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Review Article

**THE PREVALENCE AND MANAGEMENT OF SLEEP  
DISORDERS IN SAUDIARABIA: SYSTEMATIC REVIEW****Ezdehar Hassan Muhanna<sup>1</sup>, Faten Hussain Alsaihtai<sup>2</sup>, Zahra Ebrahim Alramel<sup>3</sup>, Noor Nader Alalqam<sup>4</sup>, Batool Nader Alalqam<sup>5</sup>, Amal Hussain Almansour<sup>6</sup>, Salam Bader Alahmed<sup>7</sup>, Kawther Muneer Alsadda<sup>8</sup>**<sup>1</sup>Consultant family medicine in health centers in Dammam, Health center in AlrawdaArea, KSA.  
Email: Ezdehar.h.m@gmail.com<sup>2</sup>Medical intern, Mansoura university. Email: Alsaihatifaten@gmail.com<sup>3</sup>Medical intern, Mansoura university. Email: Z.alramel199@gmail.com<sup>4</sup>Medical intern, Mansoura university. Email: noornnn77@gmail.com<sup>5</sup>Medical intern, Mansoura university. Email: Drbatool123@gmail.com<sup>6</sup>General practitioner, Imam Abdulrahman bin Faisal University, KSA. Email:  
almansour.a.h18@gmail.com<sup>7</sup>Medical intern, Mansoura University. Email: salamalahmed12@gmail.com<sup>8</sup>General practitioner, Imam Abdulrahman bin Faisal University, KSA. Email:  
kawwthermuneer@gmail.com**Abstract:**

**Background/Objective:** The entire world population is greatly impacted by sleep disturbances, which result in a wide range of health issues. It is essential to comprehend how common they are and how to treat them is crucial for improving overall well-being. The investigation aims to assess the current frequency of sleep disorders in Saudi Arabia and to appraise the existing approaches for managing these disorders. This endeavor will provide valuable perspectives on the status of sleep health in the nation and guide forthcoming interventions.

**Methods:** In November 2023, a comprehensive search was conducted primarily using PubMed, following PRISMA criteria. The search focused on English-language studies examining the management of sleep disorders and their prevalence in Saudi Arabia. Specific inclusion and exclusion criteria were established to ensure the quality and relevance of the evaluated research.

**Results:** Research from Saudi Arabia across a wide spectrum was included in the study. A noticeable pattern showed a high proportion of individuals affected by sleep disorders. The findings imply a need for further investigation into the potential causes of these disorders. The research also emphasizes the necessity of tailored interventions to address the specific needs of individuals in Saudi Arabia affected by sleep disorders. This comprehensive approach could lead to improved overall health and well-being for those impacted by these conditions.

**Conclusion:** Based on our research, sleep disorders are highly prevalent in the population of Saudi Arabia. These disorders are linked to a range of demographic, lifestyle, and health-related factors. It is essential to tackle these factors to create effective interventions and improve sleep health in the country. Understanding the underlying causes of sleep disorders and their connections to various factors will allow us to customize prevention and treatment strategies to suit the population's specific needs. Additional research and public health efforts are necessary to offer support to individuals dealing with sleep disorders in Saudi Arabia.

**Keywords:** Sleep Disorder, Insomnia, OSA, Obesity, Diabetes, Prevalence, Saudi Arabia.

**Corresponding author:****Ezdehar Hassan Muhanna,***Consultant family medicine in health centers in Dammam,**Health center in AlrawdaArea, KSA.**Email: Ezdehar.h.m@gmail.com*

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**INTRODUCTION:**

Sleep disorders encompass a broad spectrum of conditions that disrupt the regular sleep patterns of individuals, affecting their ability to obtain restorative and quality sleep. The impact of these disorders extends beyond mere inconvenience, as they can significantly impair overall health and well-being [1]. From difficulties in both falling and staying asleep to experiencing excessive daytime sleepiness, the range of sleep disorders is diverse and can manifest in various ways, often leading to fatigue, irritability, and difficulties in concentration [2].

