Original Article
Evaluation of sleep quality in faculty members of Isfahan university of medical sciences

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Abstract: Background: Sleep disorders can significantly impair the quality of life and daily functions. Evaluating sleep quality can provide valuable information about working conditions. This study aims to evaluate the sleep quality of faculty members at Isfahan University of Medical Sciences (IUMS). Methods: This descriptive-analytic study was conducted from 2020 to 2021, involving 106 faculty members from the medical school. A questionnaire collected demographic information, including age, sex, height, weight, body mass index (BMI), level of education, history of faculty membership, major, working hours during the day and night, residency place, and medical history. The Pittsburgh Sleep Quality Index (PSQI) and Symptom Checklist-25 (SCL-25) questionnaire were used to assess participants' sleep quality. Data were compared between clinicians and basic science faculty members. Results: PSQI subtypes were examined among the participants. The total PSQI score was 6.20±3.4. A comparison of PSQI scores and subtypes based on age categories did not show any significant differences (P > 0.05 for all). Clinicians had significantly lower total PSQI scores (P=0.044), sleep latency (P=0.024), sleep disturbances (P=0.012), and daytime dysfunction (P=0.022). Additionally, clinicians had a lower severity of sleep latency (P=0.024), sleep disturbances (P=0.012), and total PSQI score (P=0.044). However, clinicians exhibited a higher intensity of daytime dysfunction (P=0.022). Conclusion: Faculty members exhibited a high prevalence of sleep disorders, with the most common disorders being sleep disturbance and high sleep latency. The prevalence of sleep disorders was higher among basic science faculty members compared to clinicians.

Keywords: Sleep quality, clinicians, Pittsburgh Sleep Quality Index, SCL, healthcare workers

Introduction

Sleep is one of the basic physiological needs of human beings. It is a continuous, repetitive, and easily reversible state of the organism, characterized by relative immobility and a significant increase in the threshold of reaction to external stimuli compared to the waking state [1]. Sleep has long been recognized as an essential factor in human health [2]. It is a crucial component of the circadian cycle, contributing to the restoration of physical and mental strength [3]. This dynamic, repetitive, and reversible behavior plays a significant role in various vital functions of the body, including growth and repair, as well as enhancement of learning and memory. The quantity and quality of sleep are closely linked to human health [4].

There is little skepticism among health professionals regarding the importance of obtaining sufficient sleep for maintaining physical and mental health. Insomnia and sleep disorders significantly diminish the quality of life and overall health [5]. Insomnia also poses a risk factor for developing depression, which can reduce the response to depression treatment and increase the likelihood of recurrent depressive episodes [6].

Disruptions in the sleep-wake cycle can have an impact on various physiological functions within the body. These disruptions may lead to decreased appetite, feelings of fatigue, difficulties with concentration, exacerbation of existing illnesses, and physical discomfort [7]. Sleep disorders can manifest in different forms, such

as insomnia. Insomnia is a sleep disorder characterized by difficulties in falling asleep, staying asleep, intermittent awakening, waking up too early in the morning, or a combination of these factors [4, 8]. Insomnia can encompass symptoms like excessive sleep, insufficient sleep, poor sleep quality, difficulties in initiating sleep, frequent awakenings, and breathing difficulties during sleep [9].

Sleep quality, specifically the sleep-wake cycle, has a profound impact on the immune system and is considered a crucial and influential factor in overall health conditions [10]. It is estimated that between 30-45% of the global population suffers from insomnia [11]. And the prevalence of sleep disorders in the general population ranges from 15-42% [12]. International statistics indicate that approximately 60% of individuals in any society experience sleep-related disorders, with insomnia and excessive daytime sleepiness being the most common sleep problems. Illness and physical pain can significantly affect the quality and quantity of sleep [13].

