Sleep Quality Among Employees of Institut Teknologi Sumatera (ITERA), Lampung, Indonesia: A Cross-Sectional Study in Higher Education Using the Pittsburgh Sleep Quality Index (PSQI)

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Abstract: Sleep is a vital physiological process essential for overall health and productivity. Among university employees, poor sleep quality has been linked to reduced job performance, increased risk of mental health disorders, and heightened susceptibility to occupational burnout. These risks are particularly salient in academic environments, where high administrative demands and blurred work-life boundaries are increasingly common. This study evaluated sleep quality among employees at Institut Teknologi Sumatera (ITERA) while investigating key demographic predictors. Employing a cross-sectional quantitative design, data were collected from 300 administrative and academic staff using the Pittsburgh Sleep Quality Index (PSQI). Initially, a chi-square goodness-of-fit test was conducted to assess the associations among categorical variables, and a generalized linear model (GLM) was subsequently utilized to identify factors influencing sleep quality, with a significance threshold of $p < 0.05$. The results revealed that approximately 75.67% of employees exhibited good sleep quality. Notably, significant sex differences were observed: females demonstrated a higher prevalence of poor sleep quality compared to males. Furthermore, age emerged as a critical predictor, with employees in the 41–50 age group reporting better sleep quality than those in the 21–30 and 31–40 age groups. These findings underscore the importance of considering demographic factors when developing targeted interventions aimed at improving sleep health in organizational settings.

Keywords: Age; Employees; PSQI; Sleep quality; Workplace

Introduction

Sleep is a natural physiological state that occurs cyclically, during which the body and mind experience a decrease in consciousness and reduced responsiveness to external stimuli (Chiara et al., 2015; Hirshkowitz & Sharafkhaneh, 2005). Sleep is vital for health and well-being in children, adolescents, and adults (Bruce et al., 2017; Foster, 2020; Matricciani et al., 2018). Healthy sleep is important for cognitive functioning, mood, mental health, and cardiovascular, cerebrovascular, and metabolic health (Watson et al., 2015). Despite sleep's fundamental role in maintaining and improving physical and mental health, many people get less than the recommended amount of sleep or suffer from sleeping disorders (Baranwal et al., 2023) that can impact sleep quality.

Sleep quality is defined as an individual's self-satisfaction with all aspects of the sleep experience. Sleep quality has four attributes: sleep efficiency, sleep latency, sleep duration, and wake after sleep onset (Nelson et al., 2022). Sleep quality can be assessed using both objective and subjective methods (Cudney et al., 2022; Fabbri et al., 2021). The Pittsburgh Sleep Quality

Index (PSQI) is widely recognized as the leading tool for assessing subjective self-reported sleep quality (Fabbri et al., 2021; Lee et al., 2021; Mollayeva et al., 2016). It evaluates various aspects of an individual's sleep patterns and experiences over a specified period, typically the past month.

Numerous studies have explored the relationship between sleep quality and several factors such as occupation, age, sex, health conditions, work environments, and dietary habits (Åkerstedt & Wright, 2009; Caruso, 2014). Among these factors, occupational demands play a significant role in shaping sleep patterns. For instance, employees in sectors such as healthcare and manufacturing often experience irregular working hours, which can disrupt circadian rhythms and lead to poor sleep quality (Knutsson, 2003). In contrast, institutional employees, such as those in academic or administrative roles, typically benefit from more stable work schedules, resulting in comparatively better sleep patterns than shift workers in factories or hospitals, who are frequently exposed to high levels of physical and emotional stress (Åkerstedt & Wright, 2009). Poor sleep quality among workers is associated with a heightened risk of workplace accidents, particularly in tasks requiring sustained alertness, such as driving or operating machinery (Garbarino et al., 2016). Studies have shown that sleep deprivation and shift work significantly impair cognitive performance, increasing the likelihood of errors and accidents (Wong et al., 2011). Furthermore, inadequate sleep can negatively impact employee productivity, leading to increased sick leave, physical and psychological health issues, and disturbances in workplace performance and personal relationships (Doi et al., 2003).

A study by Situngkir et al. (2022) identified factors such as age, fatigue, and caffeine consumption as contributors to poor sleep quality among remote workers in the Greater Jakarta area. Although employees in higher educational institutions are often considered to have more stable jobs and regular working hours, there is limited data on sleep quality among this group in Indonesia. For instance, a study conducted at a state university in Bogor, West Java, found no significant association between job type and sleep quality among employees but highlighted the influence of age (Sanningtyas, 2013). Building on these findings, this study aims to assess the sleep quality of employees at Institut Teknologi Sumatera (ITERA), a state university in Sumatra. Specifically, the research examines how various factors, including gender, occupation, age, and dietary habits, correlate with sleep quality.

