



## Short Communication

## Ratrijagarana night wakefulness and its impact on Manasika Bhava mental characteristics among industrial workers: A descriptive cross-sectional study



Elgeena Varghese <sup>a,\*</sup>, Kekuda T.R. Prashanth <sup>b</sup>, Meera Kuttikrishnan <sup>a</sup>,  
Renjulal Yesodharan <sup>c</sup>

<sup>a</sup> Department of Kriya Shareera, Sri Kalabyaveshwara Swamy Ayurvedic Medical College, Hospital & Research Centre, Vijayanagar, Rajiv Gandhi University of Health Science, Bengaluru, 560104, Karnataka, India

<sup>b</sup> Department of Kriya Shareera, Government Ayurveda Medical College and Teaching Hospital, Shivamogga, 577201, India

<sup>c</sup> Department of Psychiatric Nursing, Manipal Academy of Higher Education, Manipal, Udupi, 576104, Karnataka, India

## ARTICLE INFO

## Article history:

Received 26 May 2021

Received in revised form

22 July 2021

Accepted 31 July 2021

Available online 20 December 2021

## Keywords:

Ayush

Ayurveda

Circadian rhythm

Indian medicine

Nidra

Shift work disorder

Sleep disorder

## ABSTRACT

*Nidra* (sleep), *Ahara* (food) and *Brahmacharya* (abstinence) are the three sub-pillars of health and alterations in these basic pillars of health can lead to mortality and morbidity. Among these, *Nidra* has a critical role in the biological and psychological functioning of the body. The circadian rhythm is the physiological machinery that controls and regulates physiological activities throughout the 24 hours in conjunction with the day and night. The synchronicity of the circadian rhythm and adequate sleep is essential for maintaining normal physical and mental health. This study, therefore, was undertaken as a descriptive cross-sectional survey to evaluate the impact of *Ratrijagarana* (night wakefulness) on *Manasika Bhava* (mental characteristics) among industrial workers aged between 19 and 25 years from both genders. *Manasika Bhavas* were assessed using *Manasa Bhava Pariksha* (MBP), a 20 item questionnaire. The results indicate a substantial change in *Mana* (non-distracted mind), *Chinta* (anxiety/worry), *Dhairyam* (courage), *Harsha* (joy), *Veeryam* (energy), *Shraddha* (desire), *Medha* (intelligence), *Avasthaana* (stability of mind), *Vignyaana* (knowledge), *Sanjna* (recognition), and *Smriti* (memory). Among these, *Sanjna*, *Medha* and *Mana* and *Veeryam* are most affected, with positive ranks scoring 115, 107 and 104. *Vignyaana*, ( $\chi^2_{(6)} = 162.031$ ;  $p = .001$ ) *Veerya* ( $\chi^2_{(4)} = 12.688$ ;  $p = .013$ ) and *Shraddha* ( $\chi^2_{(6)} = 12.558$ ;  $p = .05$ ) also showed significant association with sleeping hours per day. These encouraging results need further corroboration through future studies with larger sample size and diverse populations.

© 2021 The Authors. Published by Elsevier B.V. on behalf of Institute of Transdisciplinary Health Sciences and Technology and World Ayurveda Foundation. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

## 1. Introduction

*Nidra* (sleep) is a physiological process with temporary loss of contact with *Jnanendriya* (sensory perception) and *Karmendriya* (faculties of action). It is considered as one of the essential sub pillar (*Upastambha Traya*) responsible for providing rest and relaxation to the mind, senses and body, which get tired and exhausted due to the demands of daily living [1]. *Yogaratanakara* (A text book of Indian Medicine) considered sleep as one of the four basic instincts or needs for the humans. Acharya Charaka stated that sleep is caused

by the nature of the night (*Bhutadhatri*), who takes care of all living beings. *Swabhavaki Nidra* (Natural Sleep) occurs at midnight in persons with the dominance of *Satva guna*.

The circadian rhythm is the biological phenomenon that controls and regulates these activities throughout the day. The biological clock runs in a cycle of approximately 24 hours, in conjunction with the day and night [2]. The synchronicity of the circadian rhythm and adequate sleep of 6–8 hours is essential for maintaining normal well-being, mood, memory and cognitive performance [3,4], and the person will have a pleasant mind (*Sumana*), free from diseases (*Aroga*), endowed with strength (*Bala*), complexion (*Varna*), virility (*Vrshata*) and also lives for hundred years [5]. Insufficient sleep can disrupt circadian rhythms that result in negative health outcomes [6]. Sudden changes in the

\* Corresponding author.

