



## Research Article

# Melatonin's Impact on Sleep: A Survey-Based analysis

Blessy Fernandes<sup>1\*</sup>, Sathish S.<sup>2</sup>, Ramakrishna Shabaraya A.<sup>3</sup>

<sup>1, 2, 3</sup>Department of Pharmacy Practice, Srinivas College of Pharmacy, Valachil, Post Farangipette, Mangalore-574143, Karnataka, India

## ARTICLE INFO

Received: 22 Oct 2023

Accepted: 24 Oct 2023

Published: 25 Oct 2023

### Keywords:

melatonin, sleep, light, health

### DOI:

10.5281/zenodo.10040547

## ABSTRACT

**Background:** Melatonin as a sleep aid continues to be the subject of research studies worldwide. Electric light, shift work continues to impact sleep. The invention of artificial light allowed people to make use of the evening after the sun set. This have brought about changes in our sleep schedule pushing bed time even later, suffers from circadian rhythm disturbances. **Methods:** A small online survey was carried out to analyse life style of public, which is a major factor for decrease in melatonin's secretion. A Structured questionnaire was prepared and sent via online, collection of basic lifestyle practiced by people was the main aim. **Results:** A total of 100 people participated in the study of which 56% were female. Analysing their education status, 72% population have degree level of education, 43% of people said they have difficulty in sleeping and have a habit of having 5 cups of coffee per day (33%). Observing sleep pattern during the night, about 40% of people use artificial light and 60% preferred darkness. 77% of people have a habit of skipping night sleep at least 1 day/week, <3 times/week (14%) and >3 times/week (9%). While analysing frequency of nocturnal waking, 49% agreed once, 19% twice, 7% thrice and 25% selected none. Timing of going to bed was varied, 35% sleep at 12pm, 31% late night, only 5% have a habit of going bed early at 8pm and 29% at 10pm. **Conclusion:** Sleep has a major impact on overall health and wellbeing. Our Study reveals more number of individuals sleep at 12pm or skip sleep as well as use artificial light which reduces melatonin production leading to changes in the body clock. For better and improved health, it is recommendable to sleep around 10pm to 5am in dark room daily.


## INTRODUCTION

Melatonin is a naturally occurring hormone that regulates sleep-wake cycle. This hormone is primarily produced by the pineal gland in the brain

and is influenced by the body's internal clock known as the circadian rhythm. Melatonin levels typically rise in the evening, signalling to the body that it's time to prepare for sleep. This hormone

\*Corresponding Author: Blessy Fernandes

Address: Department of Pharmacy Practice, Srinivas College of Pharmacy, Valachil, Post Farangipette, Mangalore-574143, Karnataka, India

Email : [fernandesblessy1999@gmail.com](mailto:fernandesblessy1999@gmail.com)

**Relevant conflicts of interest/financial disclosures:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.



helps to synchronize our sleep patterns with the natural day-night cycle. <sup>[1]</sup>Melatonin as a supplement is artificially manufactured form of hormone present in plants, animals, bacteria and fungi. Owing to its anti-oxidant properties, melatonin finds its application in food & beverages, pharmaceuticals and dietary supplements <sup>[2]</sup>. Melatonin interacts with two types of receptors in the brain-MT1 and MT2 receptors. By binding to these receptors, melatonin influences various physiological processes such as lowering body temperature and reducing alertness. <sup>[3]</sup>The use of melatonin as a sleep aid continues to be the subject of research worldwide. Findings thus far indicate that melatonin may be useful for those suffering from disruptions to their circadian rhythm.

Roughly 60 million Americans are affected by sleep disorders each year and studies show that 1.3% of U.S adults used melatonin and its use doubled from 0.6% in 2007 to 1.3% in 2012, with an estimated 3.065 million adults reporting that they had taken melatonin during past 30 days <sup>[4]</sup>. Therefore, this survey was conducted to assess the impact of melatonin on sleep pattern among the general public.

### OBJECTIVES:

- A] To assess the impact of lifestyle on sleep
- B] To co-relate the influence of artificial light on sleep

### METHODOLOGY:

Study Design: Prospective cross sectional study

Study site: Community [public]

Sample size: 100

Sample duration: 1 month (May 2023)

Inclusion criteria: Age groups above 18 years

Exclusion criteria: Age group below 18 years

Data source: online articles from google scholar, pub med, research gate

Material used: Web-based questionnaire, suverymonkey.com

Data collection: This study utilized a self-administered questionnaire via online mode and consisted of 9 questions, including multiple-choice questions. Pilot study was carried out to check the clarity of questions. Modifications were made according to the feedback from the pilot testing. The completed questionnaires were then processed using Microsoft Excel for analysis.