This study provides an empirical baseline on sleep quality among higher education employees in Sumatra, a region underrepresented in Indonesian occupational health research. While prior studies have focused on private sector or healthcare workers, this research extends the literature to state university employees, a group presumed to have stable work conditions but increasingly exposed to academic performance pressures and digital fatigue. The findings will inform institutional policies at ITERA, such as, health promotion programs and workload evaluations, and offer a replicable framework for other emerging public universities in Indonesia.

Method

Ethical Clearance

This study was conducted at ITERA from January to March 2024. Data analysis was performed at the Zoology Laboratory, Department of Biology, Institut Teknologi Sumatera. Ethical approval for this study was obtained from the Ethics Committee of the Faculty of Medicine, Universitas Lampung (Approval No. 1322/UN26.18/PP.05.02.00/2024).

Study Design and Setting

This study employed a cross-sectional design involving 300 employees from ITERA. The total employee population consisted of 920 individuals, comprising 403 administrative staff and 517 academic staff. The sample size was determined using Slovin's formula. Respondents were categorized into two groups based on their job functions: administrative staff and academic staff. Data were collected using both online (24.3%) and offline (75.6%) methods.

Demographic Data Collection

Demographic information, including age, sex, income, occupation, dietary status, and health condition, was collected using a structured questionnaire. Data were obtained through two methods: online distribution via Google Forms and direct administration using printed questionnaires.

Sleep Quality Assessment

Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI). The PSQI questionnaire consists of nine questions grouped into seven components: subjective sleep quality, sleep latency, sleep efficiency, sleep duration, use of sleep medication, nighttime disturbances, and daytime dysfunction. The global score of PSQI score ranges from 1-21, with a score ≤ 5 indicating good sleep quality and > 5 indicating poor sleep quality (Buysse et al., 1989).

Data Analysis

Descriptive statistics were first computed to summarize all study variables. Subsequently, a chi-square goodness-of-fit test was employed to evaluate the

associations among categorical variables, including employee group, sex, and age. A significance threshold of $p < 0.05$ was adopted for all statistical tests. Furthermore, a generalized linear model (GLM) was utilized to examine the factors influencing sleep quality. All analyses were performed using R (version 4.4.0; R Core Team, 2024).

Result and Discussion

Respondent Characteristics

The study on sleep quality among employees at ITERA included 300 respondents, consisting of 158 male employees and 142 female employees. Respondents were categorized into three age groups: 21–30 years, 31–40 years, and 41–50 years. They were also classified into two occupational categories: academic staff (educators) and administrative staff, with an average income ranging from IDR 2,000,001 to IDR 3,000,000 (Table 1).

Table 1. Demographic Characteristics of Employees at the Institut Teknologi Sumatera (ITERA)

Variables	Category	Frequency (Total)	Percentage (%)
Sex	Male	158	52.6
	Female	142	47.3
Occupation	Academics staff	79	26.3
	Administrative staff	221	73.6
Age group (years)	21-30	127	42.3
	31-40	115	38.3
	41-50	58	19.3
Income (Rupiah)	Rp 1.000.001- Rp 2.000.000	17	5.6
	Rp 2.000.001 - Rp 3.000.000	125	41.6
	Rp 3.000.001- Rp 4.000.000	104	34.6
	Rp 4.000.001 - Rp 5.000.000	45	15
	Rp 5.000.001- Rp 10.000.000	9	3

Sleep Quality

The Pittsburgh Sleep Quality Index (PSQI) is a widely recognized tool for evaluating sleep quality. According to Buysse et al. (1989), a PSQI score of ≤5 signifies good sleep quality, while a score >5 indicates poor sleep quality. The present study found that the global PSQI score among employees was 4.52 ± 3.09 (range: 1–10). This score was determined by aggregating the scores from each individual component. Consequently, it was found that the majority of the 300 respondents, representing 75.67%, reported good sleep quality, as depicted in Figure 1.

