Effect of Bhramari Pranayama on Occupational Stress and Sleep Quality of Corporate Workers - A Pilot Study

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Abstract Background: Occupational stress is the work-related stress caused due to excessive physical and psychological strain in workplaces resulting from increased demand and workload on the employees that cause deterioration of physical health as well as cognitive faculties leading to psychosomatic disorders, anxiety, depression, frustration and poor sleep quality. Through recent studies, it has been found that several yogic techniques such as Asanas, pranayamas, chantings and meditations have been beneficial in reducing the stress mechanism caused due to Hypothalamus-Pituitary-Adrenal (HPA) axis activation and inducing good sleep by restoring the natural circadian rhythm.**Objective:** To investigate the effect of Bhramari pranayama on occupational stress and sleep quality based on Workplace Stress Scale, Perceived Stress Scale and Pittsburgh Sleep Quality Index. **Methodology:** Eleven participants working in corporate sectors were recruited for the study using a convenience sampling technique. The research design was single group pre and post-study. Their age ranged between 20 to 40 years, belonging to both male and female genders. At the baseline, data was collected, followed by the post data after 15 days of practice of Bhramari pranayama for 30 minutes daily, using the Workplace stress scale and Perceived stress scale to measure Occupational stress and Pittsburgh Sleep Quality Index for assessing the sleep quality. **Results:** This study shows that after 15 days of practice of Bhramari pranayama, there was a reduction in stress level observed based on the Workplace stress scale (with a p-value of 0.004) and Perceived stress scale (p-value = 0.002). A significant improvement is observed in the sleep quality noted with a p-value less than 0.001. **Conclusion:** The present study has shown that Bhramari pranayama was found to be effective in reducing the Occupational stress of Corporate workers with an improvement in their sleep quality index after practising for 15 days. Moreover, further research on clinical implications is suggested based on these preliminary results.

Keywords: Bhramari pranayama, Occupational stress, sleep quality, corporate workers, HPA axis, stress, yoga.

1. Introduction

Hans Seyle has defined stress as a nonspecific and conventional response to a demanding situation, which is a mechanism of "General Adaptation syndrome" that helps in maintaining the homeostasis of the body through the activation of the Hypothalamus-Pituitary-Adrenal (HPA) axis and causing physical and mental health-related disorders due to chronic stress (Lu et al., 2021). There are two underlying mechanisms that work during stress: firstly, corresponding to sympathetic activation such as an increase in heart rate, blood pressure, glucose and oxygen transport along with contraction of muscles and pupil dilation (Alarming response) and secondly, adjusting the individual to the external situation to prevent physical and mental fatigue (Adaptation phase) (Michie, 2002). According to some clinicians, stress has been classified into two types: Eustress, also known as Acute stress, positively impacts the individual's performance, and Distress is the type of stress that persists for a long period of time, resulting in physical and psychological illnesses (Bienertova-Vasku et al., 2020). The corticotropin-releasing hormone is the main hormone that plays a major role in the physiology of stress leading to the release of corticoids, corticosteroids and catecholamines that act as immune suppressors through its impact on the sympatho-adrenergic system (Dragoș & Tănăsescu, 2010).

In relation to workplaces, it has been found that occupational stress causes negative and adverse health impacts to those working as teachers, social workers, corporates, police officers and medical personnels; causing them anxiety and depression due to high levels of workload and prolonged working hours (Basu et al., 2017). Occupational stress is said to develop due to the following factors excessive work demands, poor management, extreme peer pressure and lack of information, which affects the mental health, emotions and behavior of an individual (Moreno Fortes et al., 2020). Based on a review study, it has been found that there was a decrease in heart rate variability due to occupational stress corresponding to lowered parasympathetic dominance and increased Low frequency that symbolizes high sympathetic activation (Järvelin-Pasanen et al., 2018).

