Original Article

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Public Health Section

Socio-demographic and Lifestyle Determinants of Insomnia among Adult Patients Attending Primary Healthcare Centres, Jeddah: A Cross-sectional Study

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ABSTRACT

Introduction: Insomnia is the most prevalent sleep disorder. Its prevalence differs worldwide, from 5% to 40% depending on the criteria used to define insomnia, techniques, and method of collecting data. In Saudi Arabia, approximately 40% of adults with insomnia also have comorbid medical or psychiatric disorders. There are many factors which are associated with insomnia.

Aim: To assess the association between socio-demographic and lifestyle factors with the occurrence of insomnia.

Materials and Methods: This was a cross-sectional study conducted in 10 PHC centres of Jeddah. A total of 376 adult participants were interviewed by using a questionnaire which included questions about sociodemographic and lifestyle-related questions. Pittsburgh Sleep Quality Index and the Insomnia Severity Index was used to assess insomnia. Data were analysed and descriptive statistics (i.e., frequency, percentages, mean and standard deviation) were calculated. The chi-square test was applied to test significance of differences between groups. The p-values <0.05 were considered as statistically significant.

Results: More than half of participants (51.1%) had poor sleep quality. The highest prevalence of poor sleep quality was observed among those who performed physical exercise four times or more weekly (67.3%). The poor quality of sleep was higher among those who drink coffee (p=0.001). Regarding risk factors for grades of insomnia, higher prevalence of severe insomnia was observed among younger participants (p=0.001), Saudi citizens (p=0.032), obese participants (p=0.045), university educated participants (p<0.001), and those who practised exercise four times or more weekly (p=0.001).

Conclusion: Lifestyle factors had a significant effect on sleeping quality especially among young adults, obese people, and highly educated participants.

Keywords: Health centres, Risk factors, Sleep disturbances

INTRODUCTION

Sleep hygiene is influenced by environmental conditions and lifestyle practices that influence sleep [1]. The importance of sleep hygiene was formally recognised in 1990 when "inadequate sleep hygiene" was added as a diagnostic category to the international classification of sleep disorders [2]. Insomnia is a common sleep disorder that is associated with fatigue irritability, impaired daytime functioning, and disturbed mood, in severe cases even suicide [3,4]. The prevalence of insomnia among the general population is approximately 9-15% [5]. Several risk factors can influence insomnia such as age, gender, and work-shifts [6].

Common lifestyle practices known to affect sleep include: taking caffeine, drinking alcohol, smoking nicotine cigarettes, exercising (amount and timing), napping, bedtime routine, and consistency of getting-up- and bedtimes [7,8]. Conceptually, insomnia occurs when a combination of predisposing, precipitating, and perpetuating factors reach a threshold. Precipitating factors are those initiating the onset of insomnia include dramatic events such as grief, divorce or exams, while perpetuating factors play a role in sustaining of insomnia [9].

Caffeine, a commonly ingested psychoactive substance present in coffee, tea, cocoa, soft drinks, and many medications, stimulates the central nervous system and delays sleep onset by increasing alertness and vigilance in direct proportion to the amount consumed [10]. Although alcohol does expedite sleep onset, it is not recommended as a sedative since it disturbs sleep cycles. Intake of alcohol decreases the time to onset of sleep [11]. Smoking cigarettes containing nicotine has been associated with disturbed sleep, but the changes are inconsistent and a cause-and-effect relationship has not been established [12]. Changes in sleep due to smoking cigarettes are often complicated by simultaneous use of caffeine and alcohol. A combination of alcohol and caffeine and/or nicotine may disturb sleep more than any substance taken individually [12]. Regular exercise is recommended for improving sleep but the mechanisms remain uncertain [13,14]. Because exercise is arousing, the essential recommendation is to practice regularly but to avoid exercise three hours before sleep to prevent delayed sleep onset.

In Saudi Arabia, a study conducted in Riyadh region found about 62% have or may have sleeping disorders [15]. PHC is the first line of contact with Saudi health system, however, 40% of Primary Health Care (PHC) physicians thought that sleep disorders are not common [9]. Insomnia disorders constitute a significant burden for PHC physicians and need attention for prevention and early detection. In Saudi Arabia, Jeddah is the second most important urban and densely populated urban area following Riyadh region. As the population in Riyadh was previously studied [15], this study aimed to find out the effect of different socio-demographic or lifestyle factors on insomnia prevalence and severity in Jeddah region. As PHC is the first line of contact with health system in Saudi Arabia, patients attending PHC's centres are expected to be more representative of general population in Jeddah region.

