

Research Article

Sleep Quality among Healthcare Providers; In Riyadh, 2019.**Fahad A. Alamri¹, Samar A. Amer^{1, 2}, Almaha Almubarak³, Hadeel Alanazi³**¹family Medicine, Ministry Of health (MOH), Saudi Arabia (SA)²Public Health and Community Medicine Department, Zagazig University, MOH, SA.³Faculty of Health education**Abstract:**

Introduction: Sleep plays an essential role in health and wellbeing. One of every three Saudis has short sleep duration per night. Saudi medical students had a high prevalence of sleep disorder, 36.6% of them were have abnormal sleep habits. So, this the study aimed to assess then improve the sleep quality and overall health status among healthcare providers (HCPs), by online surveying HCPs in the capital city of the kingdom of Saudi Arabia in Riyadh from Jan to Feb 2019 ,through the following objectives; To assess sleep quality among HCPs, to measure the prevalence of sleep disturbance, and to study the factors and determinants that may affect sleep quality.

Methodology: An analytical cross-sectional study targeting 518 of randomly selected HCPs in Riyadh after a written informed consent. Using online, self-administrated, pretested; an Arabic questionnaire composed of 33 questions divided into three main parts ;(addresses the sociodemographic and work characteristics, to assess sleep habits and quality using Pittsburgh Sleep Quality Index (PSQI), and the third part to study factors and determinants that affects the sleep quality. The suitable tests were used to analyze the coded collected data using SPSS.

Results: the majority of the HCPs were 49.7% aged less than 30 y old, 65.9% females, 53.2% married, 91.7% Saudi, 23.3% health educator specialists, 93.6% working in governmental hospitals, and median of 5 years of experience. A high prevalence of poor sleep quality 85.9% as median the sleep quality score was 10, range (3-21), its significantly affected by all the studied variables (age, specialty, sex, job position, and the health status). The main causes of sleep disturbances were work stressors (41.3%), social stressors 33.8%, cell phone use (31.6%), and the health status 12.7% in descending orders.44.4percentage of HCPs reported a diagnosed sleep disorder mainly altered sleeping times.

Conclusions: poor sleep quality is highly prevalent among HCPs in Riyadh city. the sleep efficacy, sleep medication and sleep disturbance were the most affected domains

Keywords: sleep, quality, disturbance, health care providers, Riyadh.

Introduction;

Sleep problem complains are common among Health care workers and significantly affect their quality of life and productivity (1). One of every 3 Saudis has short sleep duration per night (2). Saudi medical students had high prevalence of sleep disorder, and 36.6% of them were have abnormal sleep habits (3).

Sleep is biological process (4), affects every tissue and system in the body. It has two types of sleep: **rapid eye movement (REM)** sleep occurs about 90 minutes after falling asleep and non-REM sleep which has three stages; Stage 1: the moving from wakefulness to sleep, Stage 2: is a period of light sleep before enter deep sleep, Stage 3: is the period of deep sleep that person need to feel refreshed in the morning Most of the dreaming occurs during REM sleep, although some can also occur in non-REM sleep(5).

Sleep had an essential role in vital physiologic functions including support the growth development (6) of children and adolescents, energy conservation, brain waste clearance, performance, cognition, , psychological conditions, disease, vigilance ,modulation of immune responses [7,8] and in the health wellbeing throughout life span (9).

Adequate sleep at appropriate times protects the individual's mental, physical health, quality of life, safety (10, 11). Inadequate sleep have negative consequences. Factors contributing to sleep problems including lifestyle factors, environmental factors, psychological and social issues, and

medical conditions. (12). Inadequate sleep caused mainly by Sleep Disturbance (SD) (13).

Disordered sleep (DS) are highly prevalent disorders affect all age groups, and had decrements in perceived health (14), defined as a range of sleep problems including hypersomnia conditions (such as sleep apnea and narcolepsy), parasomnia conditions (such as confusional arousal, restless leg syndrome, and sleepwalking), disorders of initiating and maintaining sleep (insomnias), disorders of excessive somnolence, disorders of sleep-wake schedule, and dysfunctions associated with sleep, sleep stages, or partial arousals.(15).The International Classification of Sleep Disorders-3 (ICSD-3) classifies over 80 different sleep disorders, which can be diagnosed and treated(16).