There have been studies that have reported a negative correlation between occupational stress and sleep quality, which results in an increased risk of anxiety, burnout, cardiovascular disorders, diabetes, obesity and insomnia (Mao et al., 2023). Sleep quality has been associated with the regulation of cognitive faculties as well as emotional and mental health (Ratcliff & Van Dongen, 2009), and Sleep disturbance has been identified as either an outcome or comorbidity of stress that results as irregular sleep, waking up at midnight or too early and delayed time to fall asleep that happens due to the disruption of the circadian rhythms (Almojali et al., 2017). Due to stress, Adreno-corticotrophin Hormone has been released, leading to increased Rapid Eye Movement (REM) sleep and altered circadian rhythm (Van Reeth et al., 2000). A study by Peng et al. also reported an association between occupational stress and period circadian regulator 3 (PER 3) gene polymorphism responsible for regulating the

sleep and wake cycle with sleep quality; further, it was found that the workers under high occupational stress were present with Allele 5 of PER 3 gene contributing to less sleep quality (Peng et al., 2022).

Research evidence has shown that yogic practices have been proven to be an effective technique in managing stress levels, sleep quality, and physical and psychological problems (Cocchiara et al., 2019). A study was conducted on thirty-three principals at Kaivalyadhama Yoga Institute with Yoga as an intervention for a period of 7 days, and the results stated that after 7 days of practice of Yogic techniques, there has been a significant reduction found in role ambiguity, powerlessness, role overload, intrinsic impoverishment, under participation, low status and occupational stress (Verma et al., 2020). According to Vedas, Yoga is an ancient technique designed to promote health and positive well-being and its regular practice helps in reducing the stress caused due to strenuous jobs, enhancing resilience (Dhriti et al. 2016).

Bhramari pranayama is a beneficial breathing technique that has positively impacted in lowering stress reactivity through modulation of the heart rate (Banerjee & Kumar, 2023). It has been observed that Bhramari pranayama is said to have increased paroxysmal gamma waves in the brain that help in regulating memory, perception and emotions (Kuppusamy et al., 2017); along with that, theta activity was also noted which helps in attaining awareness as well as a blissful state of mind (Vialatte et al., 2009). Therefore, the present study aims to find the effect of Bhramari pranayama on occupational stress and sleep quality of corporate workers. The hypotheses of the study are stated below:

Alternate Hypothesis 1: Bhramari pranayama may reduce the occupational stress of corporate workers.

Alternate Hypothesis 2: Bhramari pranayama may improve the sleep quality of corporate workers.

Null Hypothesis 1: Bhramari pranayama may not reduce the occupational stress of corporate workers.

Null Hypothesis 2: Bhramari pranayama may not improve the sleep quality of corporate workers.

2. Subjects and Methods

2.1 Study design and setting

The present study was conducted using a single group pre and post-design on Corporate workers from Barddhaman, West Bengal.

2.2 Recruitment of participants

The current pilot study was undertaken with 11 participants belonging to both male and female gender. They worked in corporate sectors, and their age ranged from 20 to 40 years. The subjects were mainly employed in the IT sector, Pharmaceutical research, Private Banks and Graphic designing. The recruitment of the subjects has been conducted through a convenience sampling technique. The inclusion criteria set for the study were that the participants must be working in the corporate sector, be

physically fit, and have signed the informed consent. People suffering from any critical ailment or psychological disorder have been excluded from the study. Informed consent was collected from the participants for conducting the research and they had the freedom of participation as well as withdrawal from the research. Their anonymity and confidentiality have been maintained.

2.3 Parameters measures

Participants' Demographic details, such as name, age and gender, were collected. The Occupational stress of the participants was measured using the Workplace Stress Scale and Perceived Stress Scale. Pittsburgh Sleep Quality Index was used to assess the participants' sleep quality. Baseline data was recorded, followed by the post data.

2.4 Allocation

It was a single group pre and post-study without any control group and all the eleven participants have undergone the intervention.

