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Sleep patterns and problems among adults in Saudi Arabia: A cross-sectional survey-based study

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ABSTRACT

Background: Sleep quality is crucial for maintaining physical and mental health, but cultural, social, and economic factors can affect it. Research on sleep quality in Saudi Arabia has yielded mixed results and focused on specific populations. *Methods:* This cross-sectional survey-based study aimed to investigate sleep patterns and problems among adults in Saudi Arabia, recruiting 2,262 participants online. *Results:* Most participants were young adults aged 18-29 years (56.4%), with 37.5% reporting sleep problems. Participants' sleep patterns differed significantly between workdays and rest days. On workdays, 57.2% of participants went to bed between 10 PM and midnight, whereas on rest days, 53% went to bed after 1 AM. The average sleep duration was 7.1 hours on workdays and 8.9 hours on rest days. Rotating shift workers were 1.5 times more likely to experience sleep problems than those working traditional hours (P = 0.03). Participants with a monthly income exceeding 14,000 SAR demonstrated a 0.7 times lower likelihood of experiencing sleep problems compared to those with an income below 4,000 SAR (P = 0.01). *Conclusion:* This study provides insights into the prevalence and factors associated with sleep problems in the Saudi Arabian population. The results suggest a high prevalence of sleep problems and a low use of professional help or medication to manage them. The findings of this study emphasize the influence of socioeconomic status and work schedules on sleep patterns. Specifically, rotating shift work and lower income levels were found to be correlated with a higher prevalence of sleep problems.

Keywords: Sleep patterns, sleep problems, adults, Saudi Arabia, sleep duration, naps, cross-sectional survey

1. INTRODUCTION

Background

Sleep is a fundamental biological process that is essential for maintaining physical and mental health. Poor sleep quality has been linked to a range of

negative health outcomes, including increased risk of cardiovascular disease, diabetes, depression, and anxiety. Globally, there has been an increase in sleep disorders, and many studies have explored sleep quality and its associated factors (Kronholm et al., 2006; Kronholm et al., 2008; Stranges et al., 2012). In Saudi Arabia, sleep disorders are a major public health concern, affecting a considerable portion of the population. Cultural, social, and economic factors may impact sleep quality in Saudi Arabia, such as the requirement for Muslims to perform five daily prayers, which can disrupt sleep patterns, particularly during early morning hours (Bahammam et al., 2012).

Moreover, traditional siesta or afternoon napping may impact nighttime sleep duration and quality, particularly among older adults (Tumiran et al., 2018). Additionally, the prevalence of shift work and long working hours in certain industries may contribute to sleep disturbances and fatigue. Despite this, existing research on sleep quality in Saudi Arabia has yielded mixed results, and there are still many unanswered questions regarding the prevalence, risk factors, and consequences of poor sleep in this population (Ahmed et al., 2017; Alamer et al., 2022). Another gap in the existing research is the limited focus on the sleep habits and patterns of the general population. Most studies have concentrated on specific populations, such as patients with chronic diseases or healthcare workers (Al-Jahdali et al., 2010; Alamer et al., 2022; Alenizi et al., 2023; Olawale et al., 2017).

To address these gaps and limitations, a cross-sectional survey was conducted on sleep quality in Saudi Arabia. The study involved collecting data from a large, diverse sample of individuals across the country. The study also aimed to identify potential targets for intervention and inform public health policies that promote healthy sleep habits and behaviors. Overall, the findings of this study may contribute to the development of effective strategies to address the growing public health issue of sleep disorders in Saudi Arabia.

2. METHODS

Study Design and Setting

This study was a cross-sectional survey-based study that aimed to investigate sleep patterns and problems among adults in a specific population. The study was conducted online, and participants were adults aged 18 years or older who resided in Saudi Arabia. This study was approved by the Institutional Review Board at King Abdulaziz University (Reference No 575-22)

Study Aims and Objectives

The main aims of this study were to explore sleep habits, problems, and related factors among adults in a specific population and to evaluate the differences and associations between demographic variables and sleep outcomes.

Sample Size and Recruitment

The required sample size was estimated using a sample size calculator based on a 95% confidence level, a total population size of 35,361,026, a margin of error of ±5%, and an assumed prevalence of 50%. The required minimum sample size was determined to be 385. The survey was shared on various social media platforms, including Facebook, WhatsApp, and Twitter. Participants who expressed interest in the study were directed to an online survey platform where they could complete the survey.

Survey Instrument

The survey instrument used in this study was a self-developed questionnaire comprising two sections: A demographic questionnaire and a sleep questionnaire. The demographic section collected data on the participants' age group, gender, marital status, educational level, nationality, place of residence, work status, working schedule, and monthly income. The sleep questionnaire consisted of ten questions that asked about the participants' usual bedtime and wake-up times on workdays and non-workdays. The questionnaire also inquired about any difficulty sleeping and whether participants had ever reported it to a healthcare professional. Additionally, the participants were asked about their daytime sleepiness and medication usage to aid sleep. The questionnaire also included questions on napping, including its duration.

Data Collection Procedures

The survey was conducted between January 1, 2023, and February 28, 2023. The survey was available only in an online format. Participants were informed that their responses would be kept confidential and that their personal information would be used only for the purpose of the study. To ensure data quality, we used several strategies, including a pilot test of the survey questions, periodic checks of the survey responses, and data cleaning procedures to identify and remove incomplete or inconsistent responses.

Data Analysis

Descriptive statistics were used to summarize the demographic characteristics and sleep-related variables of the study sample. Frequency tables and percentages were used to present categorical data, while means were used to summarize continuous data. Chi-square tests were used to examine the association between categorical variables, and the Mann–Whitney U and Kruskal–Wallis H tests were used to compare means between different groups. All statistical analyses were conducted using the statistical software SPSS version 27. A *P* value less than 0.05 was considered statistically significant.

3. RESULTS

Demographic Characteristics

The study included 2,262 participants, of whom 950 (42.0%) were men and 1312 (58.0%) were women. Most participants were young adults between 18-29 years of age (56.4%), while the least represented age group was ≥50 years (9.6%). Single individuals accounted for more than half (54.8%) of the study population and the majority had a diploma or bachelor's degree (72.7%). Moreover, 93.3% of the participants were citizens, and the Western province had the highest representation (34.0%) among the regions. Regarding work and employment, most participants were either student (40.2%) or held full-time jobs (34.2%). The most common working schedule was traditional hours (67.1%). In terms of monthly income, 46.5% of the participants earned less than 4,000 SAR, while 33.7% earned between 4,000 and 14,000 SAR (Table 1).

Table 1 Demographic Characteristics of the Study Population

Variable		n	(%)
Age Groups (years)	18-29	1276	(56.4)
	30-39	410	(18.1)
	40-49	358	(15.8)
	≥50	218	(9.6)
Gender	Male	950	(42.0)
	Female	1312	(58.0)
Marital Status	Single	1240	(54.8)
	Married	947	(41.9)
	Divorced	57	(2.5)
	Widowed	18	(0.8)
Educational Level	Below High School	38	(1.7)
	High School Diploma	405	(17.9)
	Diploma or Bachelor	1830	(72.7)
	Masters or PhD	175	(7.7)
Nationality	Citizen	2111	(93.3)
	Resident	151	(6.7)
Region	Central Province	496	(21.9)
	Eastern Province	384	(17.0)
	Northern Province	239	(10.6)
	Southern Province	373	(16.5)
	Western Province	770	(34.0)
Work Status	Full-Time Job	774	(34.2)
	Part-Time Job	102	(4.5)
	Student	909	(40.2)
	Retired	119	(5.3)
	Unemployed	358	(15.8)
Working Schedule	Traditional Hours	1518	(67.1)
	Fixed Shift Work	130	(5.7)
	Rotating Shift Work	140	(6.2)
	Not Working or Studying	474	(21.0)

Monthly Income (SAR)	<4,000	1052	(46.5)
	4,000–14,000	763	(33.7)
	>14,000	447	(19.8)

Sleep Habits and Problems

Table 2 summarizes the sleep habits and problems of the study population. On workdays, the majority of participants (57.2%) reported going to bed between 10 PM and midnight, while 31.7% went to bed after midnight. Almost half (51.5%) woke up between 6 AM and 8 AM on workdays. On rest days, slightly over half of the participants (53%) reported going to bed after 1 AM, and 57.7% woke up after 10 AM. The average sleep duration on workdays was 7.1 hours, and on rest days, it was 8.9 hours.

Table 2 Sleep Patterns of Study Population

Variable		n	(%)
Workday Bedtime	Before 10 PM	164	(7.3)
	10 PM – Midnight	1294	(57.2)
	After Midnight	718	(31.7)
	Variable	86	(3.8)
Workday Wake-up Time	Before 6 AM	547	(24.2)
	6 AM – 8 AM	1166	(51.5)
	After 8 AM	482	(21.3)
	Variable	67	(3.0)
Rest Day Bedtime	Before 11 PM	206	(9.1)
	11 PM – 1 AM	795	(35.1)
	After 1 AM	1198	(53.0)
	Variable	63	(2.8)
Rest Day Wake-up Time	Before 8 AM	238	(10.5)
	8 AM – 10 AM	637	(28.2)
	After 10 AM	1306	(57.7)
	Variable	81	(3.6)

Figure 1 summarizes the information on sleep habits and problems of the study population. Of the participants, 37.5% (848) reported having sleep problems, while only 5% (113) sought professional help. A small proportion, 8.3% (188), reported taking sleep medication. Half of the participants (50.2%) reported taking naps, with the majority (30.5%) taking naps for 1-2 hours.

Sleep Duration on Workdays and Rest Days

Table 3 summarizes the variables related to workday and rest day sleep time among participants. Participants aged 18-29 had the lowest workday sleep time (7.1 hours) compared to other age groups while reporting the highest sleep time (9.2 hours) on rest days ($P < 0.01$). No significant gender differences were observed in workday sleep time ($P = 0.52$), but females reported longer sleep time (9.1 hours) than males on rest days ($P < 0.01$). Participants who were single reported the lowest workday sleep time (7.0 hours) and the highest rest day sleep time (9.2 hours) ($P < 0.01$).

Participants who were employed full-time reported the lowest workday sleep time (6.6 hours) and the second-highest rest day sleep time (8.7 hours) ($P < 0.01$). Working schedule was significantly associated with both workday and rest day sleep time, with participants with traditional working hours reporting the lowest workday sleep time (6.7 hours) and the second-highest rest day sleep time (8.9 hours). Monthly income was significantly associated with workday sleep time ($P < 0.01$). Participants earning less than SAR 4,000 reported the highest workday sleep time (7.2 hours), and on rest days, participants earning less than SAR 4,000 reported the highest sleep time (9.0 hours) ($P = 0.01$).

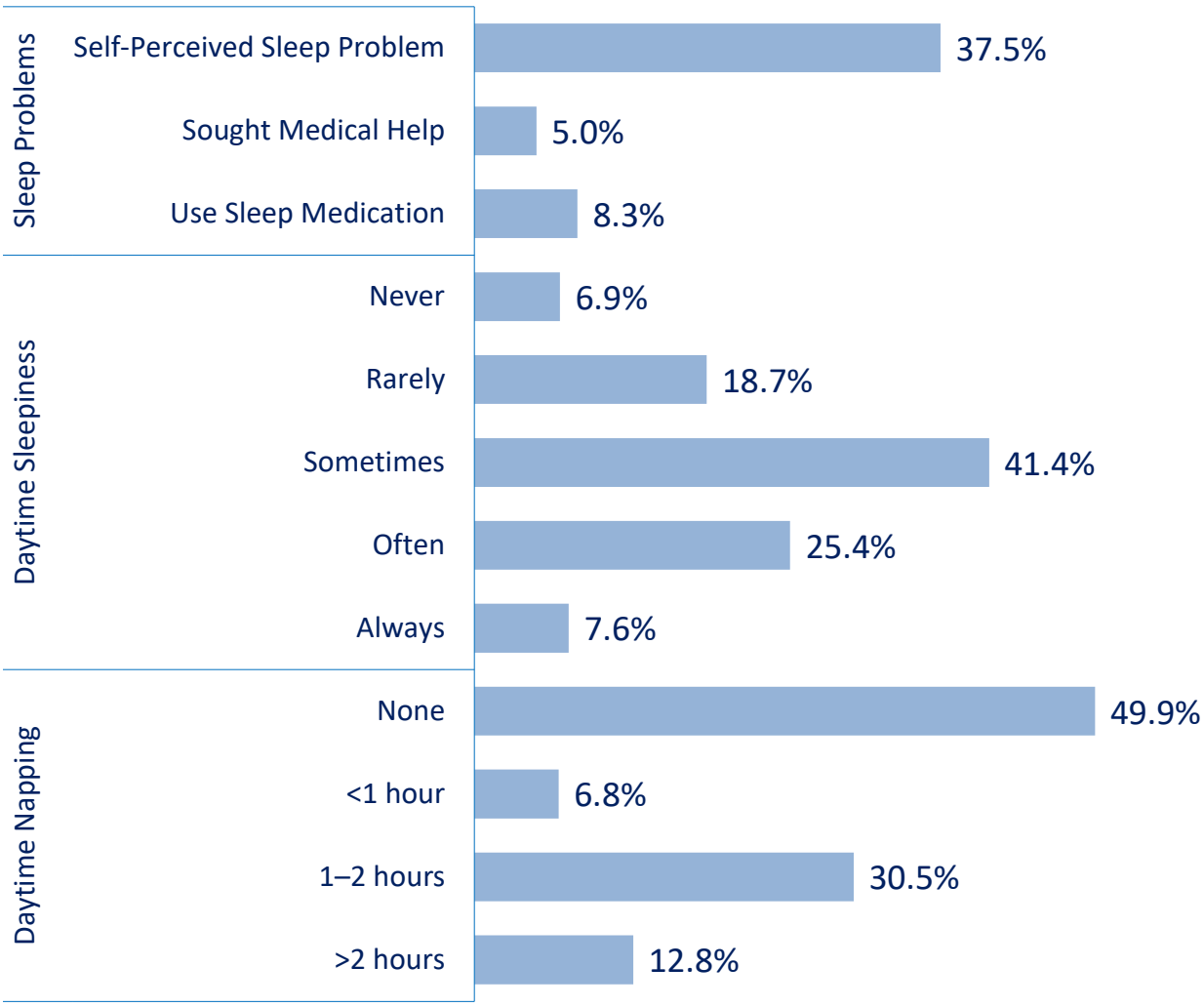

Figure 1 Sleep Habits and Problems of the Study Population

Table 3 Average Sleep Duration by Demographic Characteristics

Variable		Workday Sleep Time (Hours)	*P* value	Rest Day Sleep Time (Hours)	*P* value
Age Groups (years)	18-29	7.1	<0.01	9.2	<0.01
	30-39	7.4		9.1	
	40-49	6.8		8.3	
	≥50	7.4		7.9	
Gender	Male	7.0	0.52	8.6	<0.01
	Female	7.3		9.1	
Marital Status	Single	7.0	0.04	9.2	<0.01
	Married	7.3		8.6	
	Divorced	7.3		8.9	
	Widowed	8.4		7.9	
Educational Level	Below High School	8.1	1.00	8.6	0.39
	High School Diploma	7.1		9.0	
	Diploma or Bachelor	7.2		8.9	
	Masters or PhD	7.1		8.6	
Nationality	Citizen	7.1	0.98	8.9	0.72
	Resident	7.4		8.8	

Region	Central Province	7.3	<0.01	8.8	0.12
	Eastern Province	7.1		8.7	
	Northern Province	7.1		9.1	
	Southern Province	6.8		9.0	
	Western Province	7.2		8.9	
Work Status	Full-Time Job	6.6	<0.01	8.7	<0.01
	Part-Time Job	7.5		8.8	
	Student	6.8		9.1	
	Retired	8.1		8.2	
	Unemployed	8.7		8.9	
Working Schedule	Traditional Hours	6.7	<0.01	8.9	<0.01
	Fixed Shift Work	7.3		8.7	
	Rotating Shift Work	7.5		9.2	
	Not Working or Studying	8.5		8.8	
Monthly Income (SAR)	<4,000	7.2	<0.01	9.0	0.01
	4,000–14,000	7.2		8.9	
	>14,000	6.8		8.6	

Bivariate Analysis of Factors Associated with Sleep Problems

Table 4 presents an overview of the various factors that influence sleep problems and sleep medication use among participants. The results indicate that the prevalence of self-reported sleep problems was highest among participants aged 18-29, with 41.5% of them reporting sleep problems. This was significantly higher compared to other age groups ($P < 0.01$), although there was no significant difference in sleep medication use among different age groups. Marital status was found to be significantly associated with sleep problems, with singles reporting the highest prevalence (42.3%) compared to married, divorced, or widowed participants ($P < 0.01$).

Furthermore, the use of sleep medication was significantly higher among participants with higher educational levels ($P = 0.04$). Income was also found to be significantly associated with both sleep problems and sleep medication use, with participants earning less than SAR 4,000 reporting the highest prevalence of sleep problems (41.6%) and the lowest use of sleep medication (6.7%) ($P < 0.01$).

Table 4 Proportion of Respondents Reporting Sleep Problems by Demographic Characteristics

Variable		Having Sleep Problems		*P* value	Using Sleep Medicines		*P* value
		n	(%)		n	(%)	
Age Groups (years)	18-29	530	(41.5)	<0.01	102	(8.0)	0.67
	30-39	149	(36.3)		40	(9.8)	
	40-49	102	(28.5)		30	(8.4)	
	≥50	67	(30.7)		16	(7.3)	
Gender	Male	339	(35.7)	0.13	76	(8.0)	0.65
	Female	509	(38.8)		112	(8.5)	
Marital Status	Single	524	(42.3)	<0.01	101	(8.1)	0.96
	Married	298	(31.5)		81	(8.6)	
	Divorced	21	(36.8)		5	(8.8)	
	Widowed	5	(27.8)		1	(5.6)	
Educational Level	Below High School	12	(31.6)	0.52	2	(5.3)	0.04
	High School Diploma	144	(35.6)		20	(4.9)	
	Diploma or Bachelor	631	(38.4)		148	(9.0)	
	Masters or PhD	61	(34.9)		18	(10.3)	
Nationality	Citizen	795	(37.7)	0.53	182	(8.6)	0.05
	Resident	53	(35.1)		6	(4.0)	

Region	Central Province	195	(39.3)	0.33	44	(8.9)	0.22
	Eastern Province	147	(38.3)		30	(7.8)	
	Northern Province	83	(34.7)		17	(7.1)	
	Southern Province	125	(33.5)		22	(5.9)	
	Western Province	298	(38.7)		75	(9.7)	
Work Status	Full-Time Job	268	(34.6)	<0.01	76	(9.8)	0.10
	Part-Time Job	37	(36.3)		11	(10.8)	
	Student	380	(41.8)		69	(7.6)	
	Retired	28	(23.5)		12	(10.1)	
	Unemployed	135	(37.7)		20	(5.6)	
Working Schedule	Traditional Hours	561	(37.0)	0.07	131	(8.6)	0.28
	Fixed Shift Work	56	(43.1)		14	(10.8)	
	Rotating Shift Work	64	(45.7)		13	(9.3)	
	Not Working or Studying	167	(35.2)		30	(6.3)	
Monthly Income (SAR)	<4,000	438	(41.6)	<0.01	71	(6.7)	<0.01
	4,000–14,000	283	(37.1)		85	(11.1)	
	>14,000	127	(37.5)		188	(7.2)	

Multivariable Analysis of Factors Associated with Sleep Problems

Table 5 presents the results of a multivariable logistic regression analysis investigating factors associated with sleep problems. The analysis revealed that individuals who worked rotating shift schedules were 1.5 times more likely to experience sleep problems than those working traditional hours (P = 0.03). Moreover, individuals with a monthly income greater than 14,000 SAR were 0.7 times less likely to experience sleep problems than those with an income less than 4,000 SAR (P = 0.01). No other statistically significant associations were observed between sleep problems and age, gender, marital status, work status, or monthly income within the studied population.

Table 5 Multivariable Analysis of Factors Associated with Sleep Problems

Variable		Univariable Analysis		Multivariable Analysis		
		OR	95% CI	OR	95% CI	P value
Age Groups (years)	18-29	Reference Group				
	30-39	0.8 (0.6–1.0)		1.0 (0.7–1.5)		0.84
	40-49	0.6 (0.4–0.7)		0.8 (0.6–1.2)		0.29
	≥50	0.6 (0.5–0.9)		1.2 (0.7–1.9)		0.52
Gender	Male	Reference Group				
	Female	1.1 (1.0–1.4)		1.1 (0.9–1.3)		0.30
Marital Status	Single	Reference Group				
	Married	0.6 (0.5–0.7)		0.7 (0.6–1.0)		0.06
	Divorced	0.8 (0.5–1.4)		0.9 (0.5–1.6)		0.66
	Widowed	0.5 (0.2–1.5)		0.6 (0.2–1.8)		0.38
Work Status	Full-Time Job	Reference Group				
	Part-Time Job	1.1 (0.7–1.7)		0.9 (0.6–1.4)		0.61
	Student	1.4 (1.1–1.7)		1.0 (0.7–1.3)		0.79
	Retired	0.6 (0.4–0.9)		0.5 (0.1–1.0)		0.06
	Unemployed	1.1 (0.9–1.5)		0.8 (0.4–1.7)		0.61
Working Schedule	Traditional Hours	Reference Group				
	Fixed Shift Work	1.3 (0.9–1.9)		1.4 (0.9–2.0)		0.11
	Rotating Shift Work	1.4 (1.0–2.0)		1.5 (1.1–2.2)		0.03
	Not Working or Studying	0.9 (0.7–1.1)		1.2 (0.6–2.4)		0.58
Monthly	<4,000	Reference Group				

Income (SAR)	4,000–14,000	0.8 (0.7–1.1)	0.9 (0.7–1.2)	0.62
	>14,000	0.6 (0.4–0.7)	0.7 (0.5–0.9)	0.01

4. DISCUSSION

The findings of this study emphasize the high prevalence of sleep problems among the Saudi Arabian population. More than one-third of participants reported experiencing sleep problems, and only a small proportion sought professional help or used sleep medication to manage their sleep issues. These results are consistent with previous research indicating that individuals frequently do not seek help for sleep problems, despite their adverse impact on daily functioning and quality of life (Aikens and Rouse, 2005; Hayward et al., 2012). The findings stress the need for interventions to address sleep problems among the Saudi Arabian population, especially given the significant effect of poor sleep on overall health and well-being.

Our study also found that young adults had the lowest sleep time on workdays compared to other age groups. This is consistent with previous research that suggests that younger adults may have more demanding schedules, such as work, school, and social activities that may interfere with their sleep patterns (Gaultney, 2010; Lund et al., 2010). Additionally, our study revealed that females reported longer sleep times on rest days than males, which may be attributed to differences in biological, social, and cultural factors that influence sleep patterns between genders (Su et al., 2022).

Furthermore, our study found that a considerable number of participants reported taking naps, with the majority taking naps for 1-2 hours. Napping has been found to improve daytime functioning and overall sleep quality (Brooks and Lack, 2006; Faraut et al., 2015; Lovato and Lack, 2010), and it is a culturally acceptable practice in many Middle Eastern countries, including Saudi Arabia (Tumiran et al., 2018).

The findings of our study also indicated that employees who work in rotating shifts have a higher chance of experiencing sleep problems than those working traditional hours. This outcome is in agreement with previous research that has established a correlation between rotating shift work and disrupted sleep patterns, leading to increased risks of sleep problems (Fekedulegn et al., 2016; Vallieres et al., 2014; Waage et al., 2014). These results indicate the importance of prioritizing the sleep and well-being of employees, particularly for jobs that involve rotating shift work. By creating work schedules that emphasize the sleep and well-being of employees, employers can enhance their overall health outcomes, work performance, and quality of life (Hafner et al., 2017; Pilcher and Morris, 2020).

The finding of our study showed that individuals with higher income were less likely to experience sleep problems is an important observation that highlights the influence of socioeconomic status on sleep. This finding is consistent with previous research linking lower socioeconomic status to a higher risk of sleep problems (Chen et al., 2020; Patel et al., 2010). The higher prevalence of sleep problems among individuals with lower incomes may be because of a lack of access to resources that promote healthy sleep, such as comfortable sleeping environments, relaxation techniques, and medical care for underlying health conditions that may affect sleep. Additionally, individuals with lower incomes may have less control over their work schedules, making it more challenging to prioritize sleep and ensure that they get sufficient rest.

Our study has several notable strengths. First, the large sample size enabled us to obtain a comprehensive understanding of sleep patterns and problems among the Saudi Arabian population. Moreover, our study provides valuable insights into potential factors contributing to sleep problems, such as rotating shift work and income level, which have been largely unexplored in this population. However, our study is not without limitations that need to be considered when interpreting the findings. First, the cross-sectional design used in our study precludes establishing causality between the studied variables.

Furthermore, self-reported data were used to collect information, which is subject to recall bias and social desirability bias, potentially leading to underestimation or overestimation of sleep patterns and problems. Additionally, we did not evaluate potential confounding factors, such as medical conditions, medication use, or other lifestyle factors, which may have impacted the sleep patterns and problems reported by participants.

5. CONCLUSION

The study provides important insights into the prevalence and factors associated with sleep problems among the Saudi Arabian population. The high prevalence of sleep problems and the low proportion of individuals seeking professional help or using medication to manage their sleep issues underscore the need for interventions to address this issue. Furthermore, our study highlights the impact of socioeconomic status and work schedules on sleep patterns, with rotating shift work and lower income levels being associated with increased sleep problems.

These findings suggest that improving sleep quality should be a public health priority, with particular attention given to promoting healthy sleep behaviors among employees working in rotating shifts and those with lower incomes. Future research should explore potential interventions to address sleep problems in the Saudi Arabian population, taking into account cultural, social, and economic factors that may influence sleep patterns and behaviors.

Ethics Approval

This study was approved by the Institutional Review Board at King Abdulaziz University. Participants provided electronic informed consent prior to participating in the study. Participants were informed that their participation in the study was voluntary and that they could withdraw at any time. Confidentiality and anonymity of the participants were ensured throughout the study.

Authors' contributions

Sarah Al-Muammar: Manuscript editing; Areej Algarni: Data analysis; Raneem Abu Sadi: Manuscript writing; Hanan Mushaeb: Manuscript writing; Ftoon Badroun: Literature review; Abeer Algarni: Literature review. All authors reviewed the manuscript

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Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

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