzed using Microsoft Excel and GraphPad software, and t-test was conducted. Graphical

representations were employed to clearly illustrate changes in sleep quality and academic stress levels before and after the intervention in both groups.

	GROUP	GLOBAL PSQI [mean + sd]	
		PRE	POST
1.	STUDY GROUP	10.4+3.4	8.2+2.86
2.	CONTROL GROUP	9.87+3.31	9.47+2.75

Table 1: Pre – post data of study and control group (PSQI)

	GROUP	ACADEMIC STRESS SCALE [mean + SD]	
		PRE	POST
1.	STUDY GROUP	22.93+5.44	19.07+4.92
2.	CONTROL GROUP	23.47+5.33	23.67+5.54

Table 2: Pre – post data of study and control group (ASS)

The study group data showed reduction in the mean and standard deviation between the pre and post intervention data for PSQI. The mean PSQI scores decreased from pre-intervention (10.4 ± 3.4) to post-intervention (8.2 ± 2.86), indicating an improvement in sleep quality. The t-test revealed a statistically significant difference between the pre- and post-intervention scores ($p < 0.05$).

The study group data showed reduction in the mean and standard deviation between the pre and post intervention data for Academic Stress Scale. The mean ASS scores decreased from pre-intervention (22.93 ± 5.44) to post-intervention (19.07 ± 4.92), indicating a reduction in anxiety symptoms. The t-test revealed a statistically significant difference between the pre- and post-intervention scores ($p < 0.05$).

The control group data did not show any significant changes in the mean and standard deviation between the pre and post intervention data for PSQI. The mean PSQI scores showed no significant change from pre-intervention (9.87 ± 3.31) to post-intervention (9.47 ± 2.75), with no statistically significant difference between the pre- and post-intervention scores ($p > 0.05$).

The control group data did not show any significant changes in the mean and standard deviation between the pre and post intervention data for PSQI. The mean ASS scores showed no significant change from pre-intervention (23.47 ± 5.33) to post-intervention (23.67 ± 5.54), with no statistically significant difference between the pre- and post-intervention scores ($p > 0.05$).

These results suggest that the intervention had a positive effect on sleep quality and anxiety symptoms in the study group, while the control group showed no significant changes.

IV. Discussion

This study demonstrated positive effects in improving sleep quality and reducing academic stress through two key yogic practices: **Nadi Shodhan Pranayama** and **Prana Mudra**. These practices influence the flow of *prana*, or vital energy, within the body. When this flow is disrupted, individuals may experience poor sleep and elevated stress levels across various age groups. Nadi Shodhan Pranayama, a yogic breathing technique, helps purify the nadis—subtle energy channels—cleansing the pathways through which prana flows and resulting in a calming, serene effect. Complementing this, Prana Mudra helps stabilize the pranic flow, fostering steady thoughts and enhanced mental clarity. Together, these practices serve as powerful tools for managing stress and improving sleep quality, particularly in high-pressure environments like academic settings.

This research is supported by various recent studies that emphasize the benefits of such yogic interventions. Mahendru et al. (2021) observed that meditation and breathing exercises helped COVID-19 patients feel less depressed, less stressed, and experience better sleep after just one week. Ebrahimi et al. (2017) studied diabetic women and found yoga significantly improved their sleep quality compared to aerobic exercises. Similarly, Gündogdu and Koçalışlı (2023) found that deep breathing exercises helped breast cancer patients undergoing radiation therapy sleep better and feel less fatigued. Among medical students, alternate nostril breathing was linked to reduced heart rate and lower stress levels, according to studies cited from Adichunchanagiri Institute of Medical Sciences and Swamy (2015). Mohini et al. also highlighted how practicing mudras daily could enhance sleep, reduce stress, and improve interpersonal relationships. Collectively, these studies underscore how simple, mindful practices like breathing exercises and mudras can enhance overall well-being.

While the current project observed only subtle changes, these were nonetheless positive. Some external factors—such as participants' sedentary habits, irregular routines, or dietary influences—may have minimized the visible effects. Still, a slight improvement was noticed in sleep quality and academic stress compared to the control group. These results suggest that with greater consistency and larger samples, more significant effects could be observed.

In conclusion, this study examined the impact of a 30-day intervention involving 15 minutes of Nadi Shodhan Pranayama and Prana Mudra performed before bedtime by female hostel residents. The findings revealed small but encouraging improvements in sleep quality and academic stress. These preliminary results imply that incorporating such techniques into daily routines may support mental well-being among students. Further research with larger sample sizes and extended durations could strengthen these findings and offer deeper insights.

One of the key strengths of this study was its grounding in authentic yogic texts, which helped preserve the traditional methodology and ensured the accuracy of the practices. The intervention was also cost-effective, requiring no special equipment, allowing participants to practice easily within their own environments. Along with this the short daily time commitment of just 15 minutes made the practices highly accessible and sustainable, especially for students managing busy schedules.

However, the study had some limitations. External factors such as individual lifestyles, personal challenges, and cultural backgrounds could have influenced the outcomes, making it difficult to isolate the effects of the intervention. Moreover, the relatively short duration of the study might not have been enough to capture the long-term benefits of these practices. The limited participant demographic—female students living in hostels—also restricts the generalizability of the results to wider populations.

Looking ahead, there is promising scope for future research. Further studies could explore the therapeutic mechanisms behind Prana Mudra and Nadi Shodhan Pranayama, helping us understand how they work on both physiological and psychological levels. Incorporating these practices into institutional wellness programs could also be explored to promote holistic well-being in academic settings. By integrating such techniques into everyday student life, we may foster healthier learning environments and more resilient individuals.

V. Conclusion

The present study highlights the therapeutic potential of Prana Mudra and Nadi Shodhan Pranayama in improving sleep quality and reducing academic stress among female students living in hostels. Over a period of 30 days, the intervention group exhibited statistically significant improvements in sleep quality, as reflected by the decrease in Pittsburgh Sleep Quality Index (PSQI) scores, and a notable reduction in academic stress levels, as measured by the Academic Stress Scale (ASS). In contrast, the control group showed no significant changes, thereby underscoring the effectiveness of the intervention.

These findings are consistent with the theoretical foundations of yogic science, wherein breath regulation and mudra practices are known to harmonize the autonomic nervous system, promote emotional stability, and enhance psychosomatic health. Nadi Shodhan Pranayama, by balancing the Ida and Pingala nadis, potentially facilitates homeostasis within the neurophysiological systems, while Prana Mudra acts as a catalyst in energizing the vital forces, thereby promoting psychological resilience.

The study emphasizes that incorporating simple, time-efficient yogic techniques such as Prana Mudra and Nadi Shodhan Pranayama into daily routines can serve as a non-pharmacological, cost-effective strategy for mitigating stress-related disturbances and fostering holistic well-being among students. Future research with larger sample sizes, longer intervention durations, and additional psychophysiological markers is recommended to further validate and deepen the understanding of these findings.

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