Data analysis: The collected data(s) were analysed using Microsoft Excel (version 2013)

### RESULTS

A total of 100 people participated in the study. People who participated, based on gender were 44 (44%) male and 56 (56%) were female. Majority of the participants (56%) belong to the age group of 15-20 years with most of the participants having primary to university education (94%) and only (6%) of them were illiterate. (Table 1)

**Table 1: Demographic Details of participants**

Demographic Characteristics	No. of participants (n=100)	Percentage
<b>GENDER</b>		
Male	44	44.00%
Female	56	56.00%
<b>AGE</b>		
18-24	56	56.00%
25-34	32	32.00%
35-44	7	7.00%
Above 45	5	5.00%
<b>EDUCATION QUALIFICATION</b>		
Illiterate	6	6.00%
Primary	10	10.00%
High school	12	12.00%
Degree	72	72.00%

43% of population had difficulty falling asleep, in which majority (33%) have a habit of taking 5 cups of coffee per day indicating delayed sleep onset as well as reduced quality of sleep. According to the study, 77% have a habit of skipping night sleep i.e. 1 time per week, 14% <3times per week and 9% >3 times per week. Cause of this could be stress, anxiety, and social activities like events, parties or gatherings besides demanding work schedules, exams or deadlines that can sometimes force

individuals to stay awake through the night. The most preferred conditions during sleep were Blue LED light (24%), Low intensity light (16%) and Darkness (60%). Exposure to blue LED light and any other form of dim light can suppress the production of melatonin disturbing the circadian

rhythm. When enquired about the sleep interruptions, 49% of population woke up once during the night, 19% twice, 7% >thrice and 25% none of the time. Analysis showed 31% of the population sleep late night, 35% at 12pm, 29% at 10pm and 5% at 8pm. (Table 2)

**Table 2: Assessment of Sleep Pattern**

QUESTIONS	ANSWER OPTIONS	RESPONSES
Do you have any difficulties in falling asleep?	Yes	43.00%
	No	57.00%
How many cups of coffee you have a day?	1-2	28.00%
	3	14.00%
	5	33.00%
	None	25.00%
How often do you wake up during the night?	Once	49%
	Twice	19%
	>Thrice	7%
	None	25%
What condition do you prefer during sleep?	Blue LED Light	24.00%
	Low intensity Light	16.00%
	Darkness	60.00%
Do you have habit of skipping night sleep?	1 time/week	77.00%
	<3 times/week	14.00%
	>3 times/week	9.00%
At what time do you usually go to bed?	8pm	5.00%
	10pm	29.00%
	12pm	35.00%
	Late night	31.00%

## DISCUSSION:

On basis of the scientific data available, there is an evidence that lifestyle habits can influence the melatonin secretion in the body. According to the survey, most of the participants find it hard to fall asleep at night. The possible reason behind this could be caffeine and stimulants, electronic devices, medical conditions or irregular melatonin secretion. [5]

According to the survey conducted by NCA and SCAA, over 50% of population over 18 years drink at least 1 cup of coffee (95mg) every day.

The average daily consumption of caffeine by adults in U.S. is about 300mg per person. Consuming caffeine before bed time can delay onset of sleep and promote night time awakening as the caffeine's stimulating effects typically peak within one to two hours after consumption. [6] Artificial light mimics natural light to keep you from sleep. Laboratory studies have shown that exposure to polychromatic white light can depress melatonin secretion, delay the internal biological rhythm and reduce sleepiness at bedtime. Melatonin production is inhibited by exposure to

light, especially blue light. Recent findings state that more than four in ten Americans reported that their daily activities were impacted by poor or insufficient sleep at least once during the past seven days. By using blue blocking glasses, there can be a decrease in input to the photoreceptors which can improve sleep. [7].

Adults require an average 8 hours of sleep per night. According to Harvard Health Publishing, 60% of women regularly fall short of sleep per night. Expert's advice to go to bed as soon as one is tired and sleep until you naturally wake up. A study of 8,937 people in Sleep Medicine estimates that about a third of American adults wake up in the night at least three times a week and over 40% of that group have trouble falling asleep again. [8] It was observed that 6.5% work the night shift and 10.8% work the evening shift. Melatonin secretion typically begins in the evening, as the light levels in the environment decrease. As morning approaches and light levels increase, melatonin secretion gradually decreases. This decrease helps you wake up and stay alert during the day. [9]