Consequences of sleep disturbance were divided into two categories, (17). *The short-term consequences include* emotional distress, somatic problems, increased stress responsivity, performance deficits, mood disorders and other mental health problems, cognition, memory, and reduced quality of life (18). *while The long-term ones include* weight-related issues, dyslipidemia, hypertension, Cardiovascular disease (CVD), Type 2 Diabetes (T2DM) and metabolic syndrome. It also may increase the risk of certain cancers and death. (19)

Sleep is a complex physiological process that is regulated globally, regionally, and locally by both cellular and molecular mechanisms (20). The quality of sleep is determined by the sleep hygiene (different set of practices and

necessary habits that help the individual to get a good sleep). The quality of sleep significantly improved by making some simple adjustments to the lifestyle and behavior (21). The needed amount of sleep Varies from one to another, depending on the age (22). According to the National Sleep Foundation, most adults need seven to nine hours of quiet sleep each night (23).

So, this the study aimed to assess then improve the overall sleep quality among healthcare providers (HCPs), by online surveying HCPs in the capital city of the kingdom of Saudi Arabia in Riyadh from Jan to Feb 2019 through the following objectives; To assess sleep quality among HCPs, to measure the prevalence of sleep disturbance, and to study the factors and determinants that may affect sleep quality.

Methodology: an analytical cross sectional study targeting a randomly selected sample from the 9250 health care providers in Riyadh city, whom aged 20-<60 years old (24), the sample calculated with a sleep disorder prevalence 80% KSA(25), at 95% confidence interval and 80% power of the study to be 553, conducted during January -February 2019

A Self administrated ,online (google forms website) ,pretested ,validated by 5 experts ,an Arabic questionnaire was used as a data collection tool .its consisted of 33 questions ,composed of four main parts; **1)Demograph and work characteristics** ,**2) To measure the quality and pattern of sleep using an effective instrument the Pittsburgh Sleep Quality Index (PSQI)**,It differentiates “poor” from “good” sleep by measuring seven domains: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction over the last monthIn scoring the PSQI, seven component scores are derived, each scored 0 (no difficulty) to

3 (severe difficulty). The global score on Likert scale of its seven components (range 0 to 21). Higher scores indicate worse sleep quality ,0.83 coefficient (Cronbach’s alph) has internal consistency and reliability scoring(26) .**3) To study factors that affects the sleep quality** **4)To determine the prevalence of sleep disturbance** (self -clinically diagnosed)

The King Fahad Medical City ethical research committee approved this study with IRP login Number 19-005E .2 January 2019 , and all the researchers obtained NIH certificate, the questionnaire contains no sensitive or privates questions ,the participants answered after a written informed verbal consent titand their idenies were anonymous

The collected data was coded and analyzed using SPSS version 20. Mean, Median, Standard deviation (SD), and range was used for quantitative data summarization, while student t test and Kruskall-Wallis test was used for their analysis. Frequency (F), and percentage (%) were used for qualitative data summarization, while chi square test was for their analysis .the level of significance (p<0.05)

Results : out of the 553 only 513 health care providers were involved(respondent rate (92.7%),65.9% were females, 49.7% aged 20-<30y and 33.9% aged 30-<40y old, the majority of them were Saudi, and their families lives in Riyadh (94.0)more than half were married (53.2%), and 43.9% were single ,48.0% working an affiliate functions, 26.5% were doctors and 23.2% were specialists, about 40% working in governmental hospitals, and with a median working hours of 5 ranged (1-16h/day) . (76, 1%) of the providers had no chronic disease.

Table no (1) Shows the demographic characters among the studied health care providers (HCPs).