Poor sleep quality or excessive drowsiness can diminish the quality of life, increase the risk of mental illness, and impair daily functioning [14]. Inadequate sleep disrupts a person's emotions, thoughts, and motivation, leading to increased stress, pain, and delayed wound healing [15]. Hospitalization can particularly disrupt sleep patterns and result in poor sleep quality. Although patients may seek hospitalization for restful sleep, their sleep is often not restorative and of subpar quality [16]. Faculty members are a segment of the population that is particularly affected by sleep disorders [17]. Studies have shown that sleep problems in students and faculty members are 2 to 5 times more prevalent compared to the general population [18]. They tend to have later bedtimes, earlier wake-up times, experience more restlessness, and suffer from insomnia. A study conducted by Mansouri et al. in 2012 revealed poor sleep patterns among students, especially those living in dormitories [19]. Veldi et al. also highlighted that age, personal characteristics, and social status directly influence sleep quality [20]. Additionally, a study by Lawson et al. in 2019 found that sleep disorders are common among medical students and have a direct impact on their functioning [21].

Evaluating sleep quality can be done using various methods, each with its own advantages and disadvantages. The main approaches are: One way to evaluate sleep quality is through a sleep diary, where individuals record their sleep patterns and subjective sleep quality. It is simple and cost-effective but relies on self-reporting, which can be subjective [20]. Actigraphy involves wearing a device that measures movement and light exposure to estimate sleep patterns. It provides objective data, is non-invasive, and convenient for long-term monitoring. However, it may have limitations in accurately distinguishing wakefulness from quiet wakefulness and may not capture sleep stages. Polysomnography (PSG) is a comprehensive sleep study conducted in a sleep lab. It monitors multiple physiological measures, providing detailed information about sleep architecture and diagnosing sleep disorders [22]. However, PSG is expensive, requires an overnight stay, and may disrupt natural sleep patterns. Sleep questionnaires assess subjective sleep quality and daytime sleepiness. They are easy to administer and provide valuable information about sleep-related symptoms. However, they rely on self-reporting and may not capture objective measures of sleep [25]. Wearable sleep trackers, worn on the wrist or placed under the mattress, track sleep duration, movement, and sometimes sleep stages. They offer convenience and long-term data but may vary in accuracy and reliability. It's important to consider that these methods have limitations and may not capture the full picture of sleep quality. Consulting with a healthcare professional or sleep specialist can help determine the most appropriate method based on specific needs and concerns.

In general, there have been limited studies conducted on sleep quality, particularly focusing on educated individuals. Therefore, recognizing the significance of sleep quality, particularly among faculty members, the present study aims to examine the sleep quality of faculty members at Isfahan University of Medical Sciences.

Methods and material

Study design

Prospective descriptive-analytic study was conducted at Isfahan University of Medical Sciences from 2020 to 2021. The study involved 106 faculty members from the university. The study protocol was approved by the

Research Committee of Isfahan University of Medical Sciences, and the Ethics Committee has provided confirmation (Ethics code: IR.MUI.MED.REC.1399.942).

Inclusion and exclusion criteria

The inclusion criteria for this study were as follows: being a faculty member in the School of Medicine at Isfahan University of Medical Sciences for at least one year and providing written informed consent to participate in the study. The exclusion criteria included a lack of cooperation in filling out the study forms, improper completion of the forms, and a history of mental health problems.

Sample size calculation

In this study, all faculty members of the Medical School were examined, and the minimum sample size required to achieve the objectives was estimated as follows. A total of 100 samples were evaluated, and this sample size was estimated based on the assumption of the percentage of faculty members with sleep disorders.

$$N = \frac{(Z_{1-a/2})^2 * P(1 - P)}{d^2}$$

Z=1.96 (corresponding to a 95% confidence level); P=0.5 (estimated percentage of faculty members with sleep disorders); d=0.09.

Primary data gathering

The study population consisted of a total of 106 participants, determined based on the sample size calculation formula. Eligible individuals were randomly selected and included in the study based on the specified criteria. A questionnaire was used to collect demographic information, which included age, sex, height, weight, body mass index (BMI), level of education, history of faculty membership, major, working hours during the day and night, residency place, and medical history. Additionally, the Pittsburgh Sleep Quality Index (PSQI) was administered to the entire study population.

