*https://doi.org/10.48047/AFJBS.6.15.2024.8879-8890*

African Journal of Biological Sciences

Journal homepage: http://www.afjbs.com

Research Paper Open Access

# Study of Perceived Sleep Quantity & Quality in Hospitalized Medical Patients at a Teaching Hospital

**AbhishekVishwanathHonawad[1],Kiran HS[2],Swathi Chandresh[3], Venkatesh C R[4]**

[1] Resident,Department of General Medicine,JSS Medical College and Hospital, JSS Academy of Higher Education & Research, Mysuru
[2]Professor, Department of General Medicine, JSS Medical College and Hospital, JSS Academy of Higher Education & Research, Mysuru
[3] Senior Resident, Department of ENT,JSS Medical College and Hospital, JSS Academy of Higher Education & Research, Mysuru
[4]Associate Professor, Department of General Medicine,JSS Medical College and Hospital, JSS Academy of Higher Education & Research, Mysuru

**Corresponding Author**:Dr Venkatesh C R,
Associate Professor,Department of General Medicine,JSS Medical College and Hospital,
JSS Academy of Higher Education & Research, Mysuru

Volume 6, Issue 15, Sep 2024

Received: 15 July 2024

Accepted: 25 Aug 2024

Published: 05 Sep 2024

*doi: 10.48047/AFJBS.6.15.2024.8879-8890*

**Background**–Inadequate sleep has a negative association with general health and well-being.Information about the quantity and quality of sleepin patients in our hospital islacking. A good night's sleep improves cognitive and emotional functioning, which isimportant during an emotionally challenging stay in the hospital. This study will helpus to explore perceived night time sleep quality and sleep quantity in hospitalizedpatients of General Medicine Department at JSS Hospital and to identify the modifiablefactors associated with sleep disturbances and will help us in introducing remedialmeasures.

**Methodology:** InstitutionalEthicsCommitteeapprovalwasobtained.Totalof110patients(50patients from general wards, 25 patients from ICU complex, 20 patients from threesharing rooms and 15 patients from single rooms) were selected for the study.Samplingmethodchosenforthestudywasprobabilityproportionatetosizesampling. They were explainedregarding thestudy and written informed consentwas taken. The patients wereinterviewed regarding their previous night'ssleepquality and quantity using Verran-Snyder Halpern (VSH) sleep scale. The VSH scaleis a 15 item questionnaire. The VSH scale has three dimensions i.e., sleep disturbance(SD), sleep effectiveness (SE) and sleep supplementation (SS) and were comparedamongstthe four areas.

**Results-**Internal consistency was calculated for each sub scale by the Cronbach's alpha. Thereliabilitycoefficientalpha(Cronbach'salpha)forVSHSleepdisturbancesubscale was0.941whichissatisfactory.Thereliabilitycoefficientalpha(Cronbach'salpha)for VSH Sleep effectiveness sub scale is 0.807 which is satisfactory. The reliabilitycoefficient alpha (Cronbach's alpha) for VSH Sleep supplementation sub scale is0.651 which is satisfactory. In our study, we found that patients' sleep were worstaffected in ICU complex (SD mean 465.80 +/- 29.92) and least affected in singlerooms (SD mean 87.33 +/- 22.43). Patients in single room had the most effectivesleep (SE mean 406.00 +/- 13.51) and the least effective sleep in ICU complex (SEmean 204.60 +/- 28.02). The differences in the means of all three dimensions inthese four different areas were statistically significant (p=<0.0001). The Total SleepTime (TST) was highest in single rooms (75.00 +/- 5.98) and least in ICU complex(28.80 +/- 11.93). The Sleep Latency was worst affected in ICU complex (67.40 +/-10.32) and least affected in single rooms (12.00 +/- 4.55). The three most commonfactors that were affecting the patients' sleep and were statistically significant werelight(66.40%),noise(61.80%)andfrequentstaffinterruptions(47.30%).Fewpatientscomplainedabout thebeddiscomfort(28.20%).

**Conclusion-**Sleep has been affected in hospitalized patients, both in quality and quantity. Sleephas been the most affected in ICU complex and least in single rooms. There is notmuch statistical difference noted between the sleep quality and quantity between thesingle rooms and the three sharing rooms. Patients' sleep can be improved byreducing the unwanted disturbing noise and lightin the hospital.

**Keywords:** Sleep Quantity, Verran-Snyder Halpern, HospitalizedMedicalPatient

**Introduction:**

Sleep is a critical factor in maintaining both physical and mental health, with its importance magnified in a hospital setting where recovery from illness or surgery is the primary goal. However, numerous studies have shown that the hospital environment is often detrimental to the sleep quality and quantity of patients. Perceived sleep disturbances are common among hospitalized patients, stemming from a variety of internal and external factors. These include the inherent stresses of illness, pain, anxiety, the side effects of medications, and environmental factors such as noise, light, and frequent interruptions by hospital staff. This issue is of particular importance in teaching hospitals, where patient turnover is high and medical procedures are frequently performed, often exacerbating sleep disruptions. Understanding the factors that influence sleep in hospitalized medical patients is essential for improving patient outcomes, as sleep deprivation is known to slow recovery, impair immune function, and negatively affect mood and cognitive functioning.