2.5 Intervention

The participants were made to practice Bhramari pranayama for 15 days for a duration of 30 minutes. Adopting a meditative asana, the session started with "AUM" chanting and starting prayer, which aimed at internalizing the mind and regulating the thought patterns, followed by five minutes of breath awareness. Then, the subjects were instructed to adopt Shanmukhi Mudra with closed eyes. In this position, they were asked to inhale deeply, and while exhaling, they had to produce the sound of a humming bee (Bhramari pranayama). In the initial days, the participants started with 11 rounds of Bhramari, which gradually got extended to twenty-seven rounds. At the end of the Bhramari pranayama, the participants continued with a short guided meditation for ten minutes, and then the session ended with a Shanti mantra.

2.6 Statistical Analysis

Data has been analyzed using Jeffreys's Amazing Statistics Program (JASP) software. Descriptive statistics have been conducted on the data to check the Mean ± Standard Deviation of the perceived stress scale, workplace stress scale and Pittsburgh Sleep Quality Index. The p-value has been set at 0.05, and the data has been checked for normality using the Shapiro Wilk Test.

3. Results

3.1 Workplace Stress Scale (WSS)

3.1.1 Descriptive statistics

	Name	Age	Gender	Pre WSS (Score)	Post WSS (Score)
Valid	11	11	11	11	11
Missing	0	0	0	0	0
Mean		26.182		23.636	22.909
Std. Deviation		4.423		3.854	3.618

Shapiro-Wilk		0.556		0.86	0.87
P-value of Shapiro-Wilk		< .001		0.058	0.078
Minimum		24		14	14
Maximum		39		28	27

Table 3.1.1

From Table 3.1.1, it is seen that the Mean ± Standard Deviation (SD) of Pre WSS and Post WSS Score are: 23.636 ± 3.854 and 22.909 ± 3.618 respectively. The p-values of the Shapiro Wilk test for Pre WSS and Post WSS Score are 0.860 and 0.870, which is greater than 0.05 which states that the data is normally distributed. Hence, the data is eligible for a parametric test, i.e., a Paired Sample t-test.

3.1.2 Paired sample t test

Measure 1	Measure 2	t	df	p	Cohen's d
Pre WSS score	Post WSS score	3.73	10	0.004	1.125

Note: Student t test

Table 3.1.2

The above Table 3.1.2 shows that the p-value of the paired sample t-test of Pre and Post WSS Score is 0.004, which is less than 0.05. This proves that the null hypothesis has been rejected and there has been stress reduction based on the Workplace Stress Scale with an effect size of 1.125.

3.2 Perceived Stress Scale (PSS)

3.2.1 Descriptive statistics

	Name	Age	Gender	Pre PSS (Score)	Post PSS (Score)
Valid	11	11	11	11	11
Missing	0	0	0	0	0
Mean		26.182		22.818	21.455
Std. Deviation		4.423		4.708	4.612
Shapiro-Wilk		0.556		0.948	0.947
P-value of Shapiro-Wilk		< .001		0.617	0.611
Minimum		24		14	14
Maximum		39		30	29

Table 3.2.1

Table 3.2.1 shows that the Mean ± SD of Pre PSS and Post PSS Score are: 22.812 ± 4.708 and 21.455 ± 4.612, respectively. The p-values of the Shapiro Wilk test for Pre PSS and Post PSS Score are 0.617 and 0.611, which is greater than 0.05. Hence, the data is normally distributed, and a parametric test has been performed.

3.2.2 Paired sample t test

Measure 1	Measure 2	T	df	p	Cohen's d
Pre PSS (Score)	Post PSS (Score)	4.038	10	0.002	1.217

Table 3.2.2

From the above Table 3.2.2, it is observed that the p-value of Pre and Post PSS score is 0.002, which shows stress reduction based on the Perceived Stress Scale with an effect size of 1.217.