MATERIALS AND METHODS

This cross-sectional study was conducted in the period June-October 2016 in the Government PHC centres of Jeddah province. The study was conducted by the Directorate of Health Affairs in Jeddah (Approval No. A00383). Inclusion criteria comprised adults

aged ≥18-year-old, giving written informed consents, attending PHC centres and they were residents of Jeddah province. Exclusion criteria were being pregnant, mentally retarded, or patients taking hypnotic medications. At 95% confidence interval and a 30% estimated prevalence rate for insomnia [9] and 5% accepted error margin, the minimum sample size was calculated to be 322. However, the actual sample size was increased to 376 to allow for about 10% expected non-response rate.

Following simple random sampling technique, out of 92 PHC centres available in Jeddah city, two PHC centres were selected from each of the five geographic locations of Jeddah City, i.e., a total of 10 PHC centres constituted the study setting. This statistic was provided by personal communication with Director of Public Health Administration in Jeddah city. Patients attending government PHC's were representing the whole population because it is the first contact of patients with Saudi health system, where patients come from various background and nationalities with different health problems. By systematic random sampling, with one-third sampling fraction, at least 37 adult patients were interviewed from each health centres. The completion of data collection was achieved within nine weeks. A study questionnaire has been used for data collection with two trained interviewers using guided interview approach. It comprised sociodemographic variables, lifestyle related questions, in addition to the Pittsburgh Sleep Quality Index (PSQI) and the Insomnia Severity Index (ISI). Sociodemographic variables included age, gender, nationality, marital status, residence, educational level, employment status; work shfts, monthly income, and BMI. BMI is routinely calculated in primary health centres in Saudi Arabia. Lifestyle-related questions included questions about frequency of physical exercise for ≥30 minutes (none, 1-3 times per week, 4 or more times/week), smoking, and drinking of caffeine-containing drinks.

The PSQI is a self-rated questionnaire. It assesses sleep disturbances and quality of sleep during one-month time interval. It includes 19 individual items that generate 7 "component" scores, i.e., sleep duration, sleep latency, subjective sleep, quality sleep disturbances, daytime dysfunction, habitual sleep efficiency and use of sleeping medication. The sum of these scores for the 7 components yields one global score. Using the PSQI, with scores ranging from 0 (worst sleep quality) to 21 (best sleep quality) and that of "<5" indicating a "poor" sleep. These cut-off scores used in the literature to categorise people according to the sleep quality with a sensitivity of 89.6% and specificity of 86.5%, and internal consistency (Cronbach's α=0.83) [16]. The Arabic version of the questionnaire was translated in 2010 with a Cronbach's alpha=0.65 [17].

To assess the severity of insomnia, ISI (Arabic version) (ISI was used. It is a brief instrument that was designed to assess the severity of both night-time and day-time components of insomnia. It is increasingly used as a metric of treatment response in clinical research. Four patient groups are formed, i.e., no clinically significant insomnia (score: 0-7); subthreshold insomnia (score: 8-14); moderate clinical insomnia (score: 15-21) and severe clinical insomnia (score: 22-28) [18].

Prior to data collection, the researcher fulfilled all necessary official permissions and approvals, including that from the Joint Program of Family and Community Medicine and the Primary Health Care Administration. Written informed consents were obtained from each patient before his/her participating in the current study. All collected data were kept confidential and were not used elsewhere except for the purpose of this research.

STATISTICAL ANALYSIS

The statistical Package for Social Sciences (SPSS, version 23.0) was used for data entry and analysis. Descriptive statistics (i.e., frequency, percentages, mean and standard deviation) were calculated. The chi-square (χ^2) test was applied to test significance of differences between groups. The p-values <0.05 were considered as statistically significant.

RESULTS

Out of 376 study participants with age range between 18-83-year-old, one-fourth of these participants (27.7%) aged <28-year-old, 37.2% aged 28-37-year-old, 18.4% aged 38-47-year-old, 11.2% aged 48-57-year-old, while 5.5% aged >57-year-old. More than half of participants (53.2%) were males, while the majority (83%) was of Saudi nationality. About two-thirds of participants (62.5%) were married, 31.4% were single, 4% were divorced and 2.1% were widowed. The majority of participants (91%) lived in Jeddah city. Regarding participants' BMI, 45.7% had normal BMI, 31.4% were overweight while 22.9% were obese. About 71% were university graduates and 16% were unemployed. Only 14.4% had work shifts and 43% had a monthly income of >10000 SR [Table/Fig-1].