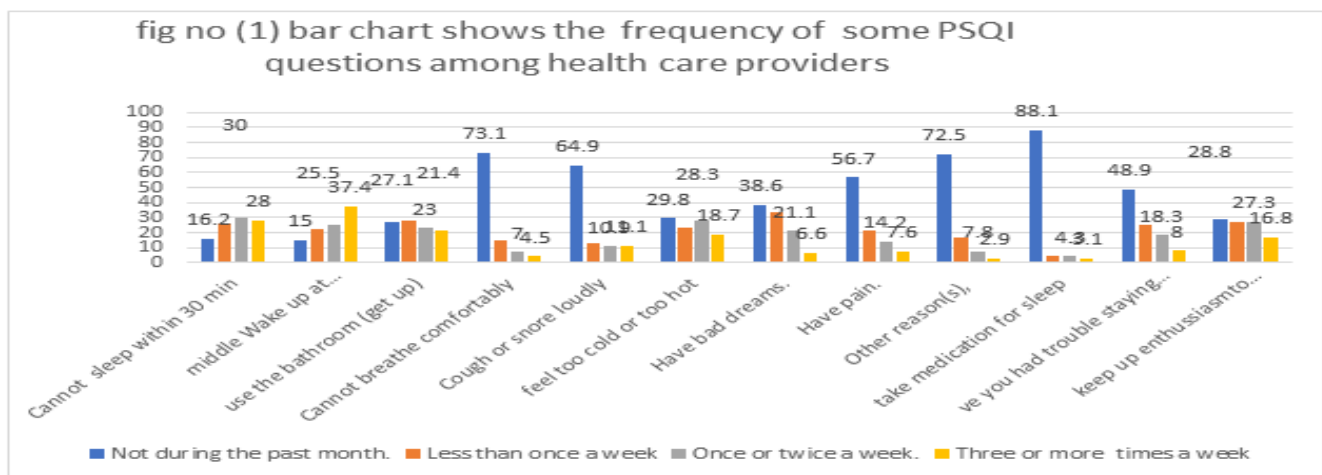
Variables	F (median)	%
Age (y)		
➤ 20-<30	255	49.7
➤ 30-<40	174	33.9
➤ 40-<50	47	9.2
➤ >50	37	7.2
Marital status		
➤ Widow	1	0.2
➤ Single	225	43.9
➤ Married	273	53.2
➤ Divorced	74	2.7
Sex		
➤ females	338	65.9
➤ Males	175	34.1
Specialties		
✓ Student	85	16.6
✓ Intern	54	10.5
✓ Physician	136	26.5
✓ Nurse	49	9.6
✓ Pharmacy	22	4.3
✓ Administrative	48	9.4

✓ Specialist (health education-public health)	119	23.2
working setting (no=424)		
➤ Governmental hospital	168	39.6
➤ Primary Health Care Centers(PHCCs)	120	28.3
➤ Ministry Of Health (MOH)	99	23.3
➤ Others	37	8.7
Working hours	(5)	1-16
Mean+_SD	(8.5+_7.5)	
History of chronic disease		
✓ No history of chronic disease	391	76.2
✓ Asthma	7	1.36
✓ Hypothyroidism	17	3.3
✓ Cardiovascular disease(CVD)	39	7.06
✓ Cancer	3	0.58
✓ Psychological disorders	14	2.73
✓ Diabetes	22	4.2
✓ Hypertension	30	5.84
✓ Overweight /obesity	39	7.06
✓ Others	34	6.62
Working status		
➤ Not working	89	17.3
➤ Trainees	79	15.4
➤ Leadership job	99	19.3
➤ Affiliate function	246	48.0

Table no (2), fig no (1, 2) Shows the Pittsburgh Sleep Quality Index (PSQI) among the studied health care providers

The mean time at which the HCPs gone to bed is 11p.m, wake up at six; 30a.m, sleeping nearly 6; 30 h per night, and took 60min to fall in sleep. Their pattern of sleep affected by many factors the majority (58% frequently cannot go to sleep within 30min, about 60% frequently middle waking up early in the morning or night, and 44% frequently get up to use bathroom. About 27% reported fairly or very bad overall sleep quality, while only 6.3% reported fairly or very bad health status.