3.3 Pittsburgh Sleep Quality Index (PSQI)

3.3.1 Descriptive statistics

	Name	Age	Gender	Pre PSQI Score	Post PSQI Score
Valid	11	11	11	11	11
Missing	0	0	0	0	0
Mean		26.182		6.818	3.727
Std. Deviation		4.423		1.471	1.104
Shapiro-Wilk		0.556		0.89	0.917
P-value of Shapiro-Wilk		< .001		0.138	0.294
Minimum		24		5	2
Maximum		39		9	6

Table 3.3.1

The Mean ± SD of Pre and Post PSQI Scores from Table 3.3.1 are noted as 6.818 ± 1.471 and 3.727 ± 1.104, respectively. A parametric t-test has been conducted on the data based on the p-value of the Post PSQI score, i.e. 0.294, which is greater than 0.05.

3.3.2 Paired sample t test

Measure 1	Measure 2	T	df	p	Cohen's d
Pre PSQI Score	Post PSQI Score	5.831	10	< .001	1.758

Table 3.3.2

After performing the paired sample t-test on the data, it has been noted that the p-value is less than 0.001, which proves the Alternate Hypothesis to be true, and there has been improvement in sleep quality with an effect size of 1.758 based on the Pittsburgh Sleep Quality Index. The reduction of the PSQI score denotes an improvement in sleep quality.

4. Discussion

The purpose of this study was to assess the effect of Bhramari pranayama on Occupational stress and sleep quality of Corporate workers, and it is observed that after 15 days of practice of Bhramari pranayama, there has been a reduction in the occupational stress levels based on Workplace stress scale and Perceived stress scale, as well as improvement in sleep quality based on Pittsburgh Sleep Quality Index, was also noted. Our results confirm the previous studies, where it was found that 15 days online intervention of Bhramari pranayama for 20 minutes daily on 42 COVID patients was found effective in reducing the stress and anxiety scores as well as there was significant improvement observed in the quality of life and sleep quality (Jagadeesan et al., 2022). Another study has revealed the effect of Bhramari pranayama on salivary cortisol (which is released in saliva by the Hypothalamus-Pituitary-Adrenal axis during stress) of twenty-six adolescents for 45 minutes thrice a week for 6 months and the Cold pressor test performed at the end of sixth month showed reduction in salivary cortisol in Yoga group after 60 minutes as compared to the baseline and the control group (Maheshkumar et al., 2022). Research has shown that Bhramari pranayama has proven to increase the brain's Theta activity, resulting in a state of thoughtlessness and total awareness (Vialatte et al., 2009).

A study was conducted by Khalsa (2004) on the sleep quality of twenty patients suffering from chronic insomnia based on Kundalini Yoga style comprising of breathing techniques and meditation for a duration of 8 weeks, which showed significant increase in the sleep quality through significant improvement in the following factors such as Total wake time, number of awakenings, total sleep time, sleep onset latency, sleep efficiency, wake time after sleep onset and the quality of

restedness at wake time (Khalsa, 2004). Evidence has shown that Bhramari pranayama not only increases the baroreflex sensitivity but also helps in improving the autonomic tone, thereby inducing sympatho-vagal balance, positively impacting sleep quality as well as improving cognition, memory and attention (Trivedi et al., 2023). Therefore, it can be stated that Bhramari pranayama is a safe and effective technique to improve sleep quality and reduce corporate workers' Occupational stress.

5. Strength of the study

The strength lies in reducing occupational stress scores based on the Workplace stress scale and Perceived stress scale. The study also shows improvement in the sleep quality of the corporate workers after practising 15 days of Bhramari pranayama. The study's uniqueness is that Bhramari pranayama has been included as the independent variable to investigate the changes in Occupational stress and sleep quality based on traditional scriptures and scientific evidence.

6. Limitations

There have been certain limitations of the current study: the sample size was small as it has been a pilot study, the sampling technique used was convenience sampling due to the limited availability of subjects, and the duration of the intervention was less, i.e., for 15 days.

7. Conclusion

The present study has shown that Bhramari pranayama was found to be effective in reducing the Occupational stress of the Corporate workers with an improvement in their sleep quality index after practising for 15 days. As these are the preliminary results, further research on clinical implications is suggested.

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