Sociodemographic characteristics	No.	%
Age groups		
• <28 years	104	27.7
• 28-37 years	140	37.2
• 38-47 years	69	18.4
• 48-57 years	42	11.2
• >57 years	21	5.5
Gender		
• Male	200	53.2
• Female	176	46.8
Nationality		
• Saudi	312	83.0
• Non-Saudi	64	17.0
Marital status		
• Married	235	62.5
• Single	118	31.4
• Divorced	15	4.0
• Widow	8	2.1
Residence		
• Outside Jeddah city	34	9.0
• Inside Jeddah city	342	91.0
Body mass index		
• Normal	172	45.7
• Overweight	118	31.4
• Obese	86	22.9
Educational level		
• Illiterate	12	3.2
• Read and Write	24	6.4
• School	75	19.9
• University	265	70.5
Employment status		
• Unemployed	60	16.0
• Employed	235	62.5
• Student	65	17.3
• Retired	16	4.3
Work shifts		
• No	322	85.6
• Yes	54	14.4
Monthly income		
• <3000 SR	46	12.2
• 3000-4999 SR	58	15.4
• 5000-9999 SAR	111	29.5
• >10000 SAR	161	42.9

[Table/Fig-1]: Sociodemographic characteristics of study sample.
SAR: Saudi arabia riyals

Regarding practices of lifestyle activities, about half of participants did not practice physical exercise and 37.2% perform any physical exercise 1-3 times weekly. About one-fourth of participants were smokers and three-fourths of participants drink coffee regularly and 75.8% drink tea regularly, as shown in [Table/Fig-2]. [Table/Fig-3] showed that participant mean±SD PSQI score was 6.0±3.3 and more than half of participants had poor sleep quality. Furthermore, a prevalence of clinical insomnia was 16.2%, while "subthreshold" insomnia was prevalent among almost one-third of participants (32.2%).

Activities	No.	%
Frequency of physical exercise (≥30 mins)		
• None	187	49.8
• 1-3 times/week	140	37.2
• 4 or more times/week	49	13.0
Smoking status		
• Nonsmoker	286	76.1
• Smoker	90	23.9
Caffeine-containing drinks*		
• Coffee	271	72.1
• Tea	285	75.8
• Energy drinks	71	18.9

[Table/Fig-2]: Prevalence of different lifestyle activities among participants.
*Few participants consumed more than one type of caffeine containing drinks

Sleep Quality and Severity of Insomnia	No.	%
Sleep quality[1]		
• Good	184	48.9
• Poor	192	51.1
• PSQI score (Mean±SD)	6.0±3.3	
Severity of insomnia[2]		
• No clinically significant insomnia	194	51.6
• Subthreshold insomnia	121	32.2
• Clinical insomnia (moderate severity)	47	12.5
• Clinical insomnia (severe)	14	3.7
• ISI score (Mean±SD)	7.8±6.3	

[Table/Fig-3]: Participants' Sleep quality and severity of insomnia.
[1]According to PSQI
[2]According to ISI

The [Table/Fig-4] shows that participants' sociodemographic characteristics, participants' sleep quality differed significantly according to their age groups (p=0.01), with higher prevalence of poor sleep quality among younger participants. Female participants had significantly higher prevalence of poor sleep quality than males (p=0.007). Saudi participants had significantly higher prevalence of poor sleep quality than non-Saudi participants (p=0.001). Sleep quality differed significantly according to participants' marital status (p=0.007), with highest prevalence of poor sleep quality among those who were divorced or single (66.7% and 61.9%, respectively). Participants who were living outside Jeddah city (outside Jeddah city but inside Jeddah province) had significantly higher prevalence of poor sleep quality than those who were living in Jeddah city (67.6% and 49.4%, respectively, p=0.043). Quality of sleep did not differ significantly according to participants' BMI. Regarding the impact of participants' socioeconomic characteristics, as risk factors for poor sleep quality, participants' quality of sleep differed according to their educational level (p<0.001), with higher prevalence of poor sleep quality among higher educated participants. Quality of sleep differed according to participants' employment status (p=0.008), with highest prevalence of poor quality among students (64.6%). However, quality of sleep did not differ among participants according to work shifts. Quality of sleep differed significantly according to participants' income (p=0.008), with highest prevalence of poor sleep quality among those with monthly income of >10000 SR (59.6%).