E-mail: [elgeenavarghese@gmail.com](mailto:elgeenavarghese@gmail.com)

Peer review under responsibility of Transdisciplinary University, Bangalore.

routines also cause disturbances in the circadian rhythm. This can trigger fatigue, disorientation, and insomnia, which can be considered as the criterion for diagnosing anxiety disorders, post-traumatic stress disorder (PTSD), and mood disorders. Our physical and mental performance is critically reduced [7,8] if we stay awake against the planned rhythmic schedule of the biological clock.

In a developing society, round-the-clock services to meet people's basic needs have brought about rising demand for work in shifts, a non-standard working time arrangement. The shift workers who are working at night (*Ratrijagarana*) are at risk of developing health problems because of the conflict in the human body's biological clock. The 'Shift Work Sleep Disorder' (SWSD) is one such circadian sleep disorder characterized by difficulty in initiating and maintaining sleep, excessive sleepiness or both. A recent meta-analysis by Zhao et al. [9] has reported that poor mental health was associated with shift work and can lead to substance abuse, cognitive impairment, poor well-being and quality of life, heightened anxiety and changes in mood [10].

The classical Ayurveda textbook *Charaka Samhita* explained these mental factors in terms of *Manasika Bhava* (mental characteristics), assessed by *Anumana pramana* (inference) [11]. They include *Bhaya* (fear), *Krodha* (anger), *Shoka* (grief), *Dvesha* (revenging tendencies), *Chinta* (anxiety/worry), *Rajah* (affection), *Dhairya* (courage), *Driti* (controlling power), *Mana* (non-distracted mind), *Harsha* (joy) *Priti* (pleasure), *Veeryam* (energy), *Shraddha* (desire/interest), *Medha* (intelligence), *Avasthaana* (stability of mind), *Upadhi* (finding solution), *Vignyaana* (knowledge), *Shila* (conduct), *Sanjna* (recognition), and *Smriti* (memory).

*Manasika Bhavas* can be severely affected with *Ratrijagarana* (night wakefulness), and to understand the influence, an analytical study has been conducted among 150 employees who were habitually working in night shifts.

### 1.1. Ethical consideration

The study was approved by the Institutional Ethics Committee of Sri Dharmasthala Manjunatheshwara College of Ayurveda, Hassan. The study processes were explained to the participants, and consent forms were obtained before the data collection.

## 2. Materials and methods

### 2.1. Source of data

Descriptive cross-sectional research was undertaken amongst 150 workers of either gender between 19 and 25 years from the textile industry in Hassan city.

### 2.2. Exclusion and inclusion criteria

Workers were selected for the survey based on the sampling criteria i.e. working at night shift for at least 15 days/month for past six months or longer. The shift was defined as minimum of 8 hours duration for the selection process. Pregnant ladies and workers diagnosed with any systemic and psychological illness were excluded from the study. The workers who had secondary insomnia due to any medical condition were also excluded from the study.

### 2.3. Methods of data collection

The researchers used a 23 item socio-demographic proforma to gather the socio-demographic data from the survey subjects, which included age, gender, height, weight, marital status, dietary habits, nature of the job, number of night shift job days, night shift

duration in hours, duration of night shift in hours, frequency of night duty interval between night duties, overtime work, presence of short nap during night duty, duration of day sleep, an average day working in hours, and the number of monthly holidays. The researchers used *Manasa Bhava Pariksha* (MBP) developed by Tanna IR for assessing *Manasika Bhava* [12].