Sleep quality measurement

The Pittsburgh Sleep Quality Index (PSQI) is widely recognized as one of the best tools for measuring sleep quality. The questionnaire was initially developed in 1989 by Dr. Boyce and colleagues at the Pittsburgh Institute of Psychiatry. It has since been translated into Persian, and its validity and reliability have been established in previous studies. The PSQI consists of nine sections, with question 5 comprising ten subsections, resulting in a total of 19 items. Each item is scored on a 4-point Likert scale ranging from 0 to 3. Higher scores on the PSQI indicate poorer sleep quality.

The Symptom Checklist-25 (SCL-25) is another assessment tool used in this study. It consists of seven subscales: subjective sleep quality, sleep latency, sleep duration, sleep efficiency (habitual sleep efficiency), sleep disorders (sleep disturbances), use of sleeping medication, and daytime dysfunction. Each subscale is scored from 0 to 3, with the following interpretations: no sleep problem (score 0), moderate sleep problem (score 1), significant sleep problem (score 2), and severe sleep problem (score 3). A total score higher than 5 on the entire questionnaire indicates poor sleep quality.

Statistical analysis

Statistical Package for Social Sciences (SPSS) (version 24, SPSS Inc., Chicago, IL) was employed for data analysis. Quantitative data were reported by mean ± standard deviation while qualitative ones by frequency distribution (percentage). Indenepndent T-test and Chi-Square tests evaluated the quantitative and qualitative variables. Pearson correlation coefficient was used to examine the relationship between quantitative variables, and the Spearman correlation coefficient was used if the data were standard. *P*-value < 0.05 was considered a significance threshold.

Results

Study population

Initially, a total of 110 faculty members participated in the study. However, four candidates were excluded due to incomplete data, resulting in a final sample size of 106 faculty members. The mean age of the participants was 49.21±9.15. Among the study population, there were 62 males (58.5%) and 44 females (41.5%). The participants were divided into two groups: clinicians (84 cases, 79.2%) and basic science faculty members (22 cases, 20.8%). An

Table 1. Comparison of demographic data and sleep disorders in candidates

Variable		Clinicians (n=84)	Basic science (n=22)	P-value
Age		47.9±9.5	50.1±10	0.287*
Age category	< 45	38 (45.2)	8 (36.4)	0.762**
	46-55	26 (31.0)	7 (31.8)	
	56-65	15 (17.9)	6 (27.3)	
	> 66	5 (6.0)	1 (4.5)	
Height		168.7±15.5	170.8±6.7	0.606*
Weight		74.6±13.9	78.4±12.7	0.170*
BMI		28.55±26.65	26.79±3.53	0.142*
Working history		10.7±9	13.5±11	0.371*
Duration of work during day		8.3±2.4	7.8±1.4	0.390*
Duration of work during night		3.1±2.1	2.4±0.8	0.198*
Sex	Male	46 (54.80)	14 (63.60)	0.455**
	Female	38 (45.20)	8 (36.40)	
Past medical history	No	56 (66.70)	17 (77.30)	0.434**
	Diabetes	5 (6.00)	2 (9.10)	
	Hypertension	8 (9.50)	0 (0.00)	
	Other disease	15 (17.90)	3 (13.60)	
Sleep problems	No problem	27 (32.10)	2 (9.10)	0.143**
	Sleep latency	19 (22.60)	7 (31.80)	
	Sleep disturbance	25 (29.80)	8 (36.40)	
	Sleep shortage	3 (3.60)	0 (0.00)	
	Pain during sleep	3 (3.60)	1 (4.50)	
	Bad dreams	6 (7.10)	3 (13.60)	
	snoring	0 (0.00)	1 (4.50)	
	Difficulty waking up	1 (1.20)	0 (0.00)	
Drug usage	No	73 (86.90)	21 (95.50)	0.453**
	Yes	11 (13.10)	1 (4.50)	
Difficulty staying awake during daily activities	No	64 (76.20)	18 (81.80)	0.776**
	Yes	20 (23.80)	4 (18.20)	

BMI: Body mass index, *Independent T-test, **Chi square test.

initial comparison of the data between the two groups revealed no significant differences in terms of age (P=0.287), height (P=0.606), weight (P=0.170), BMI (P=0.172), history of working (P=0.371), duration of work during the day (P=0.390) or night (P=0.198), gender (P=0.455), past medical history (P=0.434), sleep problems (P=0.143), drug history (P=0.453), and difficulty staying awake during daily activities (P=0.776). The detailed data are presented in **Table 1**. Based on the collected data, the most common sleep problems reported by the participants were sleep disturbance (33 cases, 31.1%) and high sleep latency (26 cases, 24.5%).