Gender-Based Comparative Analysis

A gender-based comparative analysis (Table 2) revealed several notable findings regarding sleep quality parameters. The mean subjective sleep quality score (1.11 ± 0.35) indicated slightly below-average sleep quality, with female participants reporting marginally poorer sleep quality compared to their male counterparts (p = 0.067). While sleep latency, duration, and efficiency measurements fell within normal ranges, there were no significant gender-based differences in those components. Furthermore, although nighttime disturbances were frequently reported (0.71 ± 0.48), the frequency did not differ significantly between genders. Sleep medication usage was notably low among all participants (0.01 ± 0.09), and daytime dysfunction scores remained within normal parameters (0.35 ± 0.53). Overall, the analysis demonstrated a consistent trend wherein female participants reported marginally poorer sleep quality compared to males (p = 0.059), though this difference approached but did not reach statistical significance.
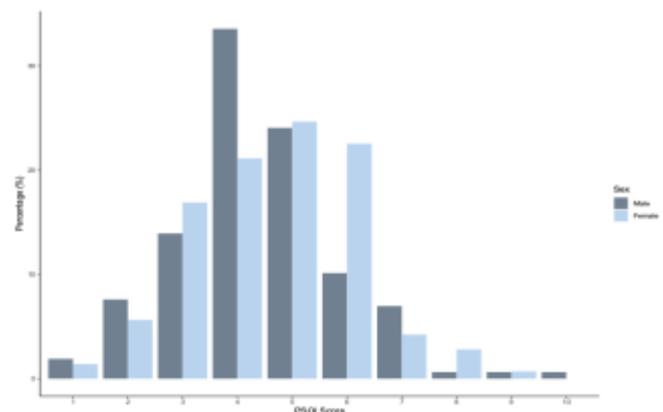

Figure 1. Sleep quality score of Institut Teknologi Sumatera (ITERA) employment

This finding is consistent with previous research by Fatima et al. (2016), Madrid-Valero et al. (2017), and Alosta et al. (2024), which reported a higher prevalence of poor sleep quality among females. The lower sleep quality reported by female staff was primarily associated with diminished subjective sleep quality, a factor known to adversely affect mental and physical health, productivity, and overall quality of life (Rosekind et al., 2010). Existing literature suggests that females tend to experience higher levels of stress, often due to dual responsibilities at home and in the workplace (Dogra & Kaushal, 2022), thereby exacerbating sleep problems. Furthermore, hormonal changes throughout a woman's life can impact sleep quality, particularly during menstruation, pregnancy, and menopause (Alosta et al., 2024; Baker et al., 2018; Baker & Lee, 2018; Liu & Reddy, 2022; Pengo et al., 2018).

Sleep Quality Analysis by Demographic Factors

Analysis of sleep quality across demographic variables revealed several notable patterns. According to Table 3, a significant gender disparity was observed, with 81.01% of male employees reporting good sleep quality compared to 69.72% of their female counterparts. This difference was statistically significant (χ^2 = 5.1813, p = 0.023). Regarding age-related patterns, although no statistically significant differences were found across age groups (χ^2 = 1.9644, p = 0.375), employees aged 31-40 years demonstrated a higher tendency toward poor sleep quality compared to those in both the 21-30 and 41-50 age groups. In the occupational analysis, sleep quality patterns showed no significant variation between academic and administrative staff (χ^2 = 0.0046, p = 0.946), suggesting that job role did not substantially influence sleep quality outcomes.

Table 2. Mean ± SD Scores for Sleep Quality Components of ITERA Staff Chi-square Test, p <0.05 = Significant)

PSQI Components	All Subjects (N=300) Mean±SD	Males (N=158) Mean±SD	Females (N=142) Mean±SD	p-value
Subjective sleep quality	1.11±0.35	1.07+0.34	1.15±0.36	0.067
Sleep duration	1.87±0.99	1.82±1.00	1.94±0.99	0.566
Sleep latency	0.47±0.63	0.44±0.61	0.51±0.66	0.594
Sleep efficiency	0.00.±0.00	0.00±0.00	0.00±0.00	-
Nighttime disturbances	0.71±0.48	0.71±0.48	0.71±0.47	0.873
Use of sleep medication	0.01±0.09	0.01±0.08	0.01±0.11	0.926
Daytime dysfunction	0.35±0.53	0.36±0.53	0.33±0.53	0.794
Global PSQI Score	4.52±3.09	4.39±3.05	4.65±3.13	0.059

Table 3. Comparison of Sleep Quality Across Sex, Occupation, and Age Groups (Chi-square test, p <0.05 = Significant)

Variable	Category	PSQI Score (%) Good	Poor	p-value
Sex	Male	81.01	18.99	0.023**
	Female	69.72	30.28	
Age group	21-30	74.02	25.98	
	31-40	73.91	26.09	0.375
	41-50	82.76	17.24	
Occupation	Academic staff	75.95	24.05	
	Administrative staff	75.57	24.43	0.946