The implications of sleep disorders on an individual's life cannot be understated. The resulting fatigue and irritability can affect personal and professional relationships, while impaired concentration can have a detrimental impact on work, education, and daily activities. Furthermore, the long-term consequences of untreated sleep disorders may include an increased risk of developing chronic conditions such as hypertension, diabetes, and depression [3].

Research has shown that longer sleep durations (>8 hours per night) and shorter sleep durations (<7 hours per night) are linked to higher rates of morbidity and mortality. Numerous epidemiological research indicates that those who sleep for long periods of time ( $\geq 8$  hours per day) and short periods of time (<7 hours per day) are at risk for all-cause mortality [4].

While some sleep disorders may have a genetic or physiological basis, others may be linked to lifestyle factors, stress, or underlying medical conditions. By identifying and addressing these root causes, individuals can work towards mitigating the impact of sleep disorders on their lives [5].

Treatment options for sleep disorders vary widely and may include lifestyle modifications, behavioral therapies, medication, or in some cases, the use of specialized devices such as continuous positive airway pressure (CPAP) machines for sleep apnea. Additionally, adopting good sleep hygiene practices, such as maintaining a consistent sleep

schedule, creating a comfortable sleep environment, and avoiding stimulants before bedtime, can also play a crucial role in managing sleep disorders [6].

Given the rising rates of obesity and diabetes, Saudi Arabia probably has a high prevalence of sleep disorders, including OSA [2]. A few Saudi studies have assessed the prevalence of OSA and sleep disorders in the eastern province (26%) and Riyadh (21%), respectively [3]. A large-sample study of Saudi and non-Saudi citizens revealed that during the COVID-19 pandemic, there was a noticeable increase in sleep quality disturbance. Of the 790 kids that participated in the trial, around half had significant changes in their sleeping patterns [4]. This study aims to provide a comprehensive understanding of the prevalence and current management strategies for sleep disorders in Saudi Arabia. By conducting a systematic review, we hope to identify gaps in existing research and inform future interventions to improve sleep health in the region.

**Study Rationale:**

The study is important as it will provide valuable insights into the current state of sleep disorders in the country and the effectiveness of existing management strategies. This research has the potential to inform public health policies and interventions aimed at improving sleep health in Saudi Arabia.

**Study Objective:**

The study aims to assess the current prevalence of sleep disorders in Saudi Arabia and to evaluate the existing management strategies for these disorders. This will provide valuable insights into the state of sleep health in the country and guide future interventions.

**METHODOLOGY:**

Following the guidelines set out by PRISMA, or Preferred Reporting Items for Systematic Reviews and Meta-Analyses, this systematic review was conducted under strict guidelines [7].

**Study Plan and Duration:** A systematic review was carried out in December 2023.

**Strategy for Search:** To discover the pertinent literature, a comprehensive search was conducted across four major databases: PubMed, SCOPUS, Science Web, and Science Direct. We restricted our search to English and considered all database's unique requirements. Some following keywords were converted into PubMed Mesh terms and used to find the pertinent studies; "sleep disorder, insomnia, OSA, and sleep deprivation. The operators "OR" and "AND" in Boolean logic were used to match the required keywords. Publications with full text available in English, articles that could be downloaded for free, and human trials were among the search results.

#### Selection criteria

##### Inclusion criteria

The following standards will be considered for this review's inclusion:

- Study designs that investigated the prevalence and management of sleep disorders.
- Studies that conducted in Saudi Arabia
- Recent studies showed in the last ten years (2014-2023).
- Language in English.

##### Exclusion criteria:

- Systematic Review, meta-analysis, and Case reports will be excluded.
- Studies outside Saudi Arabia
- Studies published before 2014.

**Data extraction:** The search strategy's output was checked for duplication using Rayyan (QCRI) [8]. The researchers evaluated the titles and abstract relevance by modifying an inclusion/exclusion set of criteria to obtain the combined search results. The critics carefully examined each paper that met the criteria for inclusion. The writers covered techniques for resolving arguments. By a previously created data retrieval form, the authorized study was uploaded. Data on research titles, authors, year of study, gender, participants, goals, and primary results were retrieved by the authors. The risk of bias evaluation was made on a different page.

