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## Impact of Disturbed Circadian Rhythm in Call Center Workers.

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### ABSTRACT

The disturbance in circadian rhythm is believed to have significant adverse health consequences such as loss of appetite, excessive yawning, and irritability, physical and mental fatigue. The present study was undertaken to investigate the clinico-pathological impact if any, of disturbed circadian rhythm in call centre workers. Hundred healthy subjects ( $28.3 \pm 2.5$  yrs) working for the minimum of three consecutive months in night shifts were compared with hundred healthy subjects involved in day duties. ( $27.4 \pm 3.7$  yrs) Epworth sleepiness scale was used for the assessment of sleep. SPSS – 16 software was used. Un-paired t test was used for the comparison between two groups and Mann Whitney U test for comparison of mean between two groups. The difference in the mean of ESS between study and control groups were statistically significant ( $P < 0.001$ ). Sleep being an integral part of human life plays an important role in promotion of health and prevention of diseases. The disturbance in the circadian rhythm in call centre workers might be due to the effect of not getting enough rest and sleep; an immense sleep debt causes mental, emotional, and physical fatigue.

**Keywords:** Circadian Rhythm, Epworth Sleepiness Scale, Sleep Debt, Mental Fatigue, Emotional Fatigue.

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## INTRODUCTION

Circadian literally means “about a day”. Circadian rhythm [1] is a roughly 24 hour’s cycle; it is a physiological process of living being including plants and animals. Body always tries to maintain its circadian rhythm because it is also a part of nature and follows the natural guidelines. Undoubtedly, the nature’s most precious gift to mankind is sleep. Ayurveda [2] has given a lot of importance to Sleep in our daily life for the maintenance of health. As sleep being chief nourisher of the body it plays an important role in promotion of health and prevention of diseases [3]. Sleep also help to build the immune system and help to fight disease and endure sickness.[4] Human body produces extra protein molecules during sleeping, and these help to mend our body at a cellular level. The damage from all kinds of things, such as stress, pollutants, infection, exposure to Sun and so on, is repaired while we are happily in the land of nod [5]. One of the benefits of sleep is that it helps to reduce the levels of stress and inflammation in our body. A good night's sleep can lower blood pressure and the elevated levels of stress hormones which are a natural result of today's fast paced lifestyle. By reducing high levels of stress, sleep helps to reverse these effects and encourages a state of relaxation [5]. One of the great benefits of sleep is that it allows our brain to better process new experiences and knowledge, increasing our understanding and retention. Thus it helps in better learning as well as improves memory.

Circadian sleep rhythm is one of the several body rhythms modulated by the hypothalamus. Melatonin, a transmitter produced by the pineal gland in the brain, has been implicated as a modulator of light entrainment [6]. When we cross time zones, our circadian rhythms get disrupted leading to jet lag [7]. People working in shifts have an increased risk of heart, gastro-intestinal, emotional, and mental problems. Physical and emotional illness, relationship difficulties, loss of work-based productivity, accidents, drug / alcohol dependence, even suicide can, in many instances, be linked to sleep deprivation [8]. Hence, Instead of seeing our need for rest as a weakness, we need to learn to welcome it as our ally, as a friend who wants to help us learn to live our life best, because, better Sleep truly does lead to a better life, in every possible way.

In present era of globalization there are many factors which causes imbalance of sleep, mainly vigil during night. This very cause is predominantly seen in call center agents working in night shifts. Shift work is unavoidable because of a need of continuous availability of essential services like medical, police, military, transport, electricity, etc. and some continuous technological processes in the chemical, petroleum and steel industries and expensive instrument must be used to its full capacity for economic reasons<sup>9</sup>. This disturbance in circadian rhythm is believed to have significant adverse health consequences such as loss of appetite, excessive yawning, and irritability, physical and mental fatigue. Hence, the present study was undertaken to investigate the clinico-pathological impact if any, on disturbed circadian rhythm in call center workers.

## SUBJECTS AND METHODS

It was a retrospective field research done on call centre workers. Hundred healthy subjects ( $28.3 \pm 2.5$  yrs) working for the minimum of three consecutive months in night shifts were compared with hundred healthy subjects involved in day duties. ( $27.4 \pm 3.7$  yrs). Control groups were taken from medical and paramedical staff of K J Somaiya Medical College & Research Centre. The workers with the history of diabetes mellitus, hypertension and any chronic disease, history of any psychiatric disorder were excluded from the study.