Getting a full night's sleep is important for REM sleep cycles. Melatonin levels peak during the middle of the night, usually between 2 a.m. and 4 a.m., depending on an individual's circadian rhythm. This is the period when your body is in the deepest phase of sleep. The optimal sleep schedule would be from 10pm to 6am because of our body's natural circadian rhythm and the fact that it mimics the sun's rising and falling. [10] Lifestyle changes like stress management, aiming for regular bed times, exercise, diet, managing blood sugars, eating melatonin rich foods- seafood, cherries, ginger, Cognitive Behavioural Therapy and decreasing artificial light in the evening or at night can regulate adequate levels of melatonin production in body naturally [11][12]

### CONCLUSION:

Jet lag and sleep problems associated with shift work, sleeping with dim light, sleeping late or

skipping are the reasons for decrease in melatonin secretion. It is important to maintain a regular sleep schedule and avoid exposure to bright artificial light, especially in the evening, to support the natural secretion of melatonin and promote a healthy sleep-wake cycle. Awareness should be generated with the public regarding life style modification which can improve melatonin secretion.

### FUTURE PROSPECTIVE:

Future studies could help to broaden the scientific understanding of the benefits of melatonin. As the study was conducted among 100 individuals for 1 month only, the sample size and duration of study can be extended and multi-centred studies can be conducted.

### ACKNOWLEDGEMENTS:

We are thankful to Research guide, Principal and Management of Srinivas college of Pharmacy, Mangalore for providing all the necessary facilities to carry out this research work.

### REFERENCES

1. Tordjman S, Chokron S, Delorme R, Charrier A, Bellissant E, Jaafari N, et al. Melatonin: Pharmacology, Functions and Therapeutic Benefits. *Current Neuropharmacology*.2017 Feb;15(3):434–43
2. Joanna Sosnowska. Melatonin is not a sleeping pill. The dark side of the popular health supplement. *Nightly*.2018Feb
3. ipolla-Neto J, Amaral FG do. Melatonin as a Hormone: New Physiological and Clinical Insights. *Endocrine Reviews*.2018 Dec;39(6):990–1028
4. Li J, Somers VK, Xu H, Lopez-Jimenez F, Covassin N. Trends in Use of Melatonin Supplements Among US Adults, 1999-2018.*JAMA*.2022 Feb;327(5):483–5
5. Louis Shenkman. The effects of coffee consumption on sleep and melatonin secretion. *Science Direct*.2002;3(3):271-273.



6. Shilo L, Sabbah H, Hadari R, Kovatz S, Weinberg U, Dolev S, et al. The effects of coffee consumption on sleep and melatonin secretion. *Sleep Medicine*.2002 May;3(3):271–3.
7. Gooley JJ, Chamberlain K, Smith KA, Khalsa SBS, Rajaratnam SMW, Van Reen E, et al. Exposure to room light before bedtime suppresses melatonin onset and shortens melatonin duration in humans. *The Journal of Clinical Endocrinology & Metabolism*.2011 Mar;96(3):463–72
8. Clarke TC, Black LI, Stussman BJ, Barnes PM, Nahin RL. Trends in the use of complementary health approaches among adults: United states, 2002-2012. *National health statistics reports*; no.79. Hyattsville, MD: National Centre for Health Statistics. 2015.
9. Shigekazu Higuchi, Yuki Nagafuchi, Sang-il Lee, Tetsuo Harada. Influence of Light at Night on Melatonin Suppression in Children. *Clinical Endocrinology & Metabolism*.2014; 99(9):3298-3303.
10. Dieter Kunz Richard Mahlberg Cordula Müller Amely Tilmann Frederik Bes. Melatonin in Patients with Reduced REM Sleep Duration: Two Randomized Controlled Trials. *Clinical Endocrinology & Metabolism*.2004;89(1):128–134
11. Costello, R. B., Lentino, C. V., Boyd, C. C., O’Connell, M. L., Crawford, C. C., Sprengel, M. L., & Deuster, P. A. The effectiveness of melatonin for promoting healthy sleep: A rapid evidence assessment of the literaturez.*Nutrition Journal*.2014;13:106
12. Peuhkuri K, Sihvola N, Korpela R. Dietary factors and fluctuating levels of melatonin. *Food & Nutrition Research*.2012 Jul;5(6):5-8.

**HOW TO CITE:** Blessy Fernandes\*, Sathish S., Ramakrishna Shabaraya A., Melatonin’s Impact on Sleep: A Survey-Based analysis, *Int. J. in Pharm. Sci.*, 2023, Vol 1, Issue 10, 219-223. <https://doi.org/10.5281/zenodo.10040547>