Sleep quality

PSQI subtypes were investigated among cases. The total score of PSQI was 6.20±3.4. The mean, median, and range of the subtypes are summarized in **Table 2**.

A comparison of PSQI scores and subtypes based on age categories did not show significant differences (P > 0.05 for all) (**Table 2**).

Comparisons of sleep quality

A comparison of the total PSQI score and its subtypes was conducted between the two groups, clinicians and basic science faculty

Table 2. Comparison of different PSQI subtypes based on age categories

PSQI subtype	< 45 N=46 Mean (SD) Mdn (IQR)	45-55 N=33 Mean (SD) Mdn (IQR)	56-65 N=21 Mean (SD) Mdn (IQR)	> 66 N=6 Mean (SD) Mdn (IQR)	Total scores Mean (SD)	P value*
Subjective sleep quality	1.15 (0.79) 1 (1)	0.71 (1.00) 1 (1)	0.95 (0.67) 1 (1)	1.17 (0.41) 0	1.07 (0.72)	0.681
Sleep latency	1.24 (1.32) 1 (2)	1.22 (0.00) 0	1.10 (1.00) 1 (1)	1.50 (0.84) 0	1.13 (1.20)	0.429
Sleep duration	1.41 (0.65) 0	0.61 (2.00) 2 (1)	1.76 (0.83) 2 (1)	1.83 (0.98) 1 (2)	1.57 (0.70)	0.152
Habitual sleep efficiency	0.33 (0.73) 0	0.70 (0.00) 0	0.52 (0.87) 0	0.67 (1.03) 0	0.40 (0.76)	0.712
Sleep disturbances	0.89 (0.38) 1 (1)	0.35 (1.00) 1 (1)	1.00 (0.32) 1 (1)	1.17 (0.41) 0	0.94 (0.36)	0.294
Use of sleep medications	0.30 (0.66) 0	1.00 (0.00) 0	0.43 (0.81) 0	0.50 (1.22) 0	0.37 (0.83)	0.814
Daytime dysfunction	0.73 (0.65) 1 (1)	0.67 (1.00) 1 (1)	0.43 (0.60) 0	0.83 (0.75) 1 (1)	0.68 (0.66)	0.256
Total PSQI score	6.13 (3.47) 5 (3)	3.48 (5.00) 5 (2)	6.19 (3.49) 4 (5)	7.67 (3.27) 5 (6)	6.20 (3.44)	0.644

*Chi square test.

Table 3. Comparison of PSQI between two groups

PSQI subtype	Clinicians (n=84)	Basic science (n=22)	P-value**
Subjective sleep quality	0.99±0.67*	1.36±0.85	0.088
Sleep latency	1.01±1.23	1.77±1.31	0.024
Sleep duration	1.55±0.67	1.64±0.85	0.183
Habitual sleep efficiency	0.35±0.72	0.59±0.91	0.285
Sleep disturbances	0.89±0.35	1.14±0.35	0.012
Use of sleep medications	0.32±0.76	0.55±1.06	0.391
Daytime dysfunction	0.64±0.69	0.82±0.5	0.022
Total PSQI score	5.76±3.14	7.86±4.06	0.044

*mean ± standard deviation, **Independent T-test.

members. The findings revealed that clinicians had significantly lower scores in total PSQI (P=0.044), sleep latency (P=0.024), sleep disturbances (P=0.012), and daytime dysfunction (P=0.022), as presented in **Table 3**.

Table 4 presents the different subtypes of PSQI and the intensity of the problems in the two groups. It was observed that clinicians had lower severity of sleep latency (P=0.024), sleep disturbance (P=0.012), and total PSQI score (P=0.044). On the other hand, clinicians had a higher intensity of daytime dysfunction (P=0.022).