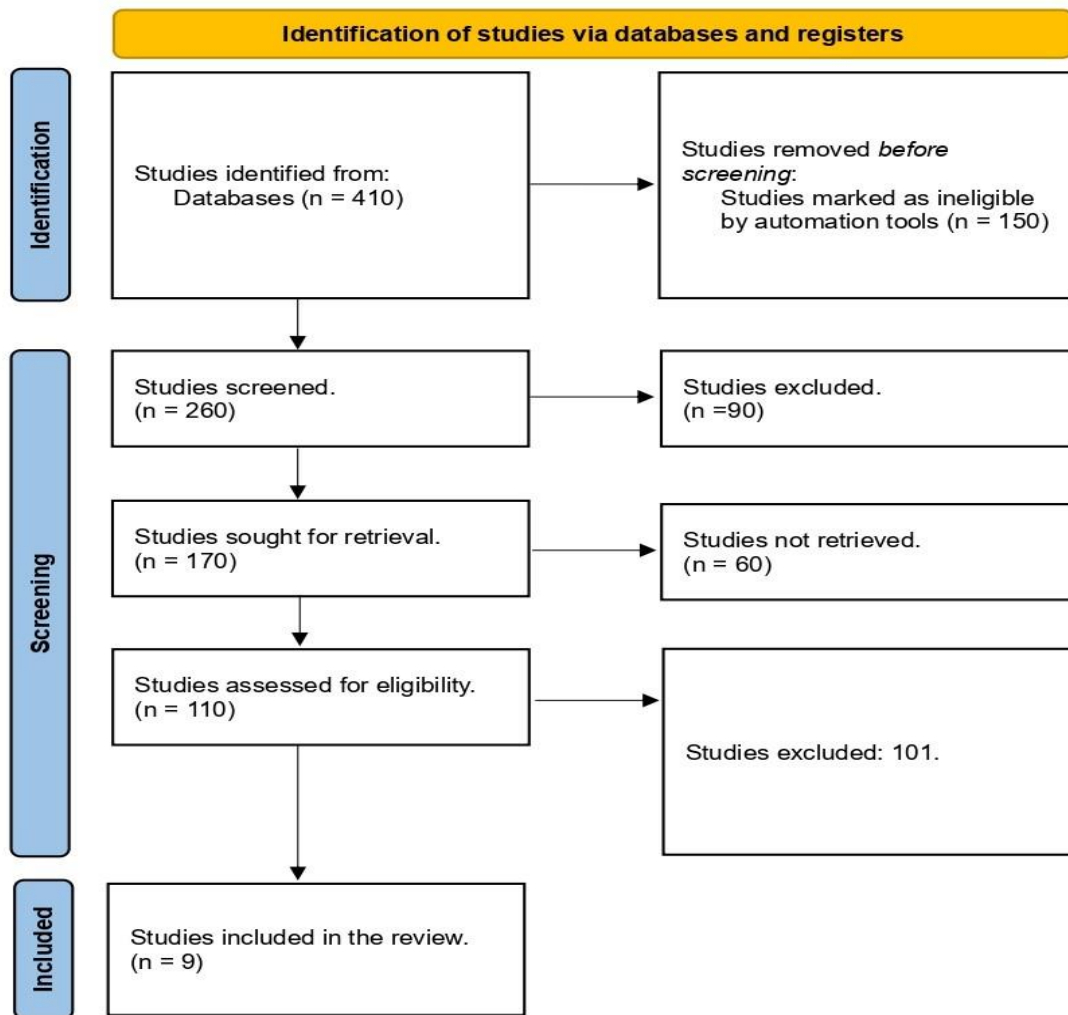
**Data synthesis Strategy:** To give a qualitative analysis of the findings and study components, summary tables were made utilizing data from relevant research. Once information needed for the systematic review was retrieved, the most productive way to use the selected data came from the study publications that were included.

**Bias assessment risk:** The ROBINS-I risk of bias assessment method for non-randomized treatment trials was used to assess the quality of the included studies [9]. Confounding, research participant selection, intervention classification, divergence from intended interventions, inadequate data, outcome evaluation, and choice of reported result were the seven areas that were assessed.