Questions	median	mean	range
Usually gone to bed (time)	11p.m	8.43+_4.4	(am4-am12)
How long (in minutes) has it taken you to fall asleep each night ?	60	155+_39	10-240
Wake up in the morning (time)	6:30a.m		4p.m-4 a.m
Hours of actual sleep at night		6.23+_2.1	(12-3)



the main factors that affects the quality of sleep among health care providers were work stressors ,family/social works stressors ,using cell phone, and the general health status in descending orders (41.9%,35,3% , 31.9 and 13.3%.....etc ,55.2% of the studied HCPs reported the most common sleep disorders in descending order were (sleep scheduled disorders and wake up ,insomnia, partial fatigueetc).only 1.3% of them diagnosed by specialists (fig 3,4,5)

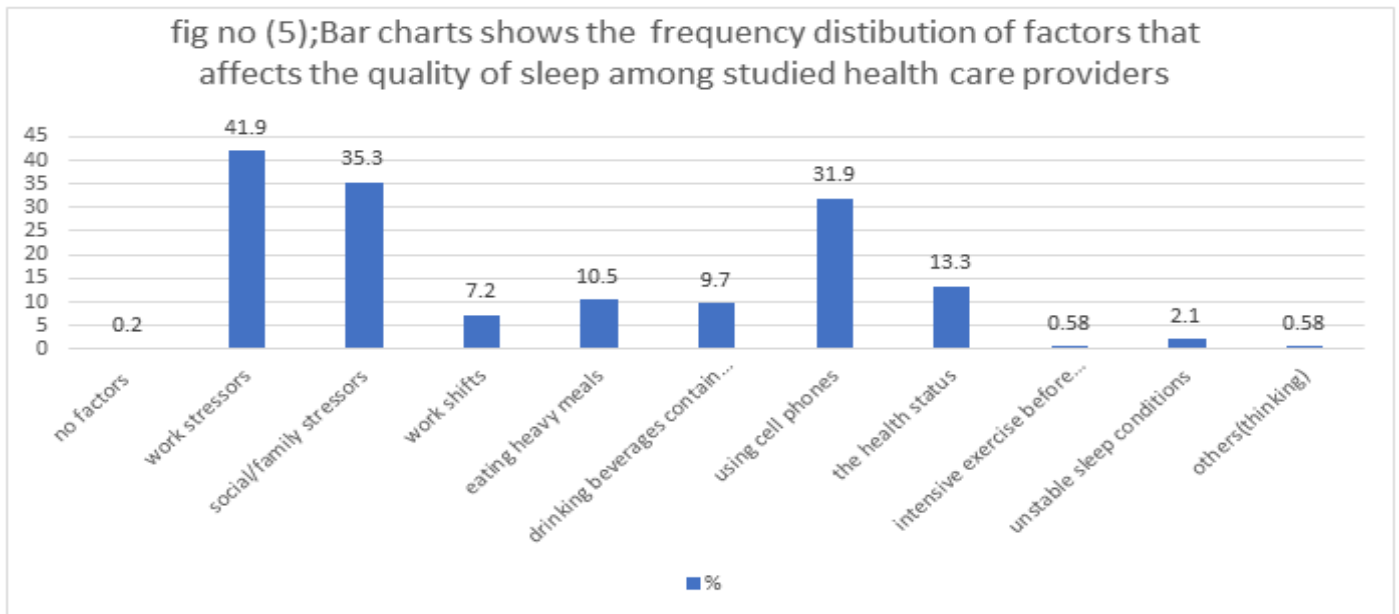
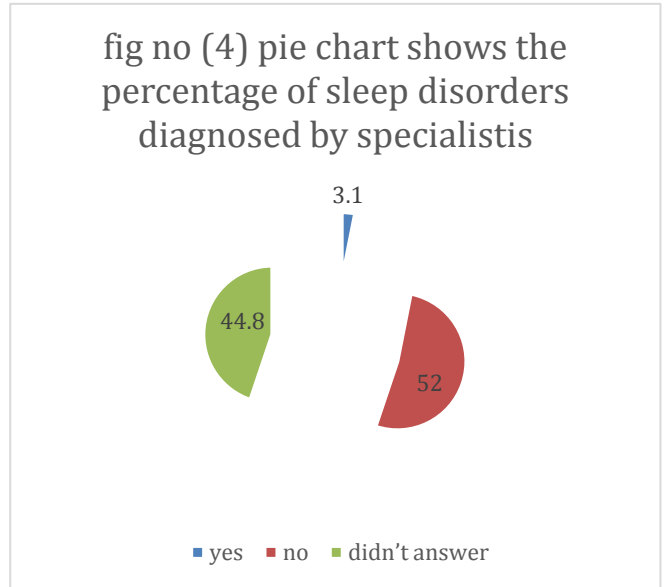
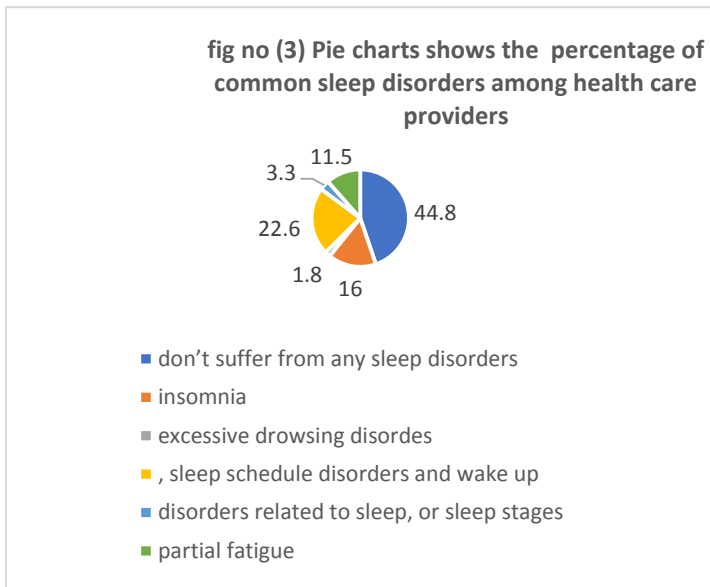
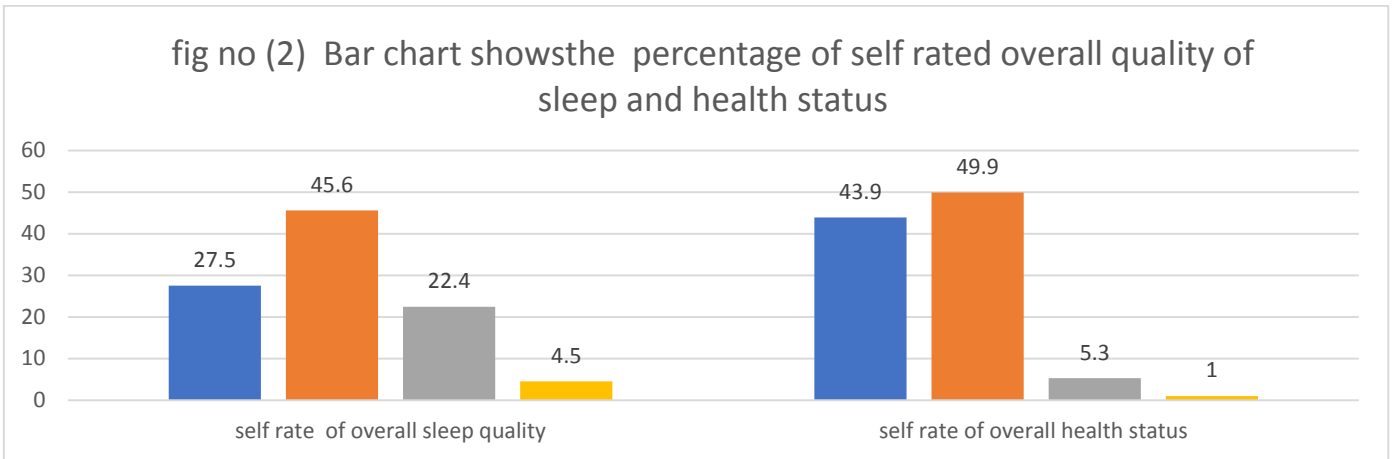