**Method of evaluation:** Epworth sleepiness scale was used for the assessment. The personal focused interview method which involves individual’s response in term of oral verbal responses was adopted to formulize data. The approximate index of sleep disturbance is counted using ‘Epworth sleepiness scale’<sup>[10]</sup>. The approximate index of sleep disturbance was:

0 – No chance of dozing, 1 – Slight chance of dozing, 2 – Moderate chance of dozing and 3 – High chance of dozing. The Sleepiness Score was assessed as 1 – 5: Enough sleep, 6 – 7: Average sleep, 8 and up: Inadequate sleep.

**Statistical analysis:** The data was expressed as Mean  $\pm$  S.D and analyzed using SPSS-16 software. Un-paired t test was used for the comparison between two groups and Mann Whitney U test for comparison of mean between two groups. P value less than 0.05 was considered the level of significance.

Approval for the study was taken from institution ethics committee and informed, written consent from all the participants.

**RESULTS**

Hundred healthy subjects (28.3 ± 2.5 yrs) from the study group (Range 21-35 yrs.) Were compared with hundred healthy control subjects (27.4 ± 3.7 yrs) involved in day duties. (Range 18-35 yrs). There was no significant difference between two groups. Significant difference was seen in the mean ESS between two groups. (Table 1) Various symptoms of sleep deprivation were observed in study group. The main complaints as told by respondents were insomnia, disturbed sleep schedules, reduced performance, difficulties with personal relationships, irritability or depressed mood, seems a longer shift, causes indigestion, wastes the day, restricts their social life.

**Table 1: Comparison of Epworth Sleepiness score (ESS) in two groups**

	Group	N	Mean	SD	Range	P value	Significance
ESS	Study	100	10.6	2.2	8-15	<0.001	Significant
	Control	100	4.9	1.1	3-7		

**DISCUSSION**

Sleep is the basic function of living beings hence referred as ‘Support of Life’ in Āyurveda [10, 11]. Sleep being an integral part of our life plays an important role in promotion of health and prevention of diseases. Data collected in the present study shown a positive correlation between sleep debt and mental, emotional & physical fatigue. Sleep debt is the effect of not getting enough rest and sleep. Ayurveda [11] teaches a ‘moment to moment’ monitoring of the interactions between order (health) and disorder (disease). The essential nature of sleep is useful for optimal human well-being, thus Sleep is referred as ‘Nature’s soft nurse’. One’s physical, mental and spiritual health depends on Sleep. Sleeping in time promotes development, complexion, strength, enthusiasm, appetite, alertness. This state of health characterizes by the symptoms such as getting sleep at proper time, absence of bad dreams and sound awakening. Sleeping in night is the most wholesome. To remain healthy, one should avoid night vigil and day sleep. Keeping awake at night causes dryness inside the body, which leads to squeezing pain in the body parts, heaviness of the head and eyes, too much yawning, lassitude, exhaustion even without strain, giddiness and indigestion [12].

Shift work is a major occupational stressor and has been linked with a myriad of social, psychological and physical problems [13, 14]. Night workers find it hard to get decent quality and quantity of sleep during the day for a number of reasons. Firstly, our natural circadian rhythm boots alertness in the morning, making sleep difficult. Secondly, not only the quantity but also the quality of sleep is changed during daytime due to 1) the distribution of different sleep stages within the sleep period is altered and 2) the timing within sleep, of hormone [15,16] secretion is modified. Thirdly, distractions like, outside light and noise mean a person to spends less time in a really deep sleep and don’t wake up refreshed. It is tempting to stay up when the family is around than lose to sleep her. Thus results in a constant feeling of tiredness [17] and dropping off sleep at work. They often miss out an important family or social events due to their work.

Twelve hour night shift work has significant cardiovascular effect as elevation of blood pressure and heart rate and heart rate variability, associated with delayed blood pressure recovery[9]. Older night workers are more adversely affected than younger night workers[7]. A study on Nurses showed that there was increased risk of endometrial cancer among obese female nurses working during night shift [16]. Nurses’ smoking has close and complicated relations with sleep problems or night shifts [18]. Surgical residents appear to be able to compensate when sleep deprived and there is no significant impairment in the ability to learn and retain new material.

While assessing the effects of circadian rhythm on aspect of sleep, we noted that disruption to rhythm usually has a negative effect. Here in call center agents due to their disturbed circadian rhythm they pay high price to their health. Sleep deprivation has a major impact on cognitive functioning such as speech, memory, innovative & flexible thinking [8]. Because “the longer you’ve been awake, the greater the desire to

sleep". Three main causes we observed during our survey governing 'Night Shift Unpopular' are it reduces the worker's social life, it fatigues them and it renders them prone to disorders of gastrointestinal tract.