Sociodemographic characteristics	Good		Poor		p-value
	No.	%	No.	%	
Age groups					
• <28 years	43	41.3	61	58.7	
• 28-37 years	65	46.4	75	53.6	
• 38-47 years	34	49.3	35	50.7	
• 48-57 years	25	59.5	17	40.5	
• >57 years	17	81.0	4	19.0	0.010*
Gender					
• Male	111	55.5	89	44.5	
• Female	73	41.5	103	58.5	0.007*
Nationality					
• Saudi	141	45.2	171	54.8	
• Non-Saudi	43	67.2	21	32.8	0.001*
Marital status					
• Married	128	54.5	107	45.5	
• Divorced	5	33.3	10	66.7	
• Single	45	38.1	73	61.9	
• Widow	6	75.0	2	25.0	0.007*
Residence					
• Outside Jeddahcity	11	32.4	23	67.6	
• Inside Jeddahcity	173	50.6	169	49.4	0.043*
Body mass index					
• Normal and Underweight	87	50.6	85	49.4	
• Overweight	60	50.8	58	49.2	
• Obese	37	43.0	49	57.0	0.458
Educational level					
• Illiterate	10	83.3	2	16.7	
• Read and Write	19	79.2	5	20.8	
• School	46	61.3	29	38.7	
• University	109	41.1	156	58.9	<0.001*
Employment status					
• Unemployed	29	48.3	31	51.7	
• Employed	119	50.6	116	49.4	
• Student	23	35.4	42	64.6	
• Retired	13	81.3	3	18.8	0.008*
Work shifts					
• No	160	49.7	162	50.3	
• Yes	24	44.4	30	55.6	0.476
Monthly income					
• <3000 SR	31	67.4	15	32.6	
• 3000-4999 SR	31	53.4	27	46.6	
• 5000-9999 SR	57	51.4	54	48.6	
• >10000 SR	65	40.4	96	59.6	0.008*

[Table/Fig-4]: Participants' sleep quality according to their sociodemographic characteristics.
*Chi-square test

Regarding the impact of participants' lifestyle activities, as risk factors for poor sleep quality, [Table/Fig-5] shows that sleep quality differed among participants according to practising physical exercise (p=0.01), with highest prevalence of poor sleep quality among those who perform physical exercise four times or more weekly (67.3%). Quality of sleep did not differ significantly among participants according to their smoking status. Participants' poor quality of sleep was higher among those who drink coffee (p=0.001) and those who do not consume energy drinks (p<0.001), but did not differ significantly according to drinking tea. Regarding the impact of participants' sociodemographic characteristics, as risk factors for grades of insomnia; [Table/Fig-6] shows that grades of insomnia among participants differed according to their age groups (p=0.001), with higher prevalence of severe insomnia among younger participants. Grades of insomnia did not differ significantly according to participants' gender. Grades of insomnia differed according to participants' nationality (p=0.032), with higher percentages of moderate and severe insomnia among Saudi than non-Saudi participants. Grades of insomnia did not differ significantly according to participants' marital status or residence. Grades of insomnia differed according to participants' BMI (p=0.045), with highest prevalence of severe insomnia among obese participants (9.3%). Severity of insomnia differed according to participants' educational level (p<0.001), with highest prevalence of severe insomnia among university-educated participants (4.5%). However, severity of insomnia did not differ significantly according to participants' employment status, work shifts or monthly income. The [Table/Fig-7] shows that severity of insomnia among participants differed according to their practice of physical exercise (p=0.001), with highest severity of insomnia among those who practiced exercise four times or more times weekly. Severity of insomnia did not differ according to smoking status or drinking coffee or tea but differed according to consuming energy drinks (p=0.026) with higher prevalence of severe insomnia among those who do not consume it.