Table no (3) shows the relationships between the sex and the Pittsburgh Sleep Quality Index (PSQI) domains;

(PSQI) domain number ()	Total	Females No=338 (65.9)	males No= 175(34.1)	P
Total sleep quality score	10	11	9	0.00*
Median	10.8+_3.5	11.3+_3.5	9.9+_3.4	
Mean+_SD	3-21	3-21	3-21	
Range				
Sleep latency (2)				0.15
➤ No difficulty	50(9.7)	30(8.9)	20(11.4)	
➤ Mild difficulty	203(39.6)	128(37.9)	75(42.9)	
➤ Moderate difficulty	173(33.7)	114(33.7)	59(33.7)	
➤ Sever difficulty	87(17.0)	66(19.5)	21(12.0)	
Habitual sleep efficiency (4)				0.01*
➤ >85%	9(1.8)	5(1.5)	4(2.3)	
➤ 75-84%	28(5.4)	11(3.3)	17(9.7)	
➤ 65-74%	60(11.7)	40(11.80)	19(10.9)	
➤ <65%	417(81.1)	282(83.4)	135(77.1)	
Sleep disturbance (5)				0.01*
➤ No difficulty	8(1.6)	7(2.1)	1(0.6)	
➤ Mild difficulty	318(61.9)	194(57.4)	124(70.9)	
➤ Moderate difficulty	178(34.7)	132(39.1)	46(26.3)	
➤ Sever difficulty	9(1.8)	5(1.5)	4(2.3)	
Sleep time dysfunction (7)				0.00*
➤ No difficulty	59(11.5)	28(8.3)	31(17.7)	
➤ Mild difficulty	228(44.4)	133(39.3)	95(54.3)	
➤ Moderate difficulty	170(33.1)	131(38.8)	39(22.3)	
➤ Sever difficulty	56(10.9)	46(13.6)	10(5.7)	
Subject sleep quality (1)				0.10
➤ Very good	141(27.4)	83(24.6)	58(33.1)	
➤ Fairly good	234(45.5)	155(45.9)	79(45.1)	
➤ Fairly bad	115(22.4)	82(5.3)	33(18.9)	
➤ Very bad	23(4.5)	18(5.3)	5(2.9)	
Sleep duration (3)				0.06
➤ >7h	102(19.8)	77(22.8)	25(14.3)	
➤ 6-7h	262(51.0)	164(48.5)	98(56.0)	
➤ 5-6	107(20.4)	66(19.5)	41(23.4)	
➤ <5h	42(8.2)	31(9.2)	11(6.3)	
Sleep Medication use (6)				0.93
➤ Not during past month 0	452(88.1)	300(88.8)	152(86.9)	
➤ Less than once a week 1	23(4.5)	14(4.1)	9(5.1)	
➤ Once or twice a week 2	22(4.3)	14(4.1)	8(4.6)	
➤ Three or more times a week	16(3.1)	10(3.0)	6(3.4)	

*p <0.05 there was a statistically significant difference yellow highest frequency of poor quality / green highest frequency of good sleep quality at the PSQI domains

The prevalence of poor sleep quality was 85.9% among HCPs .the sleep efficacy, sleep disturbance, and sleep latency were the most affected components. There was significant difference between male and females as regards the sleep time dysfunction, sleep efficiency, and total sleep quality score.

Table no (4) shows the relationships between the age groups and the Pittsburgh Sleep Quality Index (PSQI) domains.

(PSQI) domain number ()	20-<30 y No=255(49.7)	30-<40y N0=174(33.9)	40-<50y No=47(9.2)	>50 y No=37(7.2)	P
Total sleep quality score					0.00*
Median	11	10	9	10	
Mean+_SD	11.4+_3.1	10.6+_3.7	9.4+_3.7	9.6+_3.2	
Range	4-20	3-21	3-20	3-17	
Sleep latency (2)					0.02*
➤ No difficulty	33(12.9)	14(8.0)	0(0.0)	0(0.0)	
➤ Mild difficulty	101(39.6)	65(37.4)	10(21.3)	1(2.7)	
➤ Moderate difficulty	85(33.3)	53(30.5)	8(12.9)	2(5.4)	
➤ Sever difficulty	36(14.1)	42(24.1)	29(61.7)	34(91.9)	
Habitual sleep efficiency (4)					0.26
➤ >85%	4(1.6)	3(1.7)	1(2.1)	1(2.7)	
➤ 75-84%	14(5.5)	12(6.9)	2(4.3)	0(0.0)	