Regarding age, our study found that individuals in the 41-50 age group experienced better sleep quality compared to those in the 21-30 and 31-40 age groups. Although, there was no significant difference in the proportion of the poor sleep quality between the age groups. In contrast, our GLM analysis identified age as a potentially important predictor of sleep quality. This finding is intriguing, as it contradicts the common assumption that sleep quality tends to decline with age. One possible explanation for this result is that individuals in this age group may have established healthier sleep habits, experienced lifestyle changes that promote better sleep, or may have developed coping mechanisms to manage stress and other factors that can negatively impact sleep. This result is in line with Hong et al. (2022), who found that the average PSQI score of patients in their 40s was lower than that of patients in their 30s. However, previous literature has identified midlife as typically characterized by increased work demands, job-related stress, and time constraints (Tsaava et al., 2022). Additionally, reduced sleep quality in mid-life is frequently attributed to childcare responsibilities and occupational demands (Coutrot et al., 2022). Although the 41–50 age group often encounters hormonal changes and age-related health challenges, some individuals within this cohort may have attained a better work-life balance and developed healthier sleep habits (Altena et al., 2020).

In contrast to expectations, our study found no significant difference in sleep quality between academic and administrative staff. However, being an academic staff member was associated with a slightly higher PSQI score compared to administrative staff, although this effect was not statistically significant. This finding is consistent with Abd El-Ghany et al. (2024), who reported that approximately two-thirds of academic staff members at a medical college in Jeddah suffered from poor sleep quality, possibly due to excessive workload.

Factors Influencing Sleep Quality (PSQI score): A GLM Analysis

The Generalized Linear Model analysis revealed several predictors' effects on the Pittsburgh Sleep Quality Index (PSQI) score (Table 4). Being female, being an academic staff member, and having a higher income were associated with slight increases in the PSQI score;

however, these effects were not statistically significant. Similarly, being in the 31-40 age group and following a specific diet were linked to slight decreases in the PSQI score, but again, these effects were not statistically significant. However, a significant negative effect on the PSQI score was found for individuals in the 41-50 age group, indicating better sleep quality compared to the reference age group (31-40). This suggests that as people enter their 40s, they tend to experience improved sleep quality, as measured by the PSQI score. Overall, the model highlights the importance of age as a predictor of sleep quality, with those in the 41-50 age group standing out as having significantly better sleep quality compared to their younger counterparts.

Our study also explored the relationship between diet and sleep quality. Respondents who reported being on a diet had a slightly lower PSQI score compared to non-diet respondents. Research has established that dietary choices can affect sleep quality (Anindiba et al., 2022). Diets high in complex carbohydrates, such as whole grains, can promote better sleep by increasing the availability of tryptophan, a precursor to melatonin and serotonin, hormones that regulate sleep (Grandner et al., 2013). Furthermore, our analysis found that asthma, gastritis, and bronchitis were positively correlated with an increased PSQI score. These conditions are known to impair overall health and sleep, a finding that aligns with previous research (Larsson et al., 2001; Ruan et al., 2023).

Table 4. Variables Affecting Sleep Quality (PSQI Score) Among Employees at Institut Teknologi Sumatera (p < 0.05 = Significant)

	Estimate	Std. Error	t-value	p-value
Sex (Ref: female)	0.2755	0.1927	1.429	0.1540
Occupation (Ref: academic staff)	0.1852	0.2447	0.757	0.4497
Age group 2 (31-40)	-0.0728	0.2036	-0.358	0.7208
Age group 3 (41-50)	-0.5481	0.2661	-2.059	0.0403*
Income	0.0064	0.1247	0.051	0.9593
Diet (Ref: yes)	-0.1111	0.3575	-0.312	0.7552

The lack of statistically significant effects for some predictors, such as gender, job status, income, and diet, suggests that these factors may not be as strongly associated with sleep quality in this population. However, it is essential to consider that these non-significant findings may be due to the specific sample characteristics or the measurement tools used. Further research is needed to explore the underlying mechanisms driving the observed age-related improvement in sleep quality and to investigate whether these findings can be replicated in other populations.

Additionally, the results of this study highlight the importance of considering age as a critical factor in sleep quality research and interventions aimed at promoting healthy sleep habits across the lifespan. To gain a more comprehensive understanding of employee sleep quality, future research should employ an expanded research design that incorporates additional variables such as physical activity levels, family status, occupation roles, psychological factors (e.g., stress and anxiety), and living environment conditions. This approach will enable a more nuanced and representative assessment of sleep patterns among staff at ITERA and may uncover significant relationships that were not evident in the present study. Furthermore, such research can provide valuable insights for policymakers and organizational leaders seeking to promote a healthier and more productive work environment.

Conclusion

In conclusion, this study found that the majority of ITERA staff exhibit good sleep quality. Despite this overall positive finding, notable sex-related differences were observed, with female staff tending to experience poorer sleep quality than their male counterparts. Additionally, age significantly influences sleep quality within this population, particularly with the 41-50 age group reporting better sleep.

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