Several studies have explored the relationship between sleep quality, sleep quantity, and patient outcomes in various hospital settings. Freedman et al. conducted a pioneering study that evaluated sleep quality in patients in the intensive care unit (ICU) and found that sleep was significantly fragmented due to environmental noise, medical interventions, and the need for continuous monitoring [1]. This early work laid the foundation for subsequent studies that examined similar issues in broader hospital populations. Frighetto et al. further assessed sleep quality among general hospitalized patients and found that the use of sedating medications, though intended to improve sleep, often had paradoxical effects by altering sleep architecture and reducing the restorative properties of sleep [2]. These findings emphasize the need for a careful balance in the use of pharmacologic interventions to improve sleep in hospital settings.

In a more recent study, Bihari et al. focused on critically ill patients and demonstrated that sleep duration is often reduced due to continuous monitoring and frequent interruptions for medical procedures [3]. These patients experienced poor sleep quality, which was linked to adverse health outcomes such as longer hospital stays and increased risk of delirium. Similarly, Adachi et al. identified a range of factors contributing to sleep disruption in hospitalized adults, including frequent staff interruptions for medical checks, environmental noise, and the overall stress of hospitalization [4]. This study also highlighted that patients often perceive their sleep quality as poor, even when they are receiving adequate hours of sleep, indicating that the subjective experience of sleep plays a key role in patient well-being.

Research by Ritmala-Castren et al. expanded on these findings by investigating the specific environmental factors that influence sleep quality in hospitalized patients. They found that noise, light, and temperature fluctuations in hospital rooms significantly affected patients' ability to achieve restful sleep [5]. These factors, compounded by the psychological burden of illness, contribute to a complex interplay of influences that reduce both sleep quantity and quality in medical patients. Dobing et al. explored patient-reported sleep disturbances in a general internal medicine setting and found similar results, identifying pain, anxiety, and room conditions as key factors influencing perceived sleep quality [6].

Wesselius et al. provided further evidence that both the quality and quantity of sleep in hospitalized patients are often compromised, with their study showing that a range of factors, including the hospital environment and the patients’ physical condition, contribute to this

problem [7]. Interventions to improve sleep, including non-pharmacologic approaches, have been explored by Tamrat et al. who suggested that interventions such as relaxation techniques, sleep hygiene education, and environmental modifications may help improve sleep outcomes for hospitalized patients [8].

Previous research has highlighted the importance of addressing sleep disturbances, yet there is a lack of comprehensive studies specifically focused on the perceived sleep quality and quantity in hospitalized medical patients within teaching hospitals. Understanding patients' perceptions of their sleep can provide valuable insights into the subjective experience of hospitalization and reveal areas where interventions may be most effective. Additionally, this study can help identify specific factors unique to the teaching hospital environment that contribute to sleep disruption, allowing for the development of targeted strategies to improve sleep hygiene, reduce disruptions, and ultimately enhance patient recovery and satisfaction. Hence this study was conducted with the objective to explore perceived nighttime sleep quality and sleep quantity in hospitalizedpatients of General Medicine Department, at JSS Hospital and to identify the associatedfactors.

**Methodology:**

A cross-sectional, questionnaire-based study was initiated after obtaining approval from the Institutional Ethics Committee, and written informed consent was acquired from participating patients after the procedure and confidentiality measures were thoroughly explained. The study ensured voluntary participation in a non-threatening environment. The VSH Questionnaire was translated into Kannada, the local vernacular language, piloted, and validated before its formal use. Patients who met the inclusion and exclusion criteria were selected. The clinical details of each patient were recorded in a pre-tested form, and the VSH Questionnaire was administered. In cases where patients were illiterate, literate attendants assisted them in completing the questionnaire.

The data for this study was collected from four different areas of the General Medicine Department, specifically the ICU complex, general wards, three-sharing rooms, and single rooms. The inclusion criteria involved patients admitted to the General Medicine Department from these four areas, aged over 18 years, and stable patients who had been hospitalized for more than one day. The exclusion criteria ruled out patients with pre-existing sleep disorders like insomnia and obstructive sleep apnea (OSA), patients on sedative-hypnotic drugs, those with encephalopathy, altered sensorium, cerebrovascular accidents (CVA), breathing difficulties, those in severe distress or critically ill, and those with psychiatric disorders such as depression or anxiety.