Some tips for staying alert on the job include, Avoid long commutes and extended hours, Take short nap breaks throughout the shift, Work with others to help keep you alert, Try to be active during breaks (eg. take a walk), Drink a caffeinated beverage (coffee, tea, cola) to help maintain alertness, Don't leave the most tedious or boring tasks to the end of your shift when workers are most sleepy around 4-5 a.m. and Exchange ideas with your colleagues on ways to cope with the problems that you can discuss these issues and learn from each other.

Some tips for sleeping during the day are wearing dark glasses to block out the sunlight on your way home, keeping same bedtime and wake time schedule, even on weekends, eliminate noise and light from sleep environment (use eye masks and ear plugs), avoid caffeinated beverages and foods close to bedtime, avoid alcohol and switch off the television and turning on soft music.

### CONCLUSION

Being a necessary observance of golden rules of 'Nidrā' prescribed in Āyurveda will go a long way in making the society free from physical, mental and spiritual ailments. The disturbance in the circadian rhythm in call centre workers might be due to the effect of not getting enough rest and sleep; an immense sleep debt causes mental, emotional, and physical fatigue. Collected data had shown a positive co-relationship of sleep and normal health encouraging conducting the study on a larger scale.

### REFERENCES

- [1] Guyton Arthur & Hall John, Textbook of Medical Physiology, Elsevier Publications, 11<sup>th</sup> edition, 2006 : 721-725.
- [2] Waterhouse JM. Altered time. In: Case RM, Variations in Human Physiology. Manchester: Manchester University Press, 1985: 134–157.
- [3] Poceta Steven & Mitler Merrill, Sleep Disorders, Totowa, New Jersey, Humana Press, 1996.
- [4] Kasper Braunwald, Fauci Hauser & Longo Jameson, Harrison's Principles of Internal Medicine, New Delhi, Medical Publishing Division, 16<sup>th</sup> edition : 650 – 653.
- [5] Knutsson A. Health disorders of shift workers. *Occup Med* 2003; 53: 103–108.
- [6] Su TC, Lin LY, Baker D et al. Elevated blood pressure, decreased heart rate variability and incomplete blood pressure recovery after a 12 h night shift work. *J Occup Health* 2008; 50: 380–386.
- [7] Pires MLN, Teixeira CW, Esteves AM, et al. Sleep, ageing and night work. *Braz J Med Biol Res* 2009; 42: 839–843.
- [8] Pilcher JJ, Huffcutt AI. Effects of sleep deprivation on performance: A meta analysis - *Sleep* 1996; 19: 318–326.
- [9] McCarthy ME, Waters WF. Decreased attentional responsivity during sleep deprivation: Orienting response latency, amplitude, and habituation. *Sleep* 1997; 20: 115–123.
- [10] Swash Michael & Mason Stuart, Hutchison's Clinical Methods, ELBS, Bailliere Tindall, 1<sup>ST</sup> Anne's Road, East Bourne, East Sussex BN21 3UN, Great Britain : 107 -108.
- [11] Trikamjī Yādavajī, Caraka Samhitā, Vārāṇasī, Caukhambā Surbhārati Prakāśana, 1992 : 335 – 341.
- [12] Śarmā Priyavrata, Suśruta Samhitā, Vārāṇasī, Caukhambā Orientalia, 2002 : 511 – 514.
- [13] Dvivedī Lakṣmīdhara, Āyurveda kā mula siddhānta evam unaki upādeyatā, Vārāṇasī, Caukhambā Kṛṣṇadāsa Academy, 1990: 23 – 26.
- [14] Mahajan B. K. Methods in Biostatistics, New Delhi, Jaypee Brothers Medical Publishers, Pvt. Ltd. 2006: 49 – 51.
- [15] Munakata M, Ichii S, Nunokawa T et al. Influence of night shift work on psychologic state and cardiovascular and neuroendocrine responses in healthy nurses. *Hypertension Res* 2001; 24: 25–31.
- [16] Viswanathan AN, Hankinson SE, Schernhammer ES. Night shift work and the risk of endometrial cancer. *Cancer Res* 2007; 67: 10618–10622.
- [17] Lofthus GK. Sensory motor performance and limb preference. *Percepts Motor Skills* 1981; 52: 688–693.