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Evaluating Sleep Behavior among Pediatric Residents in Tertiary Care Centers across Saudi Arabia

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ABSTRACT

Background: Sleep is crucial for mental and physical health. Healthcare workers, especially in high-stress pediatric tertiary care, frequently experience sleep disturbances due to long workdays and on-call responsibilities. Despite its significant influence on medical professionals and patient safety, empirical research on Saudi Arabian pediatricians is notably lacking.

Objective: The study aimed to evaluate sleep behavior and quality among pediatric residents in tertiary care centers across Saudi Arabia.

Methods: This quantitative cross-sectional study focused on pediatric residents in Saudi Arabian Tertiary Care Centers from August 2024 to December 2025. An **online survey**, utilizing the Pittsburgh Sleep Quality Index (PSQI), assessed participant sleep quality. The survey comprised three sections: Consent for participation, sociodemographics and habits, and the PSQI itself.

Results: A total of 66 Saudi pediatric residents participated, with senior residents constituting 53% of the cohort. The findings indicated a substantial prevalence of poor sleep quality, observed in 78.8% of respondents. No statistically significant association was identified between PSQI scores and Body Mass Index (r=0.1, P=0.1). Furthermore, the prevalence of poor sleep did not demonstrate significant correlations with educational level (P=0.3), gender (P=0.7), marital status (P=0.4), smoking status (P=0.7) and parental status (P=0.5).

Conclusion: There was a high prevalence of poor sleep quality among pediatric residents in this study, which can influence their performance in work and lead to suboptimal care provided to the patients. However, we couldn't determine any factor that influenced sleep quality, which may indicate the incorporation of other factors affecting the sleep quality.

Keywords: Sleep quality, Pediatric, Residents, Prevalence, Factors.

INTRODUCTION

Sleep is an essential physiological function that has a critical role in the maintenance of overall health and well-being [1]. High and adequate sleep quality is vital for emotional stability, cognitive function, physical recovery, and the immune system [2]. Good quality and adequate sleep are associated with good health and quality of life among the population [3]. Sleep quality is important in well-being and health. However, there is no widely accepted description of this term. Several indicators were considered for good sleep quality, including sleep efficiency, latency, non-rapid eye movement, sleep ratios, arousals, naps, and awakenings [4]. Poor sleep quality affects clinical performance and cognition adversely [5]. Prolonged poor sleep was found to be linked with significant elevation of physical health issues such as obesity, diabetes, hypertension, and impaired lipid profile [6, 7].

Healthcare personnel are one of the vulnerable categories that experience inadequate sleep due to their professional duties to patients [8]. Residency work hours have gained attention globally during the past decades due to the mention that there is a linkage between long working hours and sleep deprivation with medical errors, attention issues, adverse events, and resident burnout [9]. Resident sleepiness is associated with elevated self-reported medical errors [10].

The importance of attention to residents is related to the fact that the residency program is a stressful and challenging time [9]. Also, fewer sleeping hours are linked with falling asleep unintentionally at work among residents [11]. Poor sleep quality among residents has been reported in previous research but with no focus on pediatric residents. One study revealed that 17.4% of trainees started residency with poor baseline sleep quality [12]. Other studies from India and Mexico reported higher rates of poor sleep quality, with rates of 39.3% and 63.8% respectively among residents [13, 14]. In a previous Saudi study that enrolled 1205 residents, it was found that the majority of the participants (86.3%) had poor sleep quality [15]. However, there was no focus on pediatric residents. Sleep quality can be estimated by the Pittsburgh Sleep Quality Index (PSQI) questionnaire, which is a validated survey [16]. Therefore, this study was established to assess sleep quality through a PSQI survey of pediatric residents in tertiary care centers across Saudi Arabia.

SUBJECTS AND METHODS

Design and subjects: This quantitative analytical cross-sectional work was conducted on pediatric residents from Tertiary Care Centers across Saudi Arabia. The study was conducted through the period from August 2024 to December 2024.