A total of 110 patients from the four areas of the General Medicine Department were included in the sample, selected using non random sampling method. The sample size was calculated using the Epi Info™ software for Windows version 7.2. Statistical analysis was done using SPSS version 21.0 Software. Proportions for categorical or binary variables and mean, median, and standard deviation for continuous variables. Inferential statistics were applied through Pearson or Spearman correlation tests, Chi-square tests, independent t-tests, and one-way ANOVA. A p-value of less than 0.05 was considered statistically significant.

**Results:**

In the present study, most of the subjects belonged to the age group of <30 years (28.2%). This was followed by the age group of 41-50 years with 20.9% and those above 61 years with 22.7%. The rest of the subjects were in the age group of 31-40 years (18.2%) and 51-60 years (17.3%). In terms of gender, the distribution was balanced, with males and females each contributing 50%. Regarding location, 45.5% of the patients were in General Wards, followed by 22.7% in the ICU Complex, 18.2% in Three Sharing Rooms, and 13.6% in Single Rooms.

**Table 1: Profile of subjects with respect to location**

| | | Location | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | ICUComplex | | SingleRooms | | Three SharingRooms | | GeneralWards | |
| | | n | % | n | % | n | % | n | % |
| Age (years) | <30 | 9 | 36.0% | 2 | 13.3% | 6 | 30.0% | 14 | 28.0% |
| | 31-40 | 4 | 16.0% | 1 | 6.7% | 3 | 15.0% | 12 | 24.0% |
| | 41-50 | 4 | 16.0% | 5 | 33.3% | 3 | 15.0% | 11 | 22.0% |
| | 51-60 | 5 | 20.0% | 3 | 20.0% | 2 | 10.0% | 9 | 18.0% |
| | >61 | 3 | 12.0% | 4 | 26.7% | 6 | 30.0% | 4 | 8.0% |
| Gender | Female | 17 | 68.0% | 7 | 46.7% | 6 | 30.0% | 25 | 50.0% |
| | Male | 8 | 32.0% | 8 | 53.3% | 14 | 70.0% | 25 | 50.0% |
| Diagnosis | Acutegastritis | 1 | 4.0% | 2 | 13.3% | 0 | .0% | 1 | 2.0% |
| | Acute GE | 3 | 12.0% | 3 | 20.0% | 3 | 15.0% | 4 | 8.0% |
| | Anemia | 3 | 12.0% | 5 | 33.3% | 6 | 30.0% | 22 | 44.0% |
| | Bicytopenia | 1 | 4.0% | 0 | 0.0% | 0 | 0.0% | 1 | 2.0% |
| | Denguefever | 4 | 16.0% | 3 | 20.0% | 7 | 35.0% | 9 | 18.0% |
| | DKA | 5 | 20.0% | 0 | 0.0% | 1 | 5.0% | 1 | 2.0% |
| | Gastritis | 0 | 0.0% | 0 | 0.0% | 1 | 5.0% | 1 | 2.0% |
| | Hypoglycemia | 0 | 0.0% | 1 | 6.7% | 0 | 0.0% | 0 | 0.0% |
| | ITP | 2 | 8.0% | 0 | 0.0% | 0 | 0.0% | 2 | 4.0% |
| | Pancytopenia | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 2 | 4.0% |
| | SevereAnemia | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 1 | 2.0% |
| | Type2 DM-Hypoglycemia | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 1 | 2.0% |
| | UncontrolledT2DM | 4 | 16.0% | 1 | 6.7% | 1 | 5.0% | 3 | 6.0% |
| | UTI | 1 | 4.0% | 0 | 0.0% | 1 | 5.0% | 2 | 4.0% |
| | VitB12Def - Anemia | 1 | 4.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |

In the Intensive Care Unit (ICU) Complex, the majority of subjects were below 30 years old (36.0%), followed by the 51-60-year age group (20.0%). In Single Rooms, most patients were between 41 and 50 years old (33.3%), while Three Sharing Rooms had a fairly equal

distribution of those under 30 years old (30.0%) and those above 61 years old (30.0%). General Wards consisted of more young patients, with 28.0% being below 30 years old. Gender-wise, the highest proportion of females was in the ICU Complex (68.0%), while in General Wards, the gender distribution was equal at 50.0%. Regarding diagnosis, Anaemia was more common in General Wards, representing 44.0% of the cases, whereas Dengue fever was most prevalent in Three Sharing Rooms at 35.0%.