The SCL25 questionnaire was also evaluated among the participants, and it was found that clinicians had significantly lower total SCL25 scores (P=0.006), lower scores in somatization (P=0.014), lower scores in obsessive-compulsive (P=0.004), lower scores in paranoid thoughts (P=0.087), and lower scores in psychosis (P=0.003), as shown in **Table 5**.

Discussion

In this study, a total of 106 faculty members were included, and they were divided into two groups: clinicians and basic science faculty members. The analysis of the collected data indicated no significant differences between the two groups in terms of working hours and time. However, notable findings emerged from the comparison between the groups. Clinicians exhibited significantly lower scores in various aspects, including total PSQI scores, sleep

Table 4. Comparison of different PSQI subtype severities in patients

PSQI subtype	Intensity	Clinicians (n=84)	Basic science (n=22)	P-value
Subjective sleep quality	No	18 (21.40)	3 (13.60)	0.088
	Medium	50 (59.50)	10 (45.50)	
	Serious	15 (17.90)	7 (31.80)	
	Very serious	1 (1.20)	2 (9.10)	
	mean	0.99±0.67	1.36±0.85	
Sleep latency	No	43 (51.20)	4 (18.20)	0.024
	Medium	14 (16.70)	7 (31.80)	
	Serious	12 (14.30)	3 (13.60)	
	Very serious	13 (17.80)	6 (36.40)	
	mean	1.01±1.23	1.77±1.31	
Sleep duration	No	0 (0.00)	1 (4.50)	0.183
	Medium	46 (54.80)	10 (45.50)	
	Serious	30 (35.70)	7 (31.80)	
	Very serious	8 (9.50)	4 (18.20)	
	mean	1.55±0.67	1.64±0.85	
Habitual sleep efficiency	No	66 (78.60)	14 (63.60)	0.285
	Medium	8 (9.50)	4 (18.20)	
	Serious	9 (10.70)	3 (13.60)	
	Very serious	1 (1.20)	1 (4.50)	
	mean	0.35±0.72	0.59±0.91	
Sleep disturbances	No	10 (11.90)	0 (0.00)	0.012
	Medium	73 (86.90)	19 (86.40)	
	Serious	1 (1.20)	3 (13.60)	
	Very serious	0.89±0.35	1.14±0.35	
Use of sleep medications	mean	68 (81.00)	16 (72.70)	0.391
	No	9 (10.70)	3 (13.60)	
	Medium	3 (3.60)	0 (0.00)	
	Serious	4 (4.80)	3 (13.60)	
	Very serious	0.32±0.76	0.55±1.06	
Daytime dysfunction	mean	40 (48.20)	5 (22.70)	0.022
	No	33 (39.80)	16 (72.70)	
	Medium	10 (12.00)	1 (4.50)	
	Serious	0.64±0.69	0.82±0.5	
Total PSQI score	< 5	47 (56)	7 (31.8)	0.044
	> 5	37 (44)	15 (68.2)	
	mean	5.76±3.14	7.86±4.06	

the basic science faculty members group.

In general, It was detected that the faculty members had high rates of sleep disorders and poor sleep quality according to PSQI and SCL25 questionnaires. The two most common sleep disorders in the study cases were sleep disturbance and high latency. Previous studies have shown the prevalence of different sleep disorders among clinicians and healthcare workers, but few have compared these data to other faculty members without clinical duties. In a recent study conducted by Marvaldi et al. in 2021, the sleep quality and sleep disorders of healthcare workers were evaluated. The study included a total of 70 studies with 101,017 participants. The findings revealed that healthcare professionals who had long working hours and night shifts were particularly susceptible to sleep disorders, particularly sleep disturbance [22]. Another study by San Martin et al., which focused on sleep disorders during the COVID-19 pandemic, examined 170 participants working in hospitals. The results showed that a PSQI score greater than 6, indicating poor sleep quality, was more prevalent among healthcare workers compared to other hospital staff [23]. These findings are consistent with previous studies that have reported similar results [24]. The results of these studies align with the findings of the present study, highlighting the significance of sleep disorders among healthcare professionals, including clinicians. It emphasizes the need for attention and intervention to address sleep-related issues in this population.