## RESULTS:

### Search results

We identified 410 research articles in our systematic search, with 150 being automatically excluded. Upon screening the titles and abstracts of 260 papers, we found 90 studies unsuitable for publication. Only 170 publications were discovered out of the 60 studies requested for retrieval. Out of the 110 publications screened for full-text review, 101 were rejected due to inappropriate study designs or conclusions. Ultimately, nine research papers met the eligibility criteria for this systematic review. The research selection process is detailed in Figure 1.



**Figure (1): PRISMA flowchart summarizes the study selection process.**

Characteristics of the included studies

**Table 1: Socio-demographic Characteristics of Participants**

The socio-demographic information of participants from nine distinct research studies is included in Table (1), summarizing the number of participants from references [2,4,10-16]. These studies were all conducted within various regions of Saudi Arabia, such as Jazan region [4], Riyadh [2,10,13], Makkah [11], Jeddah [12], the western region of Saudi Arabia [14], Tabuk city [15], and Madinah [16].

All of the reviewed studies utilized a cross-sectional design [2,4,10-16]. The age of the participants were

observed in almost all of the studies. According to Hakami, Abdulrahman et al. 2023 [4], the main age was 30.99 years, with a standard deviation of 11.66 years, and 39.1% were students while 33.4% were retired individuals. This mean age is similar to that stated in Al- Tannir, Mohamad et al. 2016 [10], which was  $33.3 \pm 11.8$  years. Abdelmoaty Goweda, Reda et al. 2020 [11] focused on medical students. Ahmed, Anwar E et al. 2017 [2] highlighted that the mean age of the participants was  $42.3 \pm 15.5$  years. According to Ahmad, Adeel Nazir et al. 2019 and Alanazi, Eman M et al. 2023 [15], the age was over 18 years in general for patients attending a family medicine clinic and residents, respectively. Baidas, Laila et al. 2019 [13] reported that the mean age was  $9.2 \pm 1.8$  years, as the study included children in primary schools. Othman, Ahmed et al. 2023 [14]

included emergency room physicians with ages ranging from 20 to 49 years. Aldhafiri, Ahmed et al. 2023 [16] reported that 24.06% were students, 39.10% were working, and 36.84% were not working.

The gender distribution was also mentioned in the studies. Hakami, Abdulrahman et al. 2023 [4] reported that 62.2% of the participants were women, while in Al-Tannir, Mohamad et al. 2016 [10], 765 out of 1369 participants were women. Abdelmoaty Goweda, Reda et al. 2020 [11] stated that half of the participants were women. Ahmed, Anwar E et al. 2017 [2] highlighted that 59.3% were men. Ahmad, Adeel Nazir et al. 2019 [12] reported that 147 out of 319 were men. Baidas, Laila et al. 2019 [13] reported that slightly more than half were boys. Othman, Ahmed et al. 2023 [14] reported that 54.7% were men, while Aldhafiri, Ahmed et al. 2023 [16] reported that 31.33% were men.

**Table 2: prevalence of comorbidity and sleep disorders, results and major outcomes of the studies.**

The studies provided detailed information on the prevalence of comorbidities and the impact of sleep disorders on participants, along with key findings.

Hakami, Abdulrahman et al. 2023 [4] found that 12.33% of participants had diabetes, 16.7% were obese, and 28.8% were affected by sleep disorders. Al-Tannir, Mohamad et al. 2016 [10] reported 13.3% hypertension, 12.5% diabetes, and 27.3% affected by sleep disorders.

Abdelmoaty Goweda, Reda et al. 2020 [11] noted 12.6% with chronic disease, and among all participants, 51.6% had Narcolepsy, 31.5% had insomnia, and 16.4% had Obstructive sleep apnea. Ahmed, Anwar E et al. 2017 [2] highlighted that 39.1% were obese, 20.8% had diabetes, and 33.9% had hypertension. Ahmad, Adeel Nazir et al. 2019 [12] reported 43% obesity, 35.7% hypertension, and 28.2% diabetes. Baidas, Laila et al. 2019 [13] found that 10.5% of children were overweight, 21% had sleep-disordered breathing (SDB), 3.4% had sleep apnea, and 14.4% reported habitual snoring. Othman, Ahmed et al. 2023 [14] reported 35.8% with moderate to severe clinical insomnia. Aldhafiri, Ahmed et al. 2023 [16] reported 38.59% experiencing sleep problems.