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Tool and method: The Pittsburgh Sleep Quality Index (PSQI) questionnaire was used to assess the sleep quality of the participants. The eligible residents were invited to fill out an online survey distributed as a Google form and reviewed by certified pediatric pulmonologists before its usage in the study. The survey involved consent being provided before filling out the survey. The survey included three parts: The first was the consent for participation in the research, the second investigated the socio-demographics and some habits of the participants, and the third section was the PSQI to assess the sleep quality of the subjects. Ethical approval was obtained from the research ethics committee unit.

Ethical approval:

The study was approved by the Ethics Board of King Fahad Armed Forces Hospital, and an informed written consent was taken from each participant or their parents in the study. This work has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

Statistical analysis:

The software SPSS version 26 (IBM Corp, Armonk, NY) was adopted to analyze the data retrieved from the surveys. Qualitative and quantitative variables were represented as a number (%) and mean ± SD respectively. The Chi-square test (χ^2) was applied to test the relationship between variables. Significance was set at $p \leq 0.05$.

RESULTS

A total of 66 residents participated in the study; 35 (53%) were senior, whereas 31 (47%) were junior. Most of the subjects, 53 (80.3%), were from the Western region, and all subjects were Saudi. More than one-half of the subjects were females 40 (60.6%) and singles 43 (65.2%) and only 12 (18.2%) reported having kids (Table 1).

Table (1): Socio-demographic characteristics

Variables		n	%
Education level	Junior resident	31	47.0%
	Senior resident	35	53.0%
From which region?	Central Region	5	7.6%
	Eastern Region	6	9.1%
	Southern Region	2	3.0%
	Western Region	53	80.3%
Nationality ة	Saudi	66	100.0%
Gender	Female	40	60.6%
	Male	26	39.4%
Marital status -	Married	23	34.8%
	Single	43	65.2%
Do you have kids	No	54	81.8%
	Yes	12	18.2%

The largest proportion of the participants was overweight 27 (40.9%), followed by those with normal BMI 24 (36.4%). The mean BMI was 24.56 ± 4.7 kg/m^2. The mean weight and height of the subjects was 67.5 ± 18.5 Kg and 164.5 ± 9.2 cm respectively (Table 2).

Table (2): BMI of study group and weight, height of study group

Variables		Frequency	Percent
BMI (kg/m^2)	Underweight	9	13.6
	normal	24	36.4
	overweight	27	40.9
	obese	6	9.1
	Mean ± SD	24.56 ± 4.7	
Weight (kg)	Mean ± SD	67.5 ± 18.5	
Height (cm)	Mean ± SD	164.5 ± 9.2	

The habits and work conditions of our residents are shown in table (3). The large majority were non-smokers 60 (90.9%) and the largest proportion 27 (40.9%) reported drinking of only one cup of caffeinated drinks per day. The largest proportions reported 15-30 minutes to arrive to hospital 32 (48.5%), and home 28 (42.4%). The average calls per month reported by more than one-half of the subjects 37 (56.1%) were five calls.

Table (3): Habits and work conditions

Variables		Count	%
Smoker	No	60	90.9%
	Yes	6	9.1%
How many cups of caffeinated drinks do you drink per day?	1 only	27	40.9%
	2 only	24	36.4%
	3 or more	10	15.2%
	None	5	7.6%
Time taken to arrive at hospital	Between 15-30 minutes	32	48.5%
	Between 30-45 minutes	11	16.7%
	Less than 15 minutes	14	21.2%
	More than 45 minutes	9	13.6%
Time to take to arrive at home	Less than 15 minutes	11	16.7%
	Between 15-30 minutes	28	42.4%
	Between 30-45 minutes	16	24.2%
	More than 45 minutes	11	16.7%
How many on-calls per month (average)	4 or less	8	12.1%
	5	37	56.1%
	6	19	28.8%
	7	2	3.0%

The PSQI scale included seven components; the questions of the PSQI scale and the answers of the participants are shown in table 4.