➤ 65-74%	28(11.0)	19(10.9)	4(8.6)	8(21.6)	
➤ <65%	209(82.0)	140(80.5)	40(85.1)	28(75.7)	
Sleep disturbance (5)					0.12
➤ No difficulty	8(3.1)	0(0.0)	0(0.0)	0(0.0)	
➤ Mild difficulty	163(63.9)	108(62.1)	27(57.4)	20(5.4)	
➤ Moderate difficulty	81(31.8)	62(35.6)	18(38.3)	17(45.9)	
➤ Sever difficulty	3(1.2)	4(2.3)	2(4.3)	0(0.0)	
Sleep time dysfunction (7)					0.42
➤ No difficulty	28(11.0)	23(13.2)	4(8.5)	4(10.8)	
➤ Mild difficulty	121(47.5)	70(40.2)	19(40.4)	18(48.6)	
➤ Moderate difficulty	87(34.1)	55(31.6)	18(38.3)	10(27.0)	
➤ Sever difficulty	19(7.5)	26(14.9)	6(12.8)	5(13.5)	
Subject sleep quality (1)					0.28
➤ Very good	66(25.9)	57(32.8)	9(19.1)	9(24.5)	
➤ Fairly good	128(50.2)	65(37.0)	23(48.9)	18(48.6)	
➤ Fairly bad	51(20.0)	45(25.9)	11(23.4)	8(21.6)	
➤ Very bad	10(3.9)	7(4.0)	4(8.5)	2(5.4)	
Sleep duration (3)					0.03*
➤ >7h	55(21.0)	39(22.4)	4(8.5)	4(10.0)	
➤ 6-7h	139(54.5)	82(47.1)	20(42.6)	21(56.8)	
➤ 5-6	41(16.1)	39(22.4)	17(36.2)	10(27.5)	
➤ <5h	20(7.8)	14(8.0)	6(12.8)	2(5.4)	
Sleep Medication use (6)					0.58
➤ Not during past month	228(89.4)	151(86.3)	41(87.0)	32(86.5)	
0	11(4.3)	6(3.4)	3(6.4)	3(8.1)	
➤ Less than once a week	8(3.1)	9(5.2)	3(6.4)	2(5.4)	
1	8(3.1)	8(4.6)	0(0.0)	0(0.0)	
➤ Once or twice a week					
2					
➤ Three or more times a week					

*p <0.05 there was a statistically significant difference yellow highest frequency of poor quality / green highest frequency of good sleep quality at the PSQI domain

There were significant association between age groups and the sleep duration, and. sleep latency

Table no (5) shows the relationship between the specialty and the Pittsburgh Sleep Quality Index (PSQI) domains;

(PSQI) domain number ()	Specialist of HE..... N0= 119	administrative No=48	Pharmacist No=22	Student No=85	Doctor N0=136	Trainer No=54	Nurse No=49	p
Total sleep quality score	10 11.3+_3.	10.5 10+_3.5	11 10.9+_3.6	12 11.8+_3.	9 9.5+_3.2	11 11.1+_3.	11 11.7+_4.	0.00*
Median	3	3-17	5-19	8	3-19	1	4	
Mean+_SD	5-20			6-19		6-19	3-21	
Range								
Sleep latency (2)								0.01*
➤ No difficulty	6(5.0)	7(14.6)	0(0.0)	9(10.6)	21(15.4)	5(9.3)	2(4.1)	
➤ Mild difficulty	38(31.9)	16(33.3)	13(59.1)	30(35.3)	59(43.4)	28(51.9)	19(38.8)	
➤ Moderate difficulty	53(44.5)	16(33.3)	7(31.8)	25(29.4)	44(32.4)	11(20.4)	17(34.7)	
➤ Sever difficulty	22(18.5)	9(18.8)	2(9.1)	21(24.7)	12(8.3)	10(18.5)	11(22.4)	
Habitual sleep efficiency (4)								0.01*
➤ >85%	4(3.4)	1(2.1)	0(0.0)	1(1.2)	3(1.2)	0(0.0)	0(0.0)	
➤ 75-84%	4(3.4)	8(16.7)	1(4.5)	1(1.2)	7(1.2)	1(1.9)	6(12.2)	
➤ 65-74%	10(8.4)	5(10.4)	2(9.1)	14(16.5)	16(16.5)	45(14.8)	4(8.2)	
➤ <65%	101(84.9)	34(70.9)	19(86.4)	69(81.4)	110(80.9)	54(83.3)	39(79.6)	
Sleep disturbance (5)								0.19
➤ No difficulty	2(1.7)	0(0.0)	0(0.0)	1(1.2)	3(2.2)	1(1.9)	1(2.0)	
➤ Mild difficulty	71(59.7)	27(56.3