Several findings were highlighted in the research. Hakami, Abdulrahman et al. 2023 [4] discovered that

primary insomnia and Excessive Daytime Sleepiness were significant symptoms reported by many respondents, indicating potential sleep disorders. They also noted that most participants did not regularly take medications for sleep disorders. Al-Tannir, Mohamad et al. 2016 [10] revealed that reduced sleep hours significantly impacted productivity in the Saudi adult population and confirmed a higher prevalence of sleep disturbance among females compared to males. Abdelmoaty Goweda, Reda et al. 2020 [11] observed a high prevalence of sleep disorders in medical students. Ahmed, Anwar E et al. 2017 [2] highlighted that the mean sleep duration was  $6.4 \pm 1.7$  hours per night, with poor sleep quality being prevalent among those with short sleep duration. They also found that participants with sleep loss affecting mood were significantly more likely to have short sleep duration, while diabetes mellitus was more common in participants with long sleep duration. Ahmad, Adeel Nazir et al. 2019 [12] reported that a high risk of sleep apnea was identified using the BQ (Berlin Questionnaire) and the ESS (Epworth Sleepiness Scale), with 12.9% of patients classified as being at high risk of sleep apnea using both measures. Baidas, Laila et al. 2019 [13] discovered that children with habitual snoring, sleep apnea, or mouth breathing were at a four times higher risk of developing SDB. Overweight children were three times more likely to report SDB symptoms than other children. Othman, Ahmed et al. 2023 [14] reported that younger physicians exhibited higher levels of insomnia severity compared to their older colleagues, suggesting that age played a role in affecting sleep disorders. However, they found no significant associations between insomnia severity and other demographic or work-related factors. Alanazi, Eman M et al. 2023 [15] stated that inadequate sleep hygiene has been considered one of several factors contributing to poor sleep and insomnia. Aldhafiri, Ahmed et al. 2023 [16] reported that the most common cause of sleeping trouble was due to stress (64.94%), followed by wasting time on their phone before sleep (37.01%), coffee and tea drinking (33.12%), late activities (19.48%), work and studying (14.94%), health conditions (11.04%), and other causes (7.79%). They added that the most common sleep aids used were Panadol night (antihistamine) (49.30%), Melatonin (39.44%), herbs and other supplements (23.94%), prescription drugs (11.27%), and other sleep aids (9.86%).



TABLE 1: Socio-demographic characteristics of the participants

Author, Year of Study	Area	Study design	No of participants	Type of participants	Age	Gender	Study duration
Hakami, Abdulrahman et al. 2023 [4]	Jazan region	quantitative descriptive cross-sectional study	670	39.1% students	The mean age = 30.99 years	62.2% women	from December 2022 to March 2023
				33.4% retired individuals			
Al-Tannir, Mohamad et al. 2016 [10]	Riyadh	cross-sectional study	1369	NA	33.3 ± 11.8 years	765 women	between October 2014 and March 2015
						571 men	
Abdelmoaty Goweda, Reda et al. 2020 [11]	Makkah	cross-sectional study	438	medical students	NA	50.5% women	between the 10th of February and the 1st of April 2020
Ahmed, Anwar E et al. 2017 [2]	King Abdulaziz Medical City, Riyadh	cross-sectional study	2095	NA	mean age of 42.3±15.5 years	59.3% men	between May and October 2014
Ahmad, Adeel Nazir et al. 2019 [12]	Jeddah	cross-sectional study	319	patients attending a family medicine clinic	aged over 18	147 male	January to March 2015
						172 female	
Baidas, Laila et al. 2019 [13]	Riyadh	cross-sectional study	1350	Children in primary schools	mean age = 9.2 ± 1.8 years	54.3% boys	September 2014 and May 2015
Othman, Ahmed et al. 2023 [14]	the western region of Saudi Arabia	cross-sectional study	106	emergency room physicians.	20 – 49 years	54.7% men	NA
Alanazi, Eman M et al.2023 [15]	Tabuk city	cross-sectional, survey-based study	384	NA	52.1% were 18-34	NA	in 2022
					40.9% were 35-50 years		
Aldhafiri, Ahmed et al. 2023 [16]	Madinah	cross-sectional study	399	24.06% were students	NA	31.33% men	between 30 January and 26 April 2022
				39.10% were working			
				36.84% were not working			

TABLE 2: prevalence of comorbidity and sleep disorders, results and major outcomes of the studies.

