ORIGINAL ARTICLE

# Prevalence of Insomnia among Emergency Doctors and their Physiological Link with Serum Melatonin: Key to Better Sleep among Doctors of LUMHS

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## ABSTRACT

**Background:** As a consequence of the epidemic, health care workers have been subjected to unusual levels of stress, anxiety, and sleep issues. Chronic insomnia is usually linked to circadian rhythm abnormalities. Insomnia is a frequent indication of a lack of serum melatonin.

**Objective:** To detect the prevalence of Insomnia among doctors at LUMHS and their physiological role with regard to serum melatonin levels.

**Methodology:** This cross-sectional study was conducted involving 116 doctors, out of which male 48(41.3%) and female 68 (58.6%), working in all clinical wards of Liaquat University of Medical & Health Sciences, Jamshoro / Hyderabad from August 2021 to February 2022. Each patient's demographic information was collected. Serum Melatonin levels in the blood were measured using an ELISA KIT. Along with (Insomnia severity index) questioner was filled out by each participant. SPSS version 26 was used to analyze the collected data.

**Results:** This study found that physicians' sleep and wake cycles are disrupted owing to their long, stressful working hours, out of 116 participants, 42.68 percent experienced insomnia. Regardless of age, gender, or BMI, Insomnia was shown to be co-related with a lower blood melatonin level (r value=-.585**, p=0.001).

**Conclusion:** The findings of this investigation are in line with our hypothesis that reduced serum Melatonin levels in insomniacs lead to delayed signal transduction, causing circadian oscillator system anomalies. We have found that insomnia among doctors shows significant variations in relation to department, sex, designation, and working hours. Further addressing it requires molecular studies.

**Keywords:** Insomnia, Prevalence, Serum Melatonin, sleep disturbance

## INTRODUCTION

In this pandemic where mortality and morbidity are skyrocketing, doctors and paramedics are the frontline defensewhere they face trauma daily in their emergency duties. They are vulnerable to developing stress-related disorders and their incidence is steadily increasing, putting a heavy toll on their mental status as well as severely affecting their physical health. Stress may induce sleeplessness and a diminishednocturnal peak of pineal melatonin release in humans.[1] Sleep deprivation impacts emotions: fury, aggression, despair, bewilderment, stress, and sorrow increase. Energy, vigor, and self-satisfaction plummet. Anxiety affects patient care and clinician health.[2] The pineal gland produces melatonin, an important sleep-wake hormone. Pineal melatonin is secreted at night, and its production is responsible for circadian rhythm (internal clock control) and other cyclic metabolic activities, enabling order and temporal correlations in regular body interactions.[2]

The incidence of psychiatric symptoms among HCP's during the COVID-19 outbreak is greater than in previous epidemics.[3] Treating these patients frequently involves strenuous efforts and a high degree of attention. Such stress elevates the likelihood of acquiring both physical and mental ailments in HCPs.[4] Increased medical staff and family concerns might affect health care delivery, restricting and withdrawing patients.[5] Because of the high level of work pressure, direct public illness interaction, and the infection risk, health professionals inWuhan, the initial locus of this ailment, reported significant levels of anger, despair, rage, and anxiety.[6,7] Huang & Zhao (2020) found a 23.6% increase in insomnia levels among HCP's working in COVID-19 wards. Sleep disruptions are a major public health problem. This condition affects millions of individuals worldwide.[8] sleep disorders are linked to diabetes, obesity, high blood pressure, lethargy, and cardiac and brain disorders such as stroke.[9] Sleep deprivation reduces personal and physical activity and predispose to various inflammatory disorders.[10] On the contrary, good sleep may enhance bodily function, ease work-related weariness, retain energy, and sustain mental wellness.[7] This decline in medical productivity has long-term effects, including the death of patients as a result of fatigue-related blunders. However, these circumstances may lead to occupational exhaustion and impede the ability of health care providers to be at their best in crucial situations.[9] sustaining HCP's mental as well as physicalhealth during crises is very crucial, and it is essential for the development of protocols to have an understanding of the incidence of both physical and mental problems among health professionals. Therefore, this research investigated the incidence of sleep disorders among medical professionals and their physiological role with serum melatonin levels.