**Table 2: Sleep parameters with respect to location**

| | Location | | | | | | | | PValue |
|---|---|---|---|---|---|---|---|---|---|
| | ICUcomplex | | SingleRooms | | Three SharingRooms | | GeneralWards | | |
| | Mean | SD | Mean | SD | Mean | SD | Mean | SD | |
| Sleepdisturbance | 465.80 | 29.92 | 87.33 | 22.43 | 138.50 | 13.29 | 276.10 | 33.12 | <0.0001* |
| SleepEffectiveness | 204.60 | 28.02 | 406.00 | 13.52 | 358.00 | 14.81 | 295.60 | 31.50 | <0.0001* |
| SleepSupplementation | 152.40 | 23.32 | 101.67 | 9.94 | 54.00 | 13.44 | 42.30 | 19.07 | <0.0001* |

**Post Hoc Bonferroni comparing between the groups**

| | Sleepdisturbance | SleepEffectiveness | SleepSupplementation |
|---|---|---|---|
| ICUcomplex vs SingleRooms | <0.0001* | <0.0001* | <0.0001* |
| ICUcomplex vs Three SharingRooms | <0.0001* | <0.0001* | <0.0001* |
| ICUcomplex vs GeneralWards | <0.0001* | <0.0001* | <0.0001* |
| Single Rooms vs Three SharingRooms | 0.005* | <0.0001* | <0.0001* |
| Single Rooms vs GeneralWards | <0.0001* | <0.0001* | <0.0001* |
| Three SharingRooms vs GeneralWards | <0.0001* | 1.000 | 0.106 |

Sleep disturbance was highest in the ICU complex, with a mean score of 465.80 ± 29.92, and lowest in Single Rooms at 87.33 ± 22.43. Subjects in Three Sharing Rooms had a mean sleep disturbance of 138.50 ± 13.29, while those in General Wards had a mean of 276.10 ± 33.12. The p-value for sleep disturbance across all locations was highly significant at <0.0001, indicating a significant variation in sleep disturbance due to location. Sleep effectiveness was lowest in the ICU complex (204.60 ± 28.02) and highest in Single Rooms (406.00 ± 13.52). The mean score for sleep effectiveness in Three Sharing Rooms was 358.00 ± 14.81, while it was 295.60 ± 31.50 in General Wards, with a significant p-value of <0.0001. Sleep supplementation was highest in the ICU complex (152.40 ± 23.32) and lowest in General

Wards (42.30 ± 19.07), with Single Rooms and Three Sharing Rooms falling in between. Once again, the p-value was highly significant at <0.0001 for this parameter.

The post hoc Bonferroni test revealed significant differences between groups. All comparisons for sleep disturbance, sleep effectiveness, and sleep supplementation between the ICU complex and other locations had p-values of <0.0001, indicating significant differences. When comparing Single Rooms to Three Sharing Rooms, significant differences were found for sleep disturbance ($p = 0.005$), sleep effectiveness (<0.0001), and sleep supplementation (<0.0001). However, there were no significant differences between Three Sharing Rooms and General Wards for sleep effectiveness ($p = 1.000$) or sleep supplementation ($p = 0.106$).

The highest mean score for Question 1 (Wake after Sleep Onset) was recorded in the ICU complex at 65.00 ± 12.50, while the lowest was in Single Rooms at 11.00 ± 6.04. A similar trend was observed for Question 2 (Total Sleep Period), with Single Rooms having the highest score (75.00 ± 5.98) and the ICU complex showing the lowest (28.80 ± 11.93). Significant differences between locations were evident, with p-values <0.0001 for most parameters. For Question 3 (Daytime Sleep), the ICU complex had the highest mean (44.20 ± 12.72) compared to other locations, with significant differences between locations ($p < 0.0001$). The same trend followed for Question 4 (Morning Sleep) and Question 5 (Evening Sleep), where the ICU complex showed higher means, while other locations had significantly lower scores ($p < 0.0001$). For Question 6 (Sleep Latency), the ICU complex had the highest mean score (67.40 ± 10.32), and significant differences were seen between locations. Across all questions, the differences were statistically significant, with p-values below 0.001.The post hoc analysis using the Bonferroni approach showed statistically significant differences between the ICU complex and other locations for each question, with p-values <0.001. Additionally, significant differences were found between Single Rooms and Three Sharing Rooms for several questions, including Q1 and Q2. General Wards showed fewer differences compared to other locations, with the least variation observed for sleep-related disturbances like Q13 (Wake After Final Arousal) and Q14 (Subjective Quality of Sleep), although these still had significant p-values (<0.001) [Table 3].