Study	Comorbidity	Prevalence of sleep disorders		results	Major outcomes
<b>Hakami, Abdulrahman et al. 2023 [4]</b>	12.33% having diabetes	28.8%	13.4% with OSA	primary insomnia and Excessive Daytime Sleepiness were significant symptoms reported by many respondents, suggesting potential sleep disorders	Most respondents did not regularly take medications
	16.7% obese		86.6 % with other disorders		
<b>Al-Tannir, Mohamad et al. 2016 [10]</b>	13.3% having hypertension	27.3%		productivity could be significantly affected by reduced hours of sleep in the Saudi adult population	Sleep disturbance was higher among females than males
	12.5% having diabetes				
<b>Abdelmoaty Goweda, Reda et al. 2020 [11]</b>	12.6% had chronic disease	51.6% with Narcolepsy	high prevalence of sleep disorders in medical students	NA	
		31.5% with insomnia			
		16.4 with Obstructive sleep apnea			
<b>Ahmed, Anwar E et al. 2017 [2]</b>	39.1 % obese	NA	the mean of sleep duration is $6.4 \pm 1.7$ hours per night	Poor sleep quality was very prevalent in those with short sleep duration. Participants with sleep loss affects mood were significantly more likely to have short sleep duration. Diabetes mellitus was more common in participants with long sleep duration.	
	20.8% with diabetes				
	33.9% with hypertension				
<b>Ahmad, Adeel Nazir et al. 2019 [12]</b>	43% being obese	NA	High risk of sleep apnea was established using two screening measures, the BQ (Berlin Questionnaire) and the ESS (Epworth Sleepiness Scale)	Using both the BQ and the ESS (the combined measure) the results showed that 12.9% of patients were classified as being at high risk of sleep apnea	
	35.7% with hypertension				
	28.2% with diabetes				
<b>Baidas, Laila et al. 2019 [13]</b>	overweight in 10.5%	21% with sleep-disordered breathing (SDB)	Children with habitual snoring, sleep apnea, or mouth breathing were at a four times higher risk of developing SDB. Overweight children were	a male predilection regarding risk of SDB, with 23% of boys at high risk compared with 19% of girls	
		sleep apnea in 3.4%			
		Habitual snoring			

		was reported in 14.4%	three times more likely to report SDB symptoms than other children	
<b>Othman, Ahmed et al. 2023 [14]</b>	NA	35.8% had moderate to severe clinical insomnia	younger physicians reported higher levels of insomnia severity compared to their older colleagues.	No significant associations were found between insomnia severity and other demographic or work-related factors.
<b>Alanazi, Eman M et al.2023 [15]</b>	NA	NA	Inadequate sleep hygiene has been considered one of the several factors contributing to poor sleep and insomnia.	NA
<b>Aldhafiri, Ahmed et al. 2023 [16]</b>	NA	38.59% reported sleep problems	The most common cause of sleeping trouble was due to stress (64.94%), followed by wasting time on their phone prior to sleep (37.01%), coffee and tea drinking (33.12%), late activities (19.48%), work and studying (14.94%), followed by health conditions (11.04%), and 7.79% were due to other causes.	the most common sleep aids used were Panadol night (antihistamine) (49.30%), Melatonin (39.44%), herbs and other supplements (23.94%), prescription drugs (11.27%), and 9.86% used other sleep aids.

### DISCUSSION:

Worldwide, it is a common occurrence for people to experience sleep disturbances, affecting a significant portion of the population at some stage in their lives. It is estimated that 50–70 million Americans suffer from chronic sleep and wakefulness issues. These disturbances have wide-reaching negative effects on individuals' quality of life, the economy, safety, and health. There are links between sleep deprivation and conditions such as diabetes, chronic diseases and obesity [17].