### 2.4. Assessment criteria

MBP is a 20 item four-point scale that measures the *Manasika Bhava* using response scores ranging from zero to three. Each of these items in the MBP represents a unique *Manasika Bhava*, namely, *Bhayam – Vishadana* (fear by depressed attitudes), *Krodha- Abhidrohena* (anger by revengeful disposition), *Shoka- Dhainyena* (grief by sorrowful disposition), *Dvesha- Pratischedana* (revenging tendencies by revenging attitudes), *Rajah- Sangena* (affection to the opposite sex), *Mana-artheshu- avyabhicharanena* (non-distracted mind by the perception of objects), *Chinta* (anxiety or worries) *Dhairya- Avishadana* (courage by the strength of mind), *Driti- Alaulyena* (controlling power by non-greediness), *Harsha-amodena* (joy by self - happiness), *Priti-toshena* (pleasure by making others happy), *Viryam – Uthanaena* (energy by initiative in actions as typically difficult to perform), *Shraddha-abhiprayena* (desire by request), *Medha-grahanena* (intelligence is by comprehension of scriptures), *Avasthaanam-avibhramena* (stability of the mind-by the Avoidance of mistake), *Upadhi-anubandhena* (finding solutions by one's own resolving capacity), *Vignyaanam-vyavasayena* (knowledge of a thing by reactions or responses), *Shila-anushilanena* (natural liking for things by habitual intake of things), *Sanjnanamagrahanena* (attentiveness), and *Smriti-smaranena* (memory by the power of remembrance).

The data collection instruments were given for validation to experts in the field of Ayurveda. The authors calculated the item content validity index (I-CVI) and the scale content validity index (S-CVI) (1.00) based on their responses and found it to be valid. The scales were administered initially in a small group of participants to assess the reliability (internal consistency) of MBP. Cronbach's alpha was computed, and the alpha value for the MBP was 0.93. As a general rule of thumb, alpha values above 0.9 are considered to be excellent. The statistical association between the variables was assessed using Wilcoxon signed-rank test and chi-square independence test in SPSS 16.0 (IBM, Chicago, IL).

## 3. Results

### 3.1. Sample characteristics

The participant characteristics of industrial workers were described in terms of frequency and percentage. Out of 150 participants, 72% belongs to the 23–25 years age category, and 84.7% were males. Most of the participants (83.3%) consume a mixed diet, whereas 38.7% consumed tea regularly, and 46% regularly consumed coffee. A few participants (9.3%) reported regular alcohol intake. Among 150 participants, 51.3% were working for 10-hours per shift; meanwhile, others were working in 8 hours shift, and 52% were doing overtime duty for at least 2 h. Holidays in a month were limited to three or less for 80.7%, and 19.3% were getting four to six days. All participants had a minimum of 18 months of experience, and 66.7% had an experience of two to three years whereas, 1.3% had experience of four years and above.

### 3.2. Ratrijagarana characteristics

The total sleeping hours of the participants were grouped into three categories, less than 6 hours (73.3%), six to 8 hours (26%) and

above 8 hours (.7%). Among the participants, 52% slept for 4 to 5 hours during the daytime immediately after finishing night shift duty; meanwhile, 30.7% reported 5 to 6 hours. A few workers (12.7%) reported they used to sleep less than 4 hours; conversely, another few (4.7%) reported sleeping more than 7 hours immediately following a night shift duty. During the night shift duty, 35.3% of participants take a short nap, and out of that, 79.2% were taking 20–30 min, 15.1% took less than 20 min, and a few (5.7%) took a short nap up to 40 min.

### 3.3. Manasika Bhava before and after Ratrijagarana among industrial workers

Manasika Bhavas were analyzed twice in each participant, before and soon after the commencement of the scheduled night shift. Wilcoxon signed-rank test was applied to compare the Manasika Bhavas before and after Ratrijagarana (see Table 1). Out of 20 Manasika Bhavas, changes in 11 Manasika Bhavas were observed after night shifts, namely, *Mana* (non-distracted mind), *Chinta* (anxiety/worry), *Dhairyam* (courage), *Harsha* (joy), *Veeryam* (energy), *Shraddha* (desire), *Medha* (intelligence), *Avasthaana* (stability of mind), *Vignyaana* (knowledge), *Sanjna* (recognition), and *Smriti* (memory). *Veeryam* (121) is the most affected (80.7%) Manasika Bhava among the participants based on the positive ranks. *Sanjna*, *Medha* and *Mana* followed *Veeryam* with positive ranks 115, 107 and 104, respectively and thus were the next most affected Manasika Bhavas. *Shraddha* was another Manasika Bhava which showed significant change after Ratrijagarana (100, 66.7%).

