Short Communication

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

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A R T I C L E   I N F O
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

A B S T R A C T
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), Asthaana (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, \( \chi^2(6) = 162.031; p = .001 \) Verrya \( \chi^2(4) = 12.688; p = .013 \) 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.

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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]. Yogaratnakara (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. Swahavakvi Nidra (Natural Sleep) occurs at midnight in persons with the dominance of Satva guṇa.

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 (Vrśhata) and also lives for hundred years [5]. Insufficient sleep can disrupt circadian rhythms that result in negative health outcomes [6]. Sudden changes in the
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 mental health was associated with shift work and can lead to substance abuse, cognitive impairment, poor well-being and mental health.

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 (revengeful 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 Bhava 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) develop 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, Bhaya – Vishadana (fear by depressed attitudes), Krodha – Abhidronena (anger by revengeful disposition), Shoka – Dhainyena (grief by sorrowful disposition), Dvesha – Pratishchedena (revenge tendencies by revengeful attitudes), Rajah – Sangena (affection to the opposite sex), Mana-artheshu- avayabhicharanena (non-distracted mind by the perception of objects), Chinta (anxiety or worries) Dhairyam – Avishaden (courage by the strength of mind), Driti-Alalayena (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 response), Medha-grahamenena (intelligence is by comprehension of scriptures), Avasthaana-avibhramena (stability of the mind by the Avoidance of mistake), Upadhi-anubandhena (finding solutions by one’s own resolving capacity), Vignyaanam-vyasasyena (knowledge of a thing by reactions or responses), Shila-anushilanena (natural liking for things by habitual intake of things), Sanjna-namagrahanena (attentioniveness), and Smriti-smaranenena (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), Vignyaya (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, Vignyaya (knowledge), ($\chi^2(6) = 162.031; \ p = .001$) Veeryam (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 Vignyaya, Veerya and Shraddha.

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 Benefts)

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 Agnya (illiteracy), Jivita (long life), Ajivita (death). The proper Nidra is also responsible for Sumana (mental health) or Prasannata (happiness) of mind. Harsha, Mana, Chinta, Dhairyam, 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 Manisika 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.

### 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 |
| Bona                          | 0 | 0          | 0             | 2 | 1.5        | 3             | 148  | -1.414 | .157 |
| Krodha                        | 2 | 3.5        | 7             | 4 | 3.5        | 14            | 144  | -.816 | .414 |
| Shola                         | 2 | 5          | 10            | 7 | 5          | 35            | 141  | -1.667 | .096 |
| Dvessa                        | 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 |
| Chinta                        | 0 | 0          | 0             | 15 | 8          | 120           | 115  | -3.69 | .001 |
| Dhairyam                      | 0 | 0          | 0             | 17 | 9          | 153           | 133  | -4.025 | .001 |
| Driti                         | 2 | 3          | 6             | 3 | 3          | 9             | 145  | -4.47 | .655 |
| Harsha                        | 1 | 12         | 12            | 24 | 13.04      | 313           | 125  | -4.481 | .001 |
| Pritha                        | 1 | 2          | 2             | 3 | 2.67       | 8             | 146  | -1.134 | .257 |
| Veeryam                       | 0 | 0          | 0             | 121 | 61        | 7381          | 29   | -10.546 | .001 |
| Shraddha                      | 0 | 0          | 0             | 100 | 50.5      | 5050          | 50   | 9.621 | .001 |
| Medha                         | 0 | 0          | 0             | 107 | 54        | 5778          | 43   | -10.125 | .001 |
| Avasthaana                    | 0 | 0          | 0             | 27 | 14         | 378           | 123  | -5.038 | .001 |
| Upadha                        | 3 | 5          | 15            | 8 | 6.38       | 51            | 139  | -1.706 | .088 |
| Vignyaya                      | 1 | 11         | 11            | 21 | 11.52      | 242           | 128  | -4.2 | .001 |
| Sheela                        | 2 | 4.5        | 9             | 7 | 5.14       | 36            | 141  | -1.732 | .083 |
| Sanjna                        | 0 | 0          | 0             | 115 | 58       | 6670          | 35   | -10.398 | .001 |
| Smriti                        | 0 | 0          | 0             | 76 | 38.5       | 2926          | 74   | -8.561 | .001 |

* Indicates a statistically significant change.
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 Raja 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 Smruti after Ratrijagarana. Among the Mansika 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 Mansika Bhavas, which did not show 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 up to 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 Smruti 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; Renjulal Yesodhanan: Formal Analysis, Original draft preparation.

Conflict of interest

Authors declare no conflict of interest.

Acknowledgement

Nil.

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