**Table 3: VSH Questionnaire with respect to location**

| | Location | | | | | | | | PValue |
|---|---|---|---|---|---|---|---|---|---|
| | ICUComplex | | SingleRooms | | Three SharingRooms | | GeneralWards | | |
| | Mean | SD | Mean | SD | Mean | SD | Mean | SD | |
| Q1 | 65.00 | 12.50 | 11.00 | 6.04 | 22.00 | 6.77 | 26.40 | 9.53 | <0.0001* |
| Q2 | 28.80 | 11.93 | 75.00 | 5.98 | 60.25 | 7.16 | 57.30 | 7.37 | <0.0001* |
| Q3 | 44.20 | 12.72 | 12.67 | 5.94 | 20.00 | 8.74 | 4.80 | 7.00 | <0.0001* |
| Q4 | 32.80 | 9.69 | 6.00 | 4.71 | 6.25 | 7.59 | 5.10 | 6.89 | <0.0001* |
| Q5 | 33.00 | 14.36 | 3.67 | 4.42 | 8.00 | 7.33 | 10.00 | 8.81 | <0.0001* |
| Q6 | 67.40 | 10.32 | 12.00 | 4.55 | 21.00 | 5.98 | 59.10 | 10.24 | <0.0001* |
| Q7 | 28.40 | 8.86 | 79.00 | 6.04 | 66.50 | 5.40 | 55.70 | 13.74 | <0.0001* |
| Q8 | 70.00 | 10.10 | 8.67 | 4.81 | 17.75 | 4.99 | 54.90 | 12.31 | <0.0001* |
| Q9 | 66.40 | 9.52 | 10.67 | 4.58 | 15.75 | 5.45 | 38.60 | 16.38 | <0.0001* |
| Q10 | 65.00 | 9.13 | 9.00 | 3.38 | 14.00 | 4.17 | 29.10 | 14.42 | <0.0001* |
| Q11 | 60.40 | 9.35 | 11.67 | 4.50 | 14.50 | 5.36 | 23.70 | 11.29 | <0.0001* |
| Q12 | 26.20 | 9.92 | 78.33 | 6.45 | 66.50 | 5.87 | 51.80 | 15.31 | <0.0001* |
| Q13 | 42.40 | 14.00 | 79.33 | 5.63 | 19.75 | 4.99 | 22.40 | 9.65 | <0.0001* |
| Q14 | 25.00 | 10.21 | 81.67 | 4.88 | 66.00 | 8.21 | 51.30 | 13.47 | <0.0001* |
| Q15 | 30.80 | 10.48 | 85.00 | 4.23 | 83.00 | 4.70 | 51.50 | 11.92 | <0.0001* |

Q1 - WakeAfterSleepOnset, Q2 - TotalSleepPeriod, Q3 - DaytimeSleep, Q4 - MorningSleep, Q5- Evening Sleep, Q6 - SleepLatency, Q7 - SoundnessOfSleep, Q8- Quality Of Disturbance G, Q9 – Midsleep Awakening, Q10 - QualityOfLatency, Q11 - MovementDuringSleep, Q12- Rest Upon Awakening, Q13 - Wake After Final Arousal, Q14 - SubjectiveQualityOfSleep, Q15 - SleepSufficiencyEvaluation,

## Post Hoc Bonferroni comparing between the groups

| | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | Q8 | Q9 | Q10 | Q11 | Q12 | Q13 | Q14 | Q15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ICUcomplex vs SingleRooms | <0.01* | <0.001* | <0.001* | <0.001* | <0.001* | <0.001* | <0.001* | <0.001* | <0.001* | <0.001* | <0.001* | <0.001* | <0.001* | <0.001* | <0.001* |
| ICUcomplex vs Three SharingRooms | <0.001* | <0.001* | <0.001* | <0.001* | <0.001* | <0.001* | <0.001* | <0.001* | <0.001* | <0.001* | <0.001* | <0.001* | <0.001* | <0.001* | <0.001* |
| ICUcomplex vs GeneralWards | <0.001* | <0.001* | <0.001* | <0.001* | <0.001* | 0.002* | <0.001* | <0.001* | <0.001* | <0.001* | <0.001* | <0.001* | <0.001* | <0.001* | <0.001* |
| Single Rooms vs Three SharingRooms | 0.006* | <0.001* | 0.099 | 1.000 | 1.000 | 0.026* | 0.006* | 0.056 | 1.000 | 1.000 | 1.000 | 0.027* | <0.001* | <0.001* | 1.000 |
| Single Rooms vs GeneralWards | <0.001* | <0.001* | 0.018* | 1.000 | 0.175 | <0.001* | <0.001* | <0.001* | <0.001* | <0.001* | <0.001* | <0.001* | <0.001* | <0.001* | <0.001* |
| Three SharingRooms vs GeneralWards | 0.499 | 1.000 | <0.001* | 1.000 | 1.000 | <0.001* | 0.001* | <0.001* | <0.001* | <0.001* | 0.002* | <0.001* | 1.000 | <0.001* | <0.001* |