### 3.4. Association between sleeping hours and Manasika Bhava

Researchers adopted the chi-square independence test to evaluate whether sleeping hours per day and Manasika bhavas were related in any way. In the detail analysis, *Vignyaana* (knowledge), ( $\chi^2_{(6)} = 162.031; p = .001$ ) *Veerya* (energy) ( $\chi^2_{(4)} = 12.688; p = .013$ ) and *Shraddha* (desire) ( $\chi^2_{(6)} = 12.558; p = .05$ ) were showing significant association with sleeping hours per day. *Ratrijagarana* had significantly reduced the sleeping hours of the individuals, and the sleeping hours per day significantly affected the Manasika bhava, namely *Vignyaana*, *Veerya* and *Shraddha*.

**Table 1**  
Manasika Bhava among industrial workers assessed after and before Ratrijagarana.

Manasika Bhava (After-Before)	Negative Ranks			Positive Ranks			Test Statistics		
	n	Mean rank	Sum of Ranks	n	Mean rank	Sum of Ranks	Ties	Z	p
Baya	0	0	0	2	1.5	3	148	-1.414	.157
Krodha	2	3.5	7	4	3.5	14	144	-.816	.414
Shoka	2	5	10	7	5	35	141	-1.667	.096
Dvesha	4	5.5	22	6	5.5	33	140	-.632	.527
Rajah	1	4	4	6	4	24	143	-1.89	.059
Mana	0	0	0	104	52	5460	46	-10.105	.001 <sup>a</sup>
Chinta	0	0	0	15	8	120	135	-3.69	.001 <sup>a</sup>
Dhairyam	0	0	0	17	9	153	133	-4.025	.001 <sup>a</sup>
Driti	2	3	6	3	3	9	145	-.447	.655
Harsha	1	12	12	24	13.04	313	125	-4.481	.001 <sup>a</sup>
Priti	1	2	2	3	2.67	8	146	-1.134	.257
Veeryam	0	0	0	121	61	7381	29	-10.546	.001 <sup>a</sup>
Shraddha	0	0	0	100	50.5	5050	50	-9.621	.001 <sup>a</sup>
Medha	0	0	0	107	54	5778	43	-10.125	.001 <sup>a</sup>
Avasthaana	0	0	0	27	14	378	123	-5.038	.001 <sup>a</sup>
Upadhi	3	5	15	8	6.38	51	139	-1.706	.088
Vignyaana	1	11	11	21	11.52	242	128	-4.2	.001 <sup>a</sup>
Sheela	2	4.5	9	7	5.14	36	141	-1.732	.083
Sanjna	0	0	0	115	58	6670	35	-10.398	.001 <sup>a</sup>
Smriti	0	0	0	76	38.50	2926	74	-8.561	.001 <sup>a</sup>

<sup>a</sup> Indicates a statistically significant change.

## 4. Discussion

### 4.1. Discussion on socio-demographic variables

The ability of the individuals to work tends to decrease with increase, in age and the rate depends upon the working condition and personal health. In the present study, 72% of the workers belong to the 23–25 year's age category, and the age-related psycho-physical issues were relatively less among these individuals. When the individual has more physical workload and lesser job control or autonomy, this concurrently influences the individual's work ability. The present study had 84.7% male participants. These high rates were due to the physically demanding jobs in the textile industry, such as loading the weaving threads, continuous standing, heightened mental alertness for maintaining the continuity of weaving. When factors such as poor environmental conditions, increased workload and time pressure interact with sleepiness, sleep disturbances, chronic fatigue, and oscillatory fluctuations of alertness and vigilance resulting from Ratrijagarana cause human errors and consequent work accidents and injuries. Adopting flexible interventions and proper support to shift workers are essential for maintaining their health, work ability and accident-free work environment.