## MATERIALS AND METHODS

This cross-sectional study was conducted in the physiology department of LUMHS in collaboration with clinical wards (I.C.U, Causality, Cardiology, Urology, Pediatrics, Medicine, Surgical, Gynecology, and obstetrician) and DR Lab at Liaquat University of Medical & Health Sciences, Jamshoro/Hyderabad from January 02nd August 2021 to 02nd March 2022 after obtaining ethical approval. A total of 116 patients were enrolledin the study, out of which two groups were formed. Group 1 comprises of doctors having an insomnia severity score ofmore than 15, diagnosed as insomnia (moderate and severe), and group two comprises of control group (absence or subclinical) patients who have an insomnia (ISI) score equals to lesser than14 who meet the eligibility criteria to participate were enrolled for this study. Before the start of data collection from each participant, written permission, consent, and proper knowledge regarding the study were given, and confidentiality of the subjects was maintained. Recruitment of study participants was completed by the use of a non-probability convenient sampling method. A systematic questionnaire was used to gather socio-demographic data. The ISI is a 7-itemself-reported assessment questionnaire examining

the type, intensity, and effect of insomnia. Add all 7 elements for a severity score (17-85). The overall score ranges from (0–7) for no insomnia to (22–28) for severe insomnia. A 5 mL venous blood sample for melatonin testing was obtained from each participant. The Human Melatonin ELISA Kit, Cat. No. E1013Hu, was used at the LUMHS DR Lab to measure serum melatonin. All lab procedures were conducted by following manufacturer directions. Timing of the sample collection was of the utmost importance in this study, and all samples were collected from 07:00am to 09:00am. So, the range between this time window for normal value is 1.61–26.67 pg/ml. Any level below this is considered as "low level" and any level above this is considered as "high level". After the data collection, SPSS version 26 was used to analyze the data. A chi-square (Pearson correlations) was used, and a p- value of less than 0.05 was considered statistically significant.

## RESULTS

This study was conducted on a sample size of 116 participants, out of which 42.68 percent experienced insomnia, among them males (26.77%), while for women it was 55.6%, in a ratio of (1:2.07). The mean age of the sample population was (36.65) years and the mean BMI was calculated as (29.39 kg/m2), particularly as 41% of the population were obese and 53% were overweight, and the mean working hours were calculated as (39.23 hours/week). Table.1

The classification of insomnia according to ISI score is shown in the table.2

Departmental variation among symptoms of insomnia is shown in the table.3

Table: 1 showing demographic data of sample population (n=116)

| Variables | Minimum | Maximum | Mean | Std Deviation | p- value |
|---|---|---|---|---|---|
| Age (in years) | 26 | 52 | 36.65 | 6.296 | 0.001 |
| BMI (kg/m2) | 19 | 41 | 29.39 | 3.951 | |
| Working hours/ week | 30 | 50 | 39.23 | 6.498 | |
| Variables: | Mean | Std. Deviation | Std. Error Mean | T | p-value |
| Serum Melatonin (pg/mL) | 12.946 | 9.7903 | .9992 | 12.956 | 0.001 |
| ISI SCORE | 10.26 | 6.789 | .693 | 14.808 | |

Table: 2 showing classification of insomnia among LUMHS doctors (n=116)

| Classification | Frequency | Percent | p- value |
|---|---|---|---|
| NO SYMPTOMS | 67 | 57.75% | 0.001 |
| SUB THRESHOLD | 32 | 27.62% | |
| MODERATE | 12 | 10.3% | |
| SEVERE | 05 | 4.33% | |

Table: 3 showing departmental variations insomnia score among subjects (n=116)

| Department | Frequency (%) | NO Symptoms | Sub threshold Symptoms | Moderate Symptoms | Severe Symptoms |
|---|---|---|---|---|---|
| ICU | 10 (8.62%) | 3 | 4 | 2 | 1 |
| CAUSALITY | 10 (8.62%) | 5 | 3 | 1 | 1 |
| CARDIO | 10 (8.62%) | 7 | 3 | 0 | 0 |
| UROLOGY | 10 (8.62%) | 9 | 1 | 0 | 0 |
| PAEDS | 16 (13.79%) | 8 | 4 | 3 | 1 |
| MEDICINE | 20 (17.24%) | 14 | 5 | 1 | 0 |
| SURGICAL | 20 (17.24%) | 12 | 7 | 1 | 0 |
| GYNAE | 20 (17.24%) | 9 | 6 | 3 | 2 |
| Total | 116 | 67(57.75%) | 32(27.62%) | 12(10.30%) | 05(4.33%) |

Regardless of age, gender, or BMI, Insomnia was shown to be significantly corelated with a lower blood melatonin level (r value=-.585**, p=0.001) and hectic work schedule level (r value=.451**, p=0.001) as shown in table, 4.