Our research suggests that Saudi Arabia likely experiences a high frequency of sleep problems. Studies in Saudi Arabia's eastern region (26%) and Riyadh (21%) have assessed the prevalence of sleep disorders, while in Jazan, a city with a hot and tropical climate, around 52.4% of primary care patients are at high risk for obstructive sleep apnea (OSA) [20] according to a research [21].

In Riyadh, a study found that 58.1% of participants experienced delays in falling asleep, and 70.3% had difficulty falling asleep [22]. Another study in Al-Ahsa found that 97.5% of participants were aware of sleep paralysis, a common sleep disorder [23]. Teens at risk reported high rates of nightmares (39.1%), sleeplessness (41.3%), and possible sleep-disordered breathing (79.3%) [24]. A recent study indicated that 3.7% of women and 2.2% of men experienced restless leg syndrome, while 15.8% of women and 9.3% of men suffered from insomnia [25].

Furthermore, we discovered that a higher prevalence

of sleep disturbances was associated with factors such as obesity, age, short necks, smoking, coffee consumption, health issues, and medication use. These characteristics align with established risk factors, including anatomical issues and certain



lifestyle factors, as stated by Ahmed, Anwar E et al. 2017 [13]. In Riyadh, it was found that obesity (39.1%), hypertension (33.9%), depression (4.3%), and asthma (17.3%) were often linked to inadequate sleep [2].

Furthermore, a systematic review that was published in Kyrgyzstan [26] revealed a wide variation in the prevalence of obstructive sleep apnea (OSA) among Asians, ranging from 3% to 97.3%. The review assessed the prevalence of individuals at risk for OSA based on symptoms and/or sleep questionnaires, as well as the prevalence of diagnosed OSA in Asian adults through sleep monitoring. However, the authors acknowledged that their findings were inconclusive due to limited information on many Asian nations. In contrast, a comprehensive study conducted in Australia [27] identified a lower prevalence range compared to Asia. These disparities in the frequency of OSA diagnosis in the general population may contribute to the differing prevalence rates.

Moreover, Dixit et al. carried out a study comparing the effectiveness of the Berlin Questionnaire (BQ) and Epworth Sleepiness Scale (ESS) questionnaires in adult patients exhibiting signs, symptoms, and a history of OSA. Their results indicate that while ESS is less sensitive as a diagnostic tool, BQ is a more valid, accurate, and sensitive measure for screening OSA in patients, potentially enhancing their quality of life. Despite previous findings, Franklin and Linberg [28] concluded that variations in sleep disorders prevalence could be attributed to different diagnostic standards, definitions, research designs, and characteristics of the populations included. Additionally, they emphasized the need for further research to better understand and address these discrepancies.

Previous research has shown a significant negative relationship between regular use of social media, mobile phones, and televisions, and poor sleep quality, which has been identified as a worsening issue. Similar findings were observed in a study by Mohammad Beigi on medical students in Qom, Iran, where the prevalence of poor sleep quality was 61.7% and the prevalence of excessive mobile phone use was 10.7%. These findings indicated a substantial correlation between the two variables. A statistically significant correlation was found by Saxena in India between students' excessive mobile phone use and sleep problems. According to a research by Ibrahim et al. conducted at King Abdulaziz University near Jiddah, extended use of cell phones during sleep caused almost two-thirds of medical students to have

poor quality sleep. In Bangladesh, Hossain et al. discovered a strong correlation between Variety-Seeking (VS) tendencies on smartphone usage, with a focus on social networking sites of the current university-level generation, and Academic Performance (AP); since most tend to overuse digital technologies, this has a negative impact on AP. The onset of sleep disturbances brought on by excessive smartphone use and visual stress may be a precursor of poor AP in the future [11].

### CONCLUSION:

It is evident from the research that sleep disorders are a significant concern in the population of Saudi Arabia, with various factors contributing to their prevalence. It is imperative to address these factors in order to develop effective interventions and enhance the overall sleep health of the country. By delving into the root causes of sleep disorders and their associations with different factors, we can tailor prevention and treatment strategies to meet the specific needs of the population. Further research and public health initiatives are crucial to provide support to individuals grappling with sleep disorders in Saudi Arabia.

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