**Table 4: Various Factors Affecting Sleep in the Respective Areas**

| | | Location | | | | | | | | | | Pvalue |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ICUComplex | | SingleRooms | | ThreeSharingRooms | | GeneralWards | | Total | | |
| | | n | % | n | % | n | % | n | % | n | % | |
| **Noise** | Yes | 22 | 88.0% | 2 | 13.3% | 8 | 40.0% | 36 | 72.0% | 68 | 61.8% | <0.001* |
| | No | 3 | 12.0% | 13 | 86.7% | 12 | 60.0% | 14 | 28.0% | 42 | 38.2% | |
| **Light** | Yes | 24 | 96.0% | 5 | 33.3% | 8 | 40.0% | 36 | 72.0% | 73 | 66.4% | <0.001* |
| | No | 1 | 4.0% | 10 | 66.7% | 12 | 60.0% | 14 | 28.0% | 37 | 33.6% | |
| **Interruptions** | Yes | 19 | 76.0% | 5 | 33.3% | 9 | 45.0% | 19 | 38.0% | 52 | 47.3% | 0.011* |
| | No | 6 | 24.0% | 10 | 66.7% | 11 | 55.0% | 31 | 62.0% | 58 | 52.7% | |
| **Bed** | Yes | 5 | 20.0% | 4 | 26.7% | 5 | 25.0% | 17 | 34.0% | 31 | 28.2% | 0.700 |
| | No | 20 | 80.0% | 11 | 73.3% | 15 | 75.0% | 33 | 66.0% | 79 | 71.8% | |
| **Daytimesleep** | Yes | 3 | 12.0% | 4 | 26.7% | 7 | 35.0% | 13 | 26.0% | 27 | 24.5% | 0.300 |
| | No | 22 | 88.0% | 11 | 73.3% | 13 | 65.0% | 37 | 74.0% | 83 | 75.5% | |
| **Unfamiliarsurroundings** | Yes | 14 | 56.0% | 2 | 13.3% | 8 | 40.0% | 24 | 48.0% | 48 | 43.6% | 0.054 |
| | No | 11 | 44.0% | 13 | 86.7% | 12 | 60.0% | 26 | 52.0% | 62 | 56.4% | |

Noise was reported by 88.0% of subjects in the ICU Complex, 13.3% in Single Rooms, 40.0% in Three Sharing Rooms, and 72.0% in General Wards. Overall, noise disturbance was reported by 61.8% of participants, with a significant p-value of <0.001, indicating a strong association between noise and location. Light disturbances were also common, affecting 96.0% of ICU Complex patients, 33.3% in Single Rooms, 40.0% in Three Sharing Rooms, and 72.0% in General Wards. The overall effect of light was 66.4%, with a p-value <0.001, suggesting significant differences between locations. Interruptions affected 76.0% of subjects in the ICU Complex, 33.3% in Single Rooms, 45.0% in Three Sharing Rooms, and 38.0% in General Wards. The overall percentage of interruptions was 47.3%, with a p-value of 0.011, showing a significant impact on sleep quality.

Bed discomfort affected 20.0% of subjects in the ICU Complex, 26.7% in Single Rooms, 25.0% in Three Sharing Rooms, and 34.0% in General Wards, with no significant differences across locations (p = 0.700). Daytime sleep affected 12.0% in the ICU Complex, 26.7% in Single Rooms, 35.0% in Three Sharing Rooms, and 26.0% in General Wards, with no statistically significant difference (p = 0.300). Unfamiliar surroundings were an issue for 56.0% of subjects in the ICU Complex, 13.3% in Single Rooms, 40.0% in Three Sharing Rooms, and 48.0% in General Wards, with borderline significance (p = 0.054). [Table 4].

**Discussion:**

Disturbed sleep in terms of quality and quantity has been associated with increased stay of patients at the hospital and delayed recovery. Association of sleep disturbances with modifiable hospital related factors is being proven through various studies. Few studies have shown that there is an association between noisy ward environment and quality and quantity of sleep. Hence this study was conducted in a tertiary hospital using VSH Sleep scale. VSH Sleep Scale had a reliability coefficient alpha of 0.941 for the sleep disturbance subscale, 0.807 for the sleep effectiveness subscale, and 0.651 for the sleep supplementation subscale, indicating satisfactory reliability across the subscales.

**Sleep Disturbance:** Sleep disturbance was found to be most severe among patients in the ICU Complex and least severe among patients in Single Rooms. The mean sleep disturbance score for ICU patients was 465.80 ± 29.92, which is higher than the mean score reported in a study by Fateme Mashayekhi et al. on Cardiac Care Unit (CCU) patients, where the mean sleep disturbance was 140.90 ± 55.6.[9] On the other hand, the sleep disturbance score among general ward patients in our study (276.10 ± 33.12) was lower than the score reported by **Dobing S et al.,** who found a mean sleep disturbance of 371 ± 35 among general internal medicine inpatients. [6] **Tariq S et al.** reported that sleep disturbance was 15% lower in single-room occupancy compared to multiple-occupancy rooms, though their results were not statistically significant ($p = 0.10$). [10] In contrast, our study found statistically significant differences in sleep disturbance scores across all areas, with a p-value of $<0.0001$. These results suggest that the location of a patient in the hospital significantly affects their experience of sleep disturbance.