Furthermore, in table 4, Pearson's correlations between insomnia and work schedule. Cut off values for melatonin were detected as 19 ng/mL, which significantly differentiated insomnia from healthy subjects with an AUC of 0.767 (Analyst's Confidence Interval).

Table: 4 Pearson correlation of serum melatonin and work schedule with & ISI score of sample population (n=116)

| SERUM MELATONIN (pg/ml) | r -value | -.585** |
|---|---|---|
| | p value | .0001 |
| WORK SCHEDULE (hours/ week) | r -value | .451** |
| | p value | .0001 |

## DISCUSSION

This study has shown that due to the hectic duty hours of doctors, their sleep wake cycle is disturbed; the prevalence of insomnia is calculated as 42.68%. A PRISMA-compliant review and met analysis published in the journal "Globalization and Health, (2020)" investigated the incidence of sleep disturbances was estimated to be 34.8 % in seven cross-sectional publications. Five further studies with a sample size of more than 2000 doctors studied the incidence of sleep disorders among physicians and found that 41.6 percent of doctors dealing with COVID-19 patients reported having sleep issues, with the figure rising to 41.6%.[11] Above mentione studies follow PRISMA Criterion for diagnosing Insomnia status, in comparison to that we have followed ISI Score. However, the data is in correspondence to it. These researches are both pre- and post-Covid19 Pandemic, so there is an obvious variation. Furthermore, further studies are still required in this field.

Six research articles that had a total sample size of over 3,500 paramedics were analyzed, and it was determined that the incidence of sleep disruptions was estimated to be 34.8%.[14] The incidence of inadequate sleep among doctors was also assessed in multiple studies, with over 2000 sample sizes. As per the findings, the incidence of sleep disruptions among the doctors who were providing care for COVID-19 sufferers was observed to be 41.6%.[11] Melatonin may lessen the time it takes persons with delayed sleep phase syndrome to fall asleep; it may also assist in resetting the body's sleep-wake cycle.[12]

The findings of Wang et al.[13] were also in line with our finding as well. Quality sleep has a significant impact on a person's productivity. Depression, exhaustion, and a decreased appetite are all symptoms of sleep disorders. On the other hand, this disease may lead to workplace blunders and mishaps because of its inability to focus, which itself is very disastrous considering the nature of healthcare providers.[14] Long shifts, the potential threat of illness and exposure, and, in certain instances, a lack of medical facilities are all problems that affect these populations. Anxiety and psychosocial trauma are exacerbated by these difficulties. The incidence of sleep disruptions among night shift nurses has been found to be 32.6% based on previous research on shift work and hectic work schedules.[15,16] Mc Alonan et al. showed that HCP's who had direct contact with SARS patients reported greater levels of stress than those who did not. The group was also affected by exhaustion, nervousness, stress and insomnia.[17] During the SARS pandemic in Taiwan, 28.4 % of afflicted HCP's experienced sleep difficulties.[18] In order to assess the incidence of sleep disorders among healthcare workers who care for COVID-19 patients, Pappa et al. did a meta-analysis; the research found that 38.8% of the analyzed group had sleep problems.[19] When exposed to COVID-19, sleep problems are more common than in regular periods, according to studies.[20] Abdullah & Musa et al showed 68.3% of Iraqi doctors exposed to COVID-19 reported sleep disruptions, whereas a comparable research done a year earlier, in 2019, in the same location, revealed a sleep disturbance incidence of 45.5%.[21] HCP's may be viewed as a crucial member of crisis management personals, and in this outbreak, they play a vital role in evaluating, assessing and managing the patients. But as yet, they wouldn't be exempt from the psychosocial impact of this illness. Inability to offer the appropriate care may produce a

sense of "lack of adequate assistance' among HCPs. which ultimately results in disappointment, disbelief, and incompetence among medical care providers. [22–24]

## CONCLUSION

We have determined conclusive data concerning insomnia prevalence among LUMHS emergency physicians. Age, BMI, gender, work schedule, and department all have a role in predisposing to insomnia, and there is a modest link between serum melatonin and insomnia, indicating that supplementation might help reduce sleep deficiency symptoms. Future research should be done to improve doctors' health and patient care.

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