Lifestyle activities	Good		Poor		p-value
	No.	%	No.	%	
Frequency of physical exercise					
• None	104	55.6	83	44.4	
• 1-3 times/week	64	45.7	76	54.3	
• 4 or more times/week	16	32.7	33	67.3	0.010*
Smoking status					
• Nonsmoker	142	49.7	144	50.3	
• Smoker	42	46.7	48	53.3	0.621
Caffeine-containing drinks					
• Coffee	66	62.9	39	37.1	
- No	118	43.5	153	56.5	0.001*
- Yes					
• Tea	39	42.9	52	57.1	
- No	145	50.9	140	49.1	0.183
- Yes					
• Energy drinks					
- No	134	43.9	171	56.1	
- Yes	50	70.4	21	29.6	<0.001*

[Table/Fig-5]: Participants' sleep quality according to their lifestyle activities.
*Chi-square test

Socio-demographic characteristics	Absent		Subthreshold		Moderate		Severe		p-value
	No.	%	No.	%	No.	%	No.	%	
Age groups									
• <28 years	47	45.2	38	36.5	16	15.4	3	2.9	
• 28-37 years	60	42.9	51	36.4	19	13.6	10	7.1	
• 38-47 years	41	59.4	19	27.5	8	11.6	1	1.4	
• 48-57 years	25	59.5	13	31.0	4	9.5	0	0.0	
• >57 years	21	100.0	0	0.0	0	0.0	0	0.0	0.001*
Gender									
• Male	112	56.0	59	29.5	25	12.5	4	2.0	
• Female	82	46.6	62	35.2	22	12.5	10	5.7	0.113
Nationality									
• Saudi	152	48.7	103	33.0	45	14.4	12	3.8	
• Non-Saudi	42	65.6	18	28.1	2	3.1	2	3.1	0.032*
Marital status									
• Married	133	56.6	68	28.9	25	10.6	9	3.8	
• Divorced	5	33.3	7	46.7	2	13.3	1	6.7	
• Single	49	41.5	45	38.1	20	16.9	4	3.4	
• Widow	7	87.5	1	12.5	0	0.0	0	0.0	0.101
Residence									
• Outside Jeddahcity	17	50.0	14	41.2	1	2.9	2	5.9	
• Inside Jeddah city	177	51.8	107	31.3	46	13.5	12	3.5	0.245
Body mass index									
• Normal and Underweight	89	51.7	62	36.0	19	11.0	2	1.2	
• Overweight	64	54.2	33	28.0	17	14.4	4	3.4	
• Obese	41	47.7	26	30.2	11	12.8	8	9.3	0.045*
Educational level									
• Illiterate	11	91.7	0	0.0	1	8.3	0	0.0	
• Read and Write	20	83.3	4	16.7	0	0.0	0	0.0	
• School	48	64.0	16	21.3	9	12.0	2	2.7	
• University	115	43.4	101	38.1	37	14.0	12	4.5	<0.001*
Employment status									
• Unemployed	32	53.3	21	35.0	5	8.3	2	3.3	
• Employed	124	52.8	69	29.4	32	13.6	10	4.3	
• Student	25	38.5	28	43.1	10	15.4	2	3.1	
• Retired	13	81.3	3	18.8	0	0.0	0	0.0	0.146
Work shifts									
• No	172	53.4	104	32.3	36	11.2	10	3.1	
• Yes	22	40.7	17	31.5	11	20.4	4	7.4	0.076
Monthly income									
• <3000 SR	31	67.4	13	28.3	2	4.3	0	0.0	
• 3000-4999 SR	31	53.5	16	27.6	9	15.5	2	3.4	
• 5000-9999 SR	52	46.9	40	36.0	15	13.5	4	3.6	
• >10000 SR	80	49.7	52	32.3	21	13.0	8	5.0	0.404

[Table/Fig-6]: Participants' grades of insomnia according to their sociodemographic characteristics.
*Spearman's Correlation

DISCUSSION

The present study aimed to assess the association between socio-demographic and lifestyle factors with the occurrence of insomnia. Results of the present study showed 51.1% of participants had poor sleep quality. Regarding severity of insomnia, 51.6% had no clinically significant insomnia, while 32.2% had "subthreshold" insomnia, 12.5% had "moderately severe" insomnia and 3.7% had "severe" insomnia. Therefore, prevalence of insomnia among participants was 16.2%.