latency, sleep disturbances, daytime dysfunction, total SCL25 score, somatization, obsessive-compulsive symptoms, paranoid thoughts, and psychosis. Conversely, clinicians showed higher intensity in daytime dysfunction compared to basic science faculty members. These results suggest that clinicians experienced better sleep quality and lower rates of sleep disturbance compared to their counterparts in

Table 5. Comparison of SCL25 questionnaire among cases

SCL25 subtype	Clinicians (n=84)	Basic science (n=22)	P-value*
Somatization	8.5±3.22	10.64±5.14	0.014
Obsessive compulsive	4.81±1.9	6.14±2.17	0.004
INT	5.11±2.07	5.68±2.17	0.216
Depression	3.42±1.35	4.23±2.16	0.125
Anxiety	4.6±2.28	4.59±2.24	0.772
Morbid fear	3.95±1.42	4.73±2.49	0.179
Paranoia	1.35±0.83	1.59±0.96	0.087
Psychosis	3.44±0.99	5.27±2.99	0.003
ADI	1.14±0.44	1.55±1.14	0.099
Total SCL25 score	36.31±10.94	44.41±17.52	0.006

*Indeneependent T-test.

An essential point of this study was comparing the sleep quality of clinicians with other faculty members with no clinical profession. Our data demonstrated that faculty members with basic science professions had significantly higher frequencies of sleep disorders and worse sleep qualities than clinicians. In 2018, Korkmaz and colleagues conducted a study on 140 healthcare workers and showed that cases with high anxiety levels had significantly higher frequencies of sleep disorders. It was mentioned that professionals with no clinical tasks were also vulnerable to increased stress and, therefore, had higher frequencies of sleep disorders [25]. Another study by Nena and others stated that shift work impairs quality of life.

On the other hand, factors such as the duration of employment, frequency of work, age, and family status can have negative impacts on sleep quality [26]. Wang et al. conducted a study during the COVID-19 outbreak, specifically focusing on pediatric healthcare workers. Their findings revealed a high prevalence of sleep disturbance among these workers. Additionally, sleep disturbance was independently associated with being an only child, exposure to COVID-19 patients, and depression. The study also highlighted that healthcare workers in clinics and other sections, including laboratories, experienced higher rates of sleep latency, sleep disturbances, and daytime dysfunction [26]. These findings are consistent with the results obtained in the present study, further supporting the notion that sleep disorders and related symptoms are common among healthcare professionals, including clini-

cians. The study's results highlight the importance of addressing these issues and implementing interventions to improve sleep quality in this population.

In addition, it was observed that both clinicians and non-clinicians suffer from poor sleep quality, with higher frequencies among basic science faculty members. This could be due to much higher attention and various recommendations and programs that aim at the sleep quality of clinicians. Therefore, faculty members who have clinical duties might be aware of sleep quality and care. On the other hand, stress management recommendations and consoling are aimed primarily at the clinicians. Healthcare professionals who deal with basic science are more vulnerable to extensive stress. These data could justify the higher prevalence of sleep disorders among basic science faculty members.

The limitations of this study were limited study population and conducting this study in a single center. It is recommended that further multicentric studies be conducted in this regard.

Conclusion

The sleep quality of faculty members at Isfahan University of Medical Sciences was investigated in a study that employed the PSQI and SCL25 questionnaires, along with a separate questionnaire gathering data on various factors. The study included both clinicians and basic science faculty members and revealed a high prevalence of sleep disorders among faculty members, with sleep disturbance and high sleep latency being the most common issues. Interestingly, sleep disorders were found to be more prevalent in basic science faculty members compared to clinicians. Future studies could expand the research to include residents, students, and faculty members from different majors to further assess sleep quality and compare the results across groups. These findings emphasize the importance of addressing sleep disorders among faculty members and suggest the need for educational programs to improve their sleep quality.

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