Table (4): PSQI scale description among the study group

	First choice		Second choice		Third choice		Fourth choice	
	n	%	n	%	n	%	n	%
Component 1 (Subjective sleep quality) & 10	13	19.7%	35	53.0%	14	21.2%	4	6.1%
Component 2 (Sleep latency)	12	18.2%	24	36.4%	15	22.7%	15	22.7%
Component 3 (Sleep duration)	2	3.0%	33	50.0%	12	18.2%	19	28.8%
Component 4 Habitual sleep efficiency	38	57.6%	11	16.7%	10	15.2%	7	10.6%
Component 5 (Sleep disturbances)	3	4.5%	45	68.2%	15	22.7%	3	4.5%
Component 6 (Use of sleeping medication)	46	69.7%	9	13.6%	5	7.6%	6	9.1%
Component 7 (Daytime dysfunction)	11	16.7%	21	31.8%	21	31.8%	13	19.7%

The prevalence of poor sleep quality was 52 (78.8%) with a mean score of 8.5 ± 3.9 and a range scores of 3-20 (Table 5).

Table (5): Prevalence of sleep problems among the study group

		n	%
PSQI	No	14	21.2
	yes	**52**	**78.8**
	Mean± SD	8.5± 3.9	
	range	3-20	

The investigation of the correlation between sleep score revealed no significant correlation with any of weight (P=0.2), height (P=0.1), or BMI levels (P=0.1) (Table 6).

Table (6): Correlation of sleep score with weight, height & BMI

			PSQI score
	Weight (in Kg)-1	r	.148
		P	.236
	Height (in cm)-1	r	.174
		P	.163
	BMI levels	r	.162
		P	.194

Sleep quality wasn't correlated with any of the demographics, including education (P=0.3), region (P=0.7), gender (P=0.7), marital status (P=0.4) or having kids (P=0.5).

Table (7): Relation of poor sleep quality with socio-demographic

		Sleep Quality				
		Optimal		poor		
		n	%	n	%	P value
Education level	Junior resident	8	25.8%	23	74.2%	0.39
	Senior resident	6	17.1%	29	82.9%	
From which region?	Central Region	1	20.0%	4	80.0%	0.78
	Eastern Region	1	16.7%	5	83.3%	
	Southern region	1	50.0%	1	50.0%	
	Western Region	11	20.8%	42	79.2%	
Gender	Female	9	22.5%	31	77.5%	0.75
	Male	5	19.2%	21	80.8%	
Marital status	Married	6	26.1%	17	73.9%	0.47
	Single	8	18.6%	35	81.4%	
Do you have kids	No	11	20.4%	43	79.6%	0.59
	Yes	3	25.0%	9	75.0%	

Table (8) showed the relation between sleep quality and habits of subjects. There was no significant relation found between sleep quality and any smoking status (P=0.7), frequency of caffeinated drinks (P=0.2), time to arrive at the hospital (P=0.7), or home (P=0.3), or frequency of calls per month (P=0.5).

Table (8): Relation according to habits and work conditions

		Sleep Quality				
		Optimal		poor		
		n	%	n	%	P value
Smoker -	No	13	21.7%	47	78.3%	0.775
	Yes	1	16.7%	5	83.3%	
How many cups of caffeinated drinks do you drink per day? -	1 only	5	18.5%	22	81.5%	0.223
	2 only	8	33.3%	16	66.7%	
	3 or more	1	10.0%	9	90.0%	
	None	0	0.0%	5	100.0%	
Time taken to arrive at hospital	Between 15-30 minutes	7	21.9%	25	78.1%	0.78
	Between 30-45 minutes	2	18.2%	9	81.8%	
	Less than 15 minutes	4	28.6%	10	71.4%	
	More than 45 minutes	1	11.1%	8	88.9%	
Time taken to arrive at home	Between 15-30 minutes	7	25.0%	21	75.0%	0.32
	Between 30-45 minutes	2	12.5%	14	87.5%	
	Less than 15 minutes	4	36.4%	7	63.6%	
	More than 45 minutes	1	9.1%	10	90.9%	
How many on-calls per month (average) -	4 or less	2	25.0%	6	75.0%	0.59
	5	6	16.2%	31	83.8%	
	6	5	26.3%	14	73.7%	
	7	1	50.0%	1	50.0%	

DISCUSSION

Sleep is required for the proper functioning of several physiological and psychological mechanisms [17]. Poor sleep quality can negatively and directly influence memory and cognitive functions. Furthermore, it can result in mood changes and an inability to focus for a long time at work [18]. However, based on our knowledge, there was no previous study concerned with sleep quality among pediatric residents in Saudi Arabia. Hence, this study was established to evaluate sleep behavior and quality among pediatric residents in tertiary care centers across Saudi Arabia.

Our study enrolled Saudi pediatric residents only. We found that poor sleep quality was highly prevalent, as most of the residents reported poor sleep (78.8%). However, a higher prevalence of poor sleep was reported in a previous Saudi study, which enrolled 1205 residents of different specialties, and it reported poor sleep among 86.3% based on the PSQI survey. Regarding pediatric residents, the large majority of them had poor sleep, whereas only 7.3% had optimal sleep [15]. However, our study reported better sleep among a higher proportion (21.2%) of pediatricians compared to the previous Saudi study [15]. Furthermore, a higher prevalence was reported in a previous Saudi study from Riyadh that included 518 healthcare providers and declared that 55.2% had sleep disorders and 85.9% had poor sleep [19]. Similar findings to ours were reported based on the PSQI from a study from Syria that revealed that 79.5% of 514 resident physicians had poor sleep [20]. In Egypt, the assessment of sleep quality using PSQI among 150 residents revealed a higher prevalence of poor sleep among 96.7% of the residents [21]. Better findings compared to ours were reported from Pakistan, where a study enrolled 334 junior physicians assessed sleep quality using PSQI and revealed that 36.8% had poor sleep [22]. A study from Spain that enrolled primary care physicians and adopted PSQI demonstrated that 35% of the subjects had poor sleep, with a higher prevalence among females (23%) compared to males (9.6%) [23]. However, gender had no influence on sleep, as we discovered in this research.

Various factors have been investigated to determine if they are related to poor sleep among healthcare professionals, including age, gender, and marital status [15, 24]. Other investigated occupational factors included on-call scheduling and professional experience [24, 25]. Our work revealed that none of the investigated factors was associated with sleep quality. One Saudi study from Jeddah revealed that females displayed poorer sleep quality compared to males [1], and such findings were in contrast to ours as we found no association between gender and sleep quality. On the other hand, obesity, smoking, and marital statuses displayed no association with sleep quality [1], and such findings are in agreement with ours.

Based on a previous Saudi study that included family medicine residents, sleep quality was influenced by residency level, and those in the first and second

residency levels displayed poorer sleep compared to those in the third and fourth residency levels [26]. Nonetheless, in this research, both junior and senior residents displayed similar sleep quality with no significant variations. In Pakistan, poor sleep was associated with female gender, lower overall sleep time, and increased rate of sleep disturbance [22]. Such findings were in contrast to ours as we found no association between sleep quality and any of the previous variables.

Poor sleep can contribute to weight gain and other illness that can be alarming among the healthcare personnel [27]. However, this work showed that there was no correlation between the mean score of sleep quality and weight or BMI.

On-call work often involves both night–time duties and long working hours, as well as intense workplace, rapid decision-making, and managing patients with life-threatening or severe conditions [28]. The largest proportion, which represented more than one-half of the sample, reported a mean frequency of five on-calls per month. It was stated that 70% of hospital physicians have on-call duties in addition to their regular working hours [2, 31]. Previous reports demonstrated that the majority of physicians had at least four on-call shifts per month [30, 32, 33]. On-call work has been discovered to be associated with self-reported adverse outcomes, including sleeping issues [32, 34]. However, we found no considerable influence on the frequency of on-calls per month and sleep quality.

It was also demonstrated that sleep quality can be influenced by lifestyle factors such as active smoking [35, 36]. Nonetheless, our work showed no influence of smoking status, or the frequency of caffeinated drinks on the sleep quality of the residents. In contrast to our findings, a previous Saudi research concerned with residents, declared that poor sleeping quality stage two was associated with age, working shifts and on-call cases [15].

CONCLUSION

There was a high prevalence of poor sleep quality among pediatric residents in this study that represents an alarm as poor sleep quality affects the performance of residents. However, we couldn't determine any factor that influenced sleep quality, which necessitate further investigation of the possible determinant factors.

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