These findings are in accordance with those reported by several studies. In Shanghai, China, Luo J et al., reported that 41.5% of the elderly in urban areas had poor sleep quality [19]. In Peru, Sanchez SE et al., reported that 55.9% of Peruvian College students had poor sleep quality [20]. In Sweden, Dragioti E et al.,

Lifestyle activities	Absent		Subthreshold		Moderate		Severe		p-value
	No.	%	No.	%	No.	%	No.	%	
Physical exercise									
• None	105	56.1	61	32.6	12	6.4	9	4.8	
• 1-3 times/week	72	51.4	44	31.4	23	16.4	1	0.7	
• >4 times/week	17	34.7	16	32.7	12	24.5	4	8.2	0.001*
Smoking status									
• Nonsmoker	153	53.5	89	31.1	33	11.5	11	3.8	
• Smoker	41	45.6	32	35.6	14	15.6	3	3.3	0.534
Caffeine-containing drinks									
• Coffee									
- No	65	61.9	30	28.6	8	7.6	2	1.9	
- Yes	129	47.6	91	33.6	39	14.4	12	4.4	0.054
• Tea									
- No	44	48.4	29	31.9	13	14.3	5	5.5	
- Yes	150	52.6	92	32.3	34	11.9	9	3.2	0.667
• Energy drinks									
- No	146	47.9	105	34.4	41	13.4	13	4.3	
- Yes	48	67.6	16	22.5	6	8.5	1	1.4	0.026*

[Table/Fig-7]: Participants' grades of insomnia according to participants' lifestyle activities.

reported that among a sample of the Swedish population, 35.7% had no clinically significant insomnia, 44.3% had subthreshold insomnia, 17.8% had moderate clinical insomnia, and 2.2% had severe clinical insomnia [21]. Therefore, 20% of the total sample had clinical insomnia. Marchi NSAd et al., in Brazil reported that prevalence of insomnia among the adult population was 32% [22]. In the USA, insomnia among the general population was reported by Leger D and Poursain B, to be 27.1% [23]. Beck F et al., reported that 15.8% of the general population in France presented with insomnia [24]. A high rate has been reported by Zailinawati AH et al., who noted that 60% of Malaysian primary health care patients had poor sleep quality [25]. They pointed out that prevalence of sleep disturbances among PHC attendants is usually higher than that for the general population. They ascribed that these sleep disturbances to the possible underlying physical and/or mental health problems that brought people to primary care clinics.

There are wide variations regarding reported prevalence rates by different studies for poor sleep quality and insomnia [24-26]. They attributed these variations to the differences in the criteria used by various studies to define insomnia. Studies that use strict definitions for insomnia tended to report lower prevalence rates, while studies which used broader definitions (e.g., using only one sleep symptom to diagnose insomnia or poor sleep quality) tended to report higher rates; for example, when Chiu HF et al., included "frequency of sleep disturbances" as a part of their diagnostic criteria for insomnia, the reported prevalence rate was much reduced from 38.2% to 13.7% [27]. Results of the present study showed that sleep quality and grades of insomnia differed significantly according to participants' age groups, with higher prevalence of poor sleep quality and severe insomnia among younger participants. Several studies pointed out the significant association of age and quality of sleep. Zailinawati AH et al., found that, in Malaysia, younger people have more sleep problems than older ones [25]. On the other hand, Luo J et al., found different results as older people have longer sleep latency, poorer sleep efficiency, more sleep disturbances and poorer subjective sleep quality [19]. However, Su TP et al., reported that older age did not significantly correlate with increased rate of insomnia [26].

Results of this study showed that female participants had significantly higher prevalence of poor sleep quality than males. This finding agreed with that reported by Ahmed AE et al., [28]. Similarly, Luo J et al., Beck F et al., and Morin CM and Gramling SE, reported that females were more susceptible to insomnia and poor sleep quality than males [19,24,29]. Lopes EA et al., argued that the reasons why females are more prone than males to poor sleep quality and insomnia are not clear [30]. However, insomnia may occur in association with hormonal changes that are unique to women. Krystal AD, stated that there may be a correlation between the decrease in circulating estrogens and progesterone and an increase in prevalence of insomnia [31]. In addition, males in Saudi culture are food-bringer who routinely go for work in the morning and come back in the evening.

This study showed that Saudi participants had significantly higher prevalence of poor sleep quality and severe insomnia than non-Saudi participants. This result is consistent with that of Ahmed AE et al., who found that insomnia symptoms were highly prevalent among the Saudi adult population [28]. This finding may be attributed to the difference in the type of occupation because non-Saudi residents usually work as manual workers while Saudis mostly work in managerial occupations. Manual workers often have regular bed- and waking-up times which is thought to strengthen the circadian timing of sleeping by means of a homeostatic mechanism [15], and by consistent exposure to light/darkness cycles which enable the brain/body to regulate sleeping and waking-up times.