### 4.2. Discussion on Manasika bhavas based on Nidra Prayojana (sleep Benefits)

According to the classical Ayurvedic textbooks, *Caraka Samhita*, *Astanga Sangraha*, and *Ashtanga Hridayam*, *Nidra* is accountable for *Sukha* (happiness), *Dukha* (unhappiness), *Pusti* (good physique), *Karsya* (Thinness), *Vrsata* (sexual power), *Klibata* (impotence), *Gnyana* (knowledge), and *Agnyaana* (illiteracy), *Jivita* (long life), *Ajivita* (death). The proper *Nidra* is also responsible for *Sumana* (mental health) or *Prasannata* (happiness) of mind. *Harsha*, *Mana*, *Chinta*, *Dhairya*, *Shraddha*, *Veerya*, *Sanjna* were the major Manisika Bhavas responsible for *Sumana*. The sleep after Ratrijagarana is not appropriately compensating, and it in turn adversely affects Manasika Bhavas. In the current study, *Veerya* is the most affected Manasika Bhava as the participants were working for prolonged hours, and they lose the ability to initiate any other work.

#### 4.3. Discussion on Manasika Bhavas on the basis of Ratrijagarana

Pranavata (bodily energy) regulates the functioning of the mind. *Ratrijagarana* causes *Kopa* (increase) of *Vata* and *Pitta Doshas* which trigger the occurrence of disorders associated with this increase. This also affects *Satva* (purity/fineness) and *Rajo guna* (principle of activity and motion). A study conducted by Bhargav et al. found that *Vata* scores were highest for individuals with anxiety issues, and patients suffering from bipolar affective disorder had a high *Pitta* score [13]. These findings also suggested that *Ratrijagarana* can cause significant mental health issues with drastic changes in the *Manasika Bhavas*. The current study findings also indicate a substantial shift in *Manasika Bhavas*, namely, *Medha*, *Avasthana*, *Vignyana*, *Veerya*, *Shraddha* and *Smriti* after *Ratrijagarana*. Among the *Manasika Bhavas*, *Veerya* (energy to initiate work) was the most affected one. The participants were working for prolonged hours in the night, and they might lose the ability to commence work based on society's demand. Also, it causes a reduction in productivity [14].

#### 4.4. Discussion on Manasika Bhavas, which are not affected by Ratrijagarana

*Bhaya* (fear), *Shoka* (grief), *Krodha* (anger), *Dvesha* (revenge), *Priti* (pleasure), *Rajah* (affection), *Upadhi* (finding solution), *Shila* (natural liking for things), and *Driti* (controlling power) were not affected in the present study. These *Manasika Bhavas* are severely affected in severe mental disorders. The *Manasika Bhavas*, which did not showed any change in the study participants, might get concerned when they practice *Ratrijagarana* for a longer time. Any such chronic conditions which cause *Vata* and *Raja–Tama* increase can lead to secondary mental illnesses [15]. One of the reasons for no change of *Bhavas* might be the young age of the participants and the less duration of *Ratrijagarana*.

#### 4.5. Limitations

The survey was undertaken in a relatively smaller cluster of industrial workers, and requires corroboration in a diverse population with larger sample size to establish outcome. A gender-wise analysis was not carried out due to fewer female participants. The survey was undertaken among young adults upto 25 years of age, and the findings cannot be extrapolated to the middle-aged and older adult population.

### 5. Conclusion

*Ratrijagarana* interferences on health and well-being of individuals and causes a significant impact on the *Manasika Bhavas*; Changes in *Medha*, *Avasthana*, *Vignyana*, *Veerya*, *Shraddha* and *Smriti* cause the inability to commence work, decrease productivity and psychobiological disturbances which can lead to errors and accidents. The study data recommends that the industrial sector leaders implement interventions to reverse the effect of *Ratrijagarana*, such as meditation, yoga, *Asanas*, breathing exercises, *pranayama*, etc., to become a part of their work schedule. This allows them to work in a peaceful, stress-free state of mind and execute duty productively and comfortably.

#### Funding

Authors did not receive any type of funding from any funding agency or institution.

### Author contributions

**Elgeena Varghese:** Conceptualization, Methodology, Investigation; **Kekuda T.R. Prashanth:** Conceptualization, Methodology, Supervision; **Meera Kuttikrishnan:** Validation, Writing- Reviewing and Editing; **Renjunal Yesodharan:** Formal Analysis, Original draft preparation.

### Conflict of interest

Authors declare no conflict of interest.

### Acknowledgement

Nil.

### References

- [1] Acharya JT. Sutrasthana. In: Charaka Samhita with ayurveda Deepika commentary of Chakrapani Datta. Varanasi: Chaukhambha Prakashan; 2013. p. 74.
- [2] Rao RV. Ayurveda and the science of aging. J Ayurveda Integr Med 2018;9(3): 225–32 [Internet][cited 2020 Jul 10]. Available from: <https://www.sciencedirect.com/science/article/pii/S0975947617304114>.
- [3] Iyer L, Yesodharan R, Nayak AK. Prevalence of insomnia, and sleep hygiene techniques practiced among elderly residing in selected old age homes of udupi and dakshina Kannada district, Karnataka. Indian J Public Heal Res Dev 2019 Sep 1;10(9):462–7.
- [4] Nambiar S, Chacko J. 255. Sensitivity of heart rate variability in detecting diurnal variations of dosa dominance – a pilot study. J Ayurveda Integr Med 2018;9(2, Supplement 1):S10 [Internet][cited 2020 Jul 10]. Available from: <https://www.sciencedirect.com/science/article/pii/S0975947618301542>.
- [5] Acharya JT. Shaarerasthana. In: Susruta Samhita with Nibandhasangraha commentary of Dalhana; 2013. p. 359.
- [6] Mishra D, Tubaki BR. Effect of Brahmi vati and Sarpagandha Ghana vati in management of essential hypertension – a randomized, double blind, clinical study. J Ayurveda Integr Med 2019;10(4):269–76 [Internet]. [cited 2020 Jul 10]. Available from: <https://www.sciencedirect.com/science/article/pii/S0975947616303357>.
- [7] Walker WH, Walton JC, DeVries AC, Nelson RJ. Circadian rhythm disruption and mental health. Transl Psychiatr 2020;10(1):28. <https://doi.org/10.1038/s41398-020-0694-0> [Internet][cited 2021 Jan 21]. Available from: .
- [8] Rajan S, Shamkuwar MK, Tanwar AK. Impact of Shirodhara on biological markers of stress: a case study. J Ayurveda Integr Med 2021;12(1):178–81 [Internet][cited 2021 May 5]. Available from: <https://www.sciencedirect.com/science/article/pii/S0975947621000073>.
- [9] Zhao Y, Richardson A, Poyser C, Butterworth P, Strazdins L, Leach LS. Shift work and mental health: a systematic review and meta-analysis. Int Arch Occup Environ Health 2019;92(6):763–93. <https://doi.org/10.1007/s00420-019-01434-3> [Internet][cited 2020 Jul 10]. Available from: .
- [10] Brown JP, Martin D, Nagaria Z, Verceles AC, Jobe SL, Wickwire EM. Mental health consequences of shift work: an updated review. Curr Psychiatr Rep 2020;22(2):7 [Internet][cited 2021 May 5]. Available from: <https://doi.org/10.1007/s11920-020-1131-z>.
- [11] Acharya JT. Vimanasthana. In: Charaka Samhita with Ayurveda Dipika commentary of Chakrapani Datta. Varanasi: Chaukhambha Orientalia; 2011. p. 249.
- [12] Tanna IR, Chandola HM, Kumar R. Role of Omega 3 Fatty acids in aetiopathogenesis of Depression (Chittavasada) and evaluation of Atasi (Linum usitatissimum) as adjuvant to Ashwagandadyarishta in its management [Internet]. Gujarat Ayurveda University; 2013. Available from: <http://hdl.handle.net/10603/13295>.
- [13] Bhargav H, Jasti N, More P, Kumar V, Chikkanna U, Kishore Kumar R, et al. Correlation of prakriti diagnosis using AyuSoft prakriti diagnostic tool with clinician rating in patients with psychiatric disorders. J Ayurveda Integr Med 2021 [Internet][cited 2021 May 30]; Available from: <https://www.sciencedirect.com/science/article/pii/S0975947621000115>.
- [14] Amaranath B, Nagendra HR, Deshpande S. Effect of integrated yoga module on personality of home guards in Bengaluru: a randomized control trial. J Ayurveda Integr Med 2016;7(1):44–7 [Internet][cited 2020 Jul 10]. Available from: <https://www.sciencedirect.com/science/article/pii/S0975947616300171>.
- [15] Tubaki BR, Chandake S, Sarhyal A. Ayurveda management of major depressive disorder: a case study. J Ayurveda Integr Med 2021 [Internet][cited 2021 May 30]; Available from: <https://www.sciencedirect.com/science/article/pii/S0975947621000565>.