

# Prevalence of Sleep Disorders among Staff Workers at a Tertiary Health Care Center

Faris F. Alhejaili<sup>1</sup>, MD, FRCCP, Sarah Altayyari<sup>2</sup>, MBBS, and Siraj O. Wali<sup>1</sup>, FRCPC

<sup>1</sup>Sleep Medicine and Research Center, King Abdulaziz University Hospital, Jeddah, Saudi Arabia

<sup>2</sup>Medical Intern, Faculty of Medicine, King Abdulaziz University, Jeddah, Saudi Arabia

## ABSTRACT

**Background:** Due to a demanding modern work style, many people sacrifice sleep by intentionally or unintentionally decreasing the number of sleeping hours or by overlooking their sleep disorders. This study aimed to screen university hospital workers in Saudi Arabia for sleep disorders and estimate their prevalence using a cross-sectional study conducted in 2016.

**Methods:** This study used the Pittsburgh Sleep Quality Index, International Restless Legs Syndrome Study Group diagnostic criteria, Epworth Sleepiness Scale, Berlin Questionnaire, and SLEEP-50 Questionnaire. 116 participants were interviewed (56% males; mean age, 30.9 years (SD: 8.5; range: 21 to 58); mean body mass index, 25.79 (SD: 6.10); 40.5% classified as overweight or obese).

**Results:** Only 6.9% reported good sleep quality. Insomnia was the most common sleep disorder (72%); sleepwalking was the least common disorder (5%). Women had a higher risk of insomnia, nightmares and circadian rhythm disorders ( $P = 0.024$ ,  $0.015$ , and  $0.009$ , respectively). A strong relationship between smoking and insomnia was found ( $P = 0.04$ ).

**Conclusion:** The population had much lower sleep quality than other populations. The bidirectional relationship between insomnia and smoking presents an opportunity and emphasizes the need for insomnia management to decrease health and economic burdens.

## Keywords

Sleep deprivation; Insomnia; Sleep quality; Sleep excessive daytime sleepiness

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### Address for Correspondence:

DR. FARIS F. ALHEJAILI  
P.O. Box 80215  
Jeddah 21589  
Saudi Arabia  
e-M: [falhejaili@kau.edu.sa](mailto:falhejaili@kau.edu.sa)

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## INTRODUCTION

Developing and maintaining a healthy sleep pattern with optimal quality and quantity is challenging, given the demanding and competitive modern work style that has definitely led to a poor balance between work and life. Sleep time is compromised by many people to increase their productivity. In addition to hectic working hours, the associated emotional strain and responsibilities also lead to poor sleep quality<sup>[1-3]</sup>. Other associated factors include shift work, female sex, older age, low education level, alcohol use, and smoking<sup>[3,4]</sup>.

Sleep disorders encompass multiple entities, including poor sleep quality, insomnia, early waking times, circadian rhythm disorders, parasomnias, sleep-related movement disorders, and sleep-related breathing disorders, with insomnia being the most common disorder encountered<sup>[5]</sup>.

Even though sleep disorders are well known, the focus on diagnosis and management of sleep disorders is relatively new<sup>[6]</sup>. The prevalence of these disorders is significant and increasing<sup>[7]</sup>. Studies have found that 35% of the Australian population has difficulty sleeping<sup>[8]</sup>, and up to 70 million people in the USA suffer from sleep disorders<sup>[6]</sup>. Sleep problems were even a concern in a sample of healthy young New Zealanders<sup>[3,9]</sup>.

Research has shown that sleep-deprived employees suffer from mood disorders including anxiety and depression, which can range across the spectrum to committing suicide. Cardiovascular complications, such as hypertension, as well as endocrine diseases and obesity were more prevalent in a sleep-deprived population. At the cognitive level, sleep loss has been associated with a decrease in attention span and information processing, all eventually leading to poor decision making, lower overall performance and a negative economic impact<sup>[8,10]</sup>.

Although the consequences of sleep deprivation have been well documented, sleep deprivation is usually overlooked, underestimated and undertreated, and a significant portion of society continues to struggle on a daily basis<sup>[11]</sup>. Due to the above-mentioned facts, sleep disorders are indeed an important epidemiological problem that needs to be addressed. This study aimed to screen King Abdulaziz University Hospital (KAUH) workers in the Western region of Saudi Arabia for sleep disorders and estimate their prevalence.

## MATERIALS AND METHODS

This was a quantitative, descriptive, cross-sectional study conducted to screen KAUH staff for sleep disorders and to estimate their prevalence. The study was conducted between August and October 2016.

The study population included all medical and non-medical KAUH staff, and a sample of 116 participants was included. The study was explained, and consent was

obtained before the participants were interviewed by well-trained medical interns. The height and weight of each participant were recorded at the time of the interview.

Five questionnaires were used in the interview:

1. The Pittsburgh Sleep Quality Index (PSQI):  
Sleep quality is assessed over a one-month period with this questionnaire. The questionnaire is composed of 19 individual items divided into seven components: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medications and daytime dysfunction. A score for each component is given and summed to yield the global PSQI score. A total score of 5 or greater is indicative of poor sleep quality.
2. International Restless Legs Syndrome Study Group (IRLSSG) diagnostic criteria:  
This questionnaire is composed of five criteria that must be met to diagnose restless legs syndrome/Willis-Ekbom disease (RLS/WED).
3. Epworth Sleepiness Scale:  
Daytime sleepiness in eight different daily situations is assessed with this scale; the probability of falling asleep in each situation is rated on a scale from 0 to 3. Scores of 10 or greater are considered abnormal.
4. Berlin Questionnaire:  
The risk of sleep apnea is assessed with this questionnaire that contains three categories. The patient is considered high risk if at least two categories have positive scores.
5. SLEEP-50 Questionnaire:  
Sleep disorders listed in the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) are assessed by this questionnaire that consists of 50 items; sleep apnea, insomnia, narcolepsy, restless legs/periodic leg movement disorder (PLMD), circadian rhythm sleep disorder, sleepwalking, nightmares, factors influencing sleep, and the impact of sleep complaints on daily functioning are assessed.

## Statistical Analysis

The data were coded, entered, and analyzed using IBM SPSS Statistics for Windows, Version 22.0 (IBM Corp., Armonk, NY USA).

Means and standard deviation (SD) are reported for continuous variables. Frequencies with proportions are reported for categorical variables.

Pearson's chi-squared tests and independent sample *t*-tests were used for comparisons between two groups for categorical variables. The level of significance was set at a *P*-value of < 0.05 using two-sided tests.

## RESULTS

This study interviewed 116 participants; 56% (n: 65) were males, and 43.9% (n: 51) were females. The mean age was 30.88 years (SD: 8.53); the age range was 21 to 58 years. The mean body mass index (BMI) was 25.79 (SD: 6.10), and more than one-third (40.5%) of the participants were classified as overweight or obese. Table 1 outlines the demographic profile of the participants. The Sleep 50 Questionnaire was used to estimate the prevalence of the following disorders: insomnia, narcolepsy, circadian rhythm disorders, sleep walking, nightmares, factors that affect sleep, and the impact of sleep complaints on daily functioning. To examine RLS, obstructive sleep apnea (OSA), and daytime sleepiness, the IRLSSG diagnostic criteria, Berlin Questionnaire, and Epworth Sleepiness Scale were used, respectively. Restless legs syndrome was observed in 6.9% of the participants, with no significant gender difference. However, excessive daytime sleepiness (EDS) was reported in 24% of the study population. The risk of OSA was high in one-fifth of the subjects, with a male predominance. Good sleep quality was reported in only 6.9% of the subjects. A significant association was found between a high BMI and the risk of sleep apnea ( $P = 0.04$ ) (Table 2).

**TABLE 1.**  
Demographic profile of the study population (N = 116)\*

Variables	Values (%)
Age (years)	30.88 ± 8.53
Male	65 (56)
Body Mass Index (kg/m <sup>2</sup> )	25.79 ± 6.10
Smoker	33 (28.4)

\*Values are provided as the mean ± Standard deviation or No. (%).

**TABLE 2.**  
Sleep disorder characteristics of the total sample and a comparison between male and female groups

Variables	Male N = 65		Female N = 51		Total N = 116		P-value
	N	%	N	%	N	%	
Restless Legs Syndrome							
Yes	1	1.54	7	13.73	8	6.90	0.21
No	64	98.46	44	86.27	108	93.10	
Excessive Daytime Sleepiness							
< 10	12	18.46	16	31.37	28	24.14	0.13
≤ 10	53	81.54	35	68.63	88	75.86	
Risk of Obstructive Sleep Apnea							
High	18	27.69	6	11.76	24	20.69	0.04*
Low	47	72.31	45	88.24	92	79.31	
Sleep Quality Based on The Pittsburgh Sleep Quality Index Questionnaire							
Good	6	9.23	2	3.92	8	6.90	0.46
Poor	59	90.77	49	96.08	108	93.10	
Parasomnia							
Yes	23	35.38	28	54.90	51	43.97	0.04*
No	42	64.62	23	45.10	65	56.03	
Mood Disturbance							
Yes	40	61.54	36	70.59	76	65.52	0.33
No	25	38.46	15	29.41	40	34.48	

The chi-squared test was used to compare the two groups (male and female) in terms of different sleep disorders.

\*Statistically significant,  $P < 0.05$

When the Sleep-50 Questionnaire subscales were used, the frequencies of sleep apnea, narcolepsy, RLS, and sleepwalking were 44%, 32%, 13%, and 5%, respectively. However, the frequencies of insomnia, circadian rhythm disorder, and nightmares were 72%, 45%, and 29%, respectively, with a female predominance (Table 3).

Interestingly, a significant association between sleep disorders and daytime sleepiness was found only for those with parasomnia and a negative impact of sleep complaints on daily functioning (Table 4).

A chi-squared test was performed to determine whether a significant association existed between the sleep quality based on the participants' ratings and the sleep quality based on the PSQI questionnaire. The results of this analysis are presented using a cutoff point of 5 for the participants' rating of their sleep quality (*i.e.*, values of 5 or less indicated poor sleep quality), and the differences were not statistically significant ( $P = 0.27$ ).

## DISCUSSION

Of the 166 study participants, only 6.9% had good sleep quality, while the remaining majority of the population reported a lack of quality sleep. The frequency of sleep disorders between sexes indicated a clear female predominance. However, the risk of sleep apnea was more common among men. Overall, insomnia was the most common sleep disorder (72%), while sleepwalking was the least common and was only reported by 5% of the population.

Only eight (6.9%) participants presented good sleep quality on the PSQI questionnaire. In studies conducted in

**TABLE 3.**  
Sleep disorders based on the Sleep-50 Questionnaire subscales

Variables	Male N = 65		Female N = 51		Total N = 116		P-value
	N	%	N	%	N	%	
Sleep Apnea (Items 1–8)							
No	39	60.00	26	51	65	56	0.352
Yes	26	40.00	25	49	51	44	
Insomnia (Items 9–16)							
No	24	36.92	9	18	33	28	0.024*
Yes	41	63.08	42	82	83	72	
Narcolepsy (Items 17–21)							
No	49	75.38	30	59	79	68	0.072
Yes	16	24.62	21	41	37	32	
Restless Legs/Periodic Leg Movement Disorder (Items 22–25)							
No	60	92.31	41	80	101	87	0.092
Yes	5	7.69	10	20	15	13	
Circadian Rhythm Sleep Disorder (Items 26–28)							
No	43	66.15	21	41	64	55	0.009*
Yes	22	33.85	30	59	52	45	
Sleepwalking (Items 29–31)							
No	62	95.38	48	94	110	95	1.000
Yes	3	4.62	3	6	6	5	
Nightmares (Items 32–36)							
No	52	80.00	30	59	82	71	0.015*
Yes	13	20.00	21	41	34	29	
Factors influencing sleep (Items 37–43)							
No	23	35.38	21	41	44	38	0.566
Yes	42	64.62	30	59	72	62	
The impact of sleep complaints on daily functioning (Items 44–50)							
No	27	41.54	15	29	42	36	0.243
Yes	38	58.46	36	71	74	64	

The chi-squared test was used to compare the two groups (male and female) in terms of different sleep disorders.  
\*Statistically significant,  $P < 0.05$

workers of other professions, the frequency of quality sleep ranged from 21.7% to 64%<sup>[12-16]</sup>. This study population had obviously poorer sleep quality, which could be related to stress and job dissatisfaction, according to a study of white-collar employees in Japan<sup>[17]</sup>. Additionally, another study showed that shift-working females reported poor sleep quality<sup>[18]</sup>. These findings show that every profession is different and has its own unique characteristics that may affect sleep quality. Additional studies exploring the elements leading to poor sleep quality in healthcare workers are needed.

Insomnia, one of the most prevalent sleep complications, has a drastic effect on patient well-being; studies have found that insomnia imposes a greater burden than depression or even heart failure<sup>[19]</sup>. Insomnia was one of the most prevalent sleep complications encountered in this study population which found a 72% prevalence of insomnia; much greater than the global estimate based on 10 different countries (31.6%)<sup>[20]</sup>. The insomnia rate was also greater than that reported in another study of Saudi healthcare workers at the National Guard Hospitals in Jeddah and Riyadh, which found that 52% of women and 35% of men had inadequate sleep quality/insomnia, compared to 63% of men and 82% of women in this study<sup>[21]</sup>. However, the prevalence in this study was closer to

the 78% found in a study conducted in 2016 to measure the frequency of sleep apnea among the general population<sup>[22]</sup>.

Women were more likely to experience insomnia in this population, and this finding is consistent with prior studies<sup>[21,23]</sup>. It is also important to highlight that previous studies found that only 20% of insomnia cases are actually medically diagnosed and treated<sup>[24]</sup>. This should highlight the importance of raising awareness and improving screening for insomnia to prevent serious complications.

In the current study, 65.52% of the population reported mood disturbance, followed by negative impacts of sleep complaints on daily functioning (64%) and having factors that influence sleep (62%).

The least frequently reported sleep disorder was sleepwalking (5%). The prevalence of RLS was 6.9%, based on the 2012 Revised IRLSSG diagnostic criteria for RLS. This finding was similar to the prevalence found in other studies conducted in Saudi Arabia<sup>[25,26]</sup>.

Nightmares (29%) and circadian rhythm disorders (45%) were more common in females. Women were also more prone to have other sleep disorders, such as insomnia. Evidence on the role of cyclic hormonal variations in

**TABLE 4.**  
Daytime sleepiness in relation to sleep disorders

	ESS > 10 Yes	ESS ≤ 10 No	P-value
<b>Restless Legs Syndrome</b>			
Yes	4	4	0.10
No	24	84	
<b>Risk of Obstructive Sleep Apnea</b>			
High Risk	7	17	0.60
Low Risk	21	71	
<b>Sleep Quality</b>			
Good	0	8	0.20
Poor	28	80	
<b>Parasomnia</b>			
Yes	17	54	0.04*
No	11	54	
<b>Mood Disturbance</b>			
Yes	22	54	0.09
No	6	34	
<b>Insomnia</b>			
Yes	20	63	0.90
No	8	25	
<b>Circadian Rhythm Disorder</b>			
Yes	16	36	0.10
No	12	52	
<b>Sleep Walking</b>			
Yes	3	3	0.10
No	25	85	
<b>Nightmares</b>			
Yes	12	22	0.07
No	16	66	
<b>Factors Influencing Sleep</b>			
Yes	19	53	0.47
No	9	35	
<b>The Impact of Sleep Complaints on Daily Functioning</b>			
Yes	24	50	0.006*
No	4	38	

The chi-squared test was used to compare the two groups

ESS: Epworth Sleepiness Scale

\*Statistically significant, P < 0.05

women and their effect on the risk of sleep disorders is plentiful. Not only are women more likely to have sleep disorders, but they also more frequently present with atypical symptoms; thus, additional consideration must be given to this group to detect their sleep disorders<sup>[27,28]</sup>.

Approximately one-fourth of the participants showed symptoms of EDS (24.14%). Excessive daytime sleepiness is correlated with conditions such as sleep apnea<sup>[29]</sup>, and it would be logical to assume that an underlying sleep disorder contributes to EDS. This study only found associations between EDS and parasomnia (43.97%) and negative impact on daily function (64%), but these results may be attributable to the study's small sample size.

The risk of sleep apnea was 20.69% according to the Berlin Questionnaire. Sleep apnea was correlated with higher BMI and male sex, which are well-documented risk factors in the literature<sup>[30]</sup>. In fact, weight has been found to be the single most important precondition in the progression of sleep apnea. It was also theorized that

men have a greater chance of sleep apnea owing to their characteristic fat distribution, which is mostly central and involves the neck and trunk. Aging is another factor known to increase the prevalence of OSA; however, this study failed to demonstrate any relationship with age, most likely because of the relatively small sample size<sup>[31]</sup>.

This study was performed in only one center in the western region of Saudi Arabia. A larger sample size is needed to obtain a better understanding and ascertain the true frequency of sleep conditions in the healthcare profession.

## CONCLUSIONS

This current study showed a high frequency of negative sleep conditions, of which poor sleep quality and insomnia were the most common, while sleepwalking and RLS were the least common. Most importantly, this population had a much lower level of good sleep quality than other populations, and because each profession has its own

unique characteristics, further studies should focus on exploring the factors leading to lack of quality sleep in the healthcare profession.

The bidirectional relationship between insomnia and smoking further emphasizes the need for insomnia detection and management in the healthcare profession.

Women were in general more liable to experience disordered sleep, and special care should be directed to this group as many may present with atypical symptoms.

Excessive daytime sleepiness was associated with parasomnia and a negative impact on daily function but not with other sleep disorders. It is the authors' recommendation that larger studies should be performed to verify these associations.

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### Conflict of Interest

The authors have no conflict of interest.

### Disclosure

The authors have not receive any type of commercial support either in the form of compensation or other finances for this study. The authors have no financial interest in any of the products devices, or drugs mentioned in this article.

### Ethical Approval

Obtained.

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## مدى انتشار اضطرابات النوم لدى العاملين في المستشفيات التخصصية

فارس فلاح الحجيلي<sup>١</sup>، سارة طلال الطياري<sup>٢</sup>، سراج عمر ولي<sup>١</sup>

<sup>١</sup>مركز طب وبحوث النوم، مستشفى جامعة الملك عبد العزيز

<sup>٢</sup>طبيبة امتياز، جامعة الملك عبد العزيز

جدة - المملكة العربية السعودية

### المستخلص.

**الأهداف:** نظرًا لتغير النمط الحديث للحياة، وما تتطلبه بيئة العمل في وقتنا الحاضر من جهد، يضحى الكثير من الناس بالنوم عن طريق التقليل المتعمد أو غير المقصود من عدد ساعات النوم، مع غض النظر عن اضطرابات النوم إن وجدت، ولهذا تهدف دراستنا إلى فحص اضطرابات النوم لدى العاملين في المستشفيات الجامعية في المملكة العربية السعودية، وتقدير معدل انتشارها باستخدام دراسة مقطعية.

**منهجية البحث:** استخدمنا مؤشر جودة النوم "بيتسبورغ"، والمعايير التشخيصية لمجموعة دراسة متلازمة تملل الساقين.

الدولي، ومقياس "إبورث" للنوم، واستبيان برلين بالإضافة إلى "Sleep ٥٠".

أجرينا مقابلات مع ١١٦ مشاركًا (٥٦٪ ذكور، متوسط العمر ٣٠,٩ سنة بانحراف معياري بلغ ٨,٩)، متوسط كتلة الجسم كان ٢٥,٧٩، وتم تصنيف ٤٠,٥٪ على أنهم يعانون من زيادة في الوزن أو السمنة.

**النتائج:** وجدنا أن فقط ٦,٩٪ من العينة كانت تتمتع بنوم جيد، كما أن الأرق كان من أكثر اضطرابات النوم شيوعًا (٧٢٪)، بينما المشي أثناء النوم أقلها (٥٪)، وكانت النساء أكثر عرضة للإصابة بالأرق والكوابيس واضطرابات الساعة البيولوجية مقارنة بالرجال القيمة الاحتمالية: (٠,٠١٥، ٠,٠٢٤، ٠,٠٠٩) على التوالي، كما وجدنا أيضًا رابطًا قويًا بين التدخين والأرق (القيمة الاحتمالية: ٠,٠٤).

**الخلاصة:** مقارنة بالمجموعات التي تمت دراستها، فإن عينة البحث هذه تعاني من اضطرابات في النوم بشكل أكثر من غيرها، كما أظهرت النتائج أن العلاقة ثنائية الاتجاه بين الأرق والتدخين، مما يؤكد الحاجة إلى علاج الأرق لتقليل الأعباء الصحية والاقتصادية التي تسببها اضطرابات النوم والتدخين.