This finding may be also explained that the non-Saudi who work in Saudi Arabia may consider insomnia as a transient complaint due to being away from home that does not necessitate visiting a health facility. Results of the present study showed that sleep quality differed significantly according to participants' marital status, with highest prevalence of poor sleep quality among those who were not married (i.e., divorced or single). This finding is in accordance with that of Ahmed AE et al., in Riyadh, who reported that prevalence rates for insomnia differed widely according to participants' marital status, being more common among widows or divorced participants than married participants [28]. Similarly, Abd Allah ESA et al., in Zagazig City, Egypt, reported that prevalence of insomnia was significantly higher among non-married participants [32].

The lower prevalence of insomnia among those who are married may reflect the role played by the family relationships in providing the normal psychological balance that becomes disrupted in case of divorce or loss of a spouse. Results of the present study revealed that insomnia severity did not differ significantly according to participants' BMI when BMI categorised into three categories as presented in [Table/Fig-4]. However, when the Pearson correlation was used a positive correlation was detected between BMI and PSQI scores of insomnia as demonstrated in [Table/Fig-6]. Similarly, several researchers found significant associations, for example, Pearson NJ et al., indicated that obese persons are significantly more likely to report insomnia or poor sleep quality [33]. On the other hand, insomnia may predispose to overconsumption of food, thus leading to weight gain [34].

The present study showed a significant association between socioeconomic status of participants and their quality of sleep and severity of insomnia, which differed significantly according to participants' educational level, employment status and monthly income. These results are in accordance with those reported by several researchers. Ogunbode AM et al., in Nigeria, noted that higher prevalence of insomnia, was associated with being more educated [35]. This finding may be explained by the relatively increased responsibilities and stresses among those who are more educated compared with those who are not educated. The present study revealed that sleep quality and severity of insomnia differed significantly among participants according to practising physical exercise, however, those who perform more exercise had poor

quality of sleep. This finding disagreed with that of Luo J et al., who noted that regularly performing physical exercise was a protective factor against poor sleep quality [19]. Moreover, experimental evidence has suggested that exercise may be associated with better sleep quality [36]. The present findings may be explained by the fact that people who regularly practice exercise in Saudi Arabia are more likely those who have high economic status. This high economic status may be linked to lifestyle where many activities such as shopping and social gatherings are performed in the night rather than daytime.

Participants' poor quality of sleep differed significantly according to drinking coffee and consumption of energy drinks. On the other hand, severity of insomnia did not differ significantly according to smoking status or drinking coffee or tea but differed significantly according to consuming energy drinks. This finding is in accordance with that of Sanchez SE et al., who reported that participants who consumed different types of caffeinated beverages, e.g., popular energy drinks had higher prevalence of poor sleep quality compared with those who abstained from these drinks [20]. Jin MJ et al., stated that the amount of caffeine intake has a significant correlation with insomnia [37]. Ironically, the present study revealed that consumption of energy drinks was significantly associated with lower prevalence of poor sleep quality and also lower prevalence of insomnia. This unexpected finding certainly needs further exploration in another study. Higher educational level may be associated with greater knowledge about sleep hygiene practices and more awareness about of the strategies that can be used to improve sleep. The more educated people may also be more proactive in their attempts to use various personalised strategies to enhance their sleep quality, as well as having greater recognition of the importance of sleep for health and well-being (e.g., through reading media articles or the internet). Authors recommended to regularly screen adult attendants of PHC centres for their sleep quality and insomnia, especially those with poor sleep hygiene and those with significant risk factors, e.g., younger age, female gender, Saudi, being divorced or single, those living outside Jeddah, being highly educated, and students. Health education should be provided to the adult attendants at primary health care centres regarding, management of obesity, proper practice of physical exercise and the necessity to limit intake of coffee and consumption of energy drinks to improve sleep quality of these high-risk groups.

LIMITATION

The limitations of this study included the cross-sectional design which is not robust in the detection of associations between risk factors and certain outcomes. The longitudinal approach is required for future research and the stratification of the sample is better to be performed based on age and gender to represent the population in different sociodemographic groups. In addition, data about past medical history of study participants can explore more factors associated with poor sleep quality particularly in old age participants.

CONCLUSION

About half of adult primary health care attendants have poor sleep quality, with clinical insomnia affecting almost one-sixth of them. Risk factors for poor sleep quality included younger age, female gender, Saudi nationality, being divorced or single, those living outside Jeddah, and being highly educated. Lifestyle-activities associated with poor sleep quality include drinking coffee and consumption of energy drinks.

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