**Sleep Effectiveness:** Patients in Single Rooms experienced the most effective sleep, while patients in the ICU Complex had the least effective sleep. The mean sleep effectiveness score in the ICU Complex was 204.60 ± 28.02, which was lower than the 255.33 ± 41.1 mean reported by **Fateme Mashayekhi et al.[9]** in their study on CCU patients. The general ward patients in our study had a mean sleep effectiveness score of 295.60 ± 31.50, which is higher than the 190 ± 22 score reported by **Dobing S et al.[6]** for general internal medicine inpatients. There is a scarcity of studies examining sleep effectiveness in private wards or three-sharing rooms, but our results indicate no significant difference in sleep effectiveness between general ward patients and those in three-sharing rooms. This finding suggests that the presence of multiple patients in a room does not necessarily lead to poorer sleep effectiveness, contrary to common assumptions.

**Sleep Supplementation:** The highest level of sleep supplementation was observed in ICU patients (mean score: 152.40 ± 23.32), while the lowest was in general ward patients (42.30 ± 19.07). In comparison, the sleep supplementation score for CCU patients in the study by **Fateme Mashayekhi et al.**[9] was 25.50 ± 27.00 , which is much lower than our findings in the ICU Complex. Dobing S et al.[6] reported a sleep supplementation score of 115 ± 18 for general internal medicine patients, which is higher than our findings for general ward patients. One possible explanation for the lower sleep supplementation in our general wards could be that our hospital is a teaching institution, where medical students frequently interact with patients during clinical rounds in the morning and afternoon. Many general ward patients reported being unable to sleep during the day due to the presence of students, with some noting that the students' questions kept them awake. This finding highlights the need to minimize daytime disturbances in teaching hospitals to improve patient sleep quality.

**Total Sleep Period, Subjective Quality of Sleep, and Sleep Sufficiency Evaluation:** Patients in Single Rooms had the highest total sleep period, while those in the ICU Complex had the lowest. The mean total sleep period for ICU patients in our study was

28.80 ± 11.93, which is lower than the 38.17 ± 11.86 reported by **Fateme Mashayekhi et al.**[9] for CCU patients. Conversely, our general ward patients had a higher total sleep period (57.30 ± 7.37) compared to Dobing et al.'s findings of 50 ± 11.[6] Single-room patients also scored the highest in subjective sleep quality and sleep sufficiency evaluation. Compared to Fateme Mashayekhi et al.'s [9] study, our ICU patients had lower subjective sleep quality but similar scores for sleep sufficiency. This suggests that while ICU patients in our hospital may feel that their sleep quality is poor, they still perceive their sleep to be sufficient in terms of meeting their overall rest needs.

**Sleep Latency and Quality of Latency**

ICU patients experienced the longest sleep latency, meaning it took them the most time to fall asleep, whereas patients in Single Rooms fell asleep the fastest. The mean sleep latency in the ICU Complex was 67.40 ± 10.32, significantly higher than the 20.33 ± 8.89 reported by Fateme Mashayekhi et al.[9] for CCU patients . In contrast, the sleep latency for general ward patients in our study (59.10 ± 10.24) was higher than the 48 ± 8 reported by Dobinget al.[6]. The quality of latency, which refers to the perceived ease of falling asleep, was also lowest in ICU patients (mean score: 65.00 ± 9.13) compared to the 22.83 ± 10.87 reported by Fateme Mashayekhi et al.[9]. These findings suggest that ICU patients struggle the most with falling asleep, potentially due to the stressful environment and frequent medical interventions. In general wards, patients also experienced longer sleep latency compared to other settings, possibly due to environmental factors such as noise and light, which were frequently mentioned by patients as disruptive.

**Soundness of Sleep, Quality of Disturbance, and Mid-Sleep Awakening**

Soundness of sleep, quality of disturbance, and mid-sleep awakening were most affected in ICU patients and least affected in Single Rooms. Our ICU patients had much higher scores for these parameters than those reported by **Fateme Mashayekhi et a**l[9]. For example, our ICU patients had a mean mid-sleep awakening score of 66.40 ± 9.52, compared to 19.67 ± 7.30 in the CCU study. One reason for this difference could be the frequent blood glucose monitoring required for our ICU patients, many of whom were admitted with diabetic ketoacidosis. Patients frequently reported being awakened for blood sugar checks throughout the night. In contrast, patients in the CCU study were not subject to hourly blood glucose monitoring. These findings underscore the importance of minimizing night-time disturbances in ICU settings to improve patient sleep quality.

**Factors Affecting Sleep**

In terms of factors affecting sleep, light was the most common disturbance overall (66.4%), followed by noise (61.8%). Among general ward patients, both light and noise were reported by 72.0% of patients. According to **Dobing et al.,[6]** noise was the most common sleep disturbance in general wards (59.2%), with bright lighting affecting only 15.5% of patients . In the ICU Complex, light was reported as a disturbance by 96.0% of patients, followed by noise (88.0%). This is consistent with findings from **Kamkar MZ et al.,[**11] where nearly all ICU patients reported being disturbed by noise and light . Many patients reported that lights were left on late into the night, or that fellow patients were noisy, contributing to their sleep difficulties. One common suggestion from patients was to be moved away from noisy individuals in the ICU, indicating that patient placement could be a modifiable factor in improving sleep quality in ICU settings.

**Modifiable Factors**

The study highlighted several modifiable factors that could improve sleep quality in hospital settings. Noise and light were the most frequently reported disturbances, and both are potentially modifiable through changes in hospital practices. Educating nurses and staff about the importance of minimizing night-time disruptions, ensuring that lights are dimmed, and reducing noise could have a significant impact on patient sleep quality. Additionally, addressing environmental issues could further improve sleep, particularly in wards where patients are more exposed to external disturbances.

**Conclusion:**

Sleep in our hospitalised patients is affected in both quality and quantity, with ICU complex patients being the worst affected and single room patients being the least affected. There has not been much difference in sleep quality and quantity between patients staying in three sharing rooms and general wards. Overall, between the four areas, there is statistically significant amount of difference in the sleep quality and quantity. We have identified various factors disturbing sleep. The easily modifiable factors include noise and lights in the hospital. Also, if possible, the number of clinical and nursing interventions can be assessed for their necessity and if not required could be reduced during the night.

**Recommendations:**

In the ICU Complex, noise, light, and frequent interruptions were major factors disrupting sleep. Efforts should focus on reducing noise by promptly silencing monitors and controlling light exposure. In General Wards, nurses should be educated on the importance of minimizing night-time disturbances, particularly during patient admissions. Daytime sleep could be improved by holding student classes outside the wards. In Three Sharing Rooms, loud patients could be distanced from quieter ones to improve sleep quality. Single Room patients, despite good sleep at night, had excessive daytime sleep, which could be reduced by encouraging more daytime activity.

**Strengths and Limitations:**

This study is unique in comparing sleep quality across four hospital areas. It identified key sleep-disrupting factors based on patient feedback. However, it lacked a comparison of hospital versus home sleep quality, and potential effects of the COVID-19 pandemic on the findings remain unclear. Future studies should explore these factors post-pandemic.

**Conflict of Interest:** Nil

**References:**

1. Freedman NS, Kotzer N, Schwab RJ. Am J Respir Crit Care Med. 1999;159 (4 Pt 1):1155-62.
2. Frighetto L, Marra C, Bandali S, et al. An assessment of quality of sleep and the use of drugs with sedating properties in hospitalized adult patients. Health Qual Life Outcomes. 2004;2:17. doi:10.1186/1477-7525-2-17.
3. Bihari S, McEvoy RD, Matheson E, et al. Factors affecting sleep duration in hospitalised patients. J Clin Sleep Med. 2012;8(3):301-307.
4. Adachi M, Staisiunas PG, Knutson KL, et al. Sleep in hospitalized adults: A review of factors influencing sleep in hospital settings. J Hosp Med. 2013;8(4):184-190. doi:10.1002/jhm.2027.
5. Ritmala-Castren M, Virtanen I, Leivo S, et al. Sleep and recovery in hospital settings: Factors affecting sleep quality. Nurs Health Sci. 2015;17(3):354-361.
6. Dobing S, et al. Sleep Quality and Factors Influencing Self-Reported Sleep Duration and Quality in the General Internal Medicine Inpatient Population. PloS One. 2016;11(6).
7. Wesselius HM, van den Ende ES, Alsma J, et al. Quality and quantity of sleep inhospitalized patients and associated factors. JAMA Intern Med. 2018;178(9):1201-1208.
8. Tamrat R, Huynh-Le MP, Goyal M. Non-pharmacologic interventions to improve the sleep of hospitalized patients: a systematic review. Journal of general internal medicine. 2014;29:788-95.
9. Mashayekhi F, Arab M, Pilevarzadeh M, Amiri M, Rafiei H. The effect of eye mask on sleep quality in patients of coronary care unit. Sleep Science. 2013;6(3):108-11.
10. Tariq S, Chauhan MN, Ahmed SE, Canelo R (2018) Patients Perspective on Multiple *vs.* Single-occupancy Rooms in a Busy District Hospital. J Pat Care 4: 142. doi: 10.4172/2573-4598.1000142
11. Kamkar MZ, Mahyar M, Maddah SA, Khoddam H, Modanloo M. The effect of melatonin on quality of sleep in patients with sleep disturbance admitted to post coronary care units: A randomized controlled trial. Biomedicine (Taipei). 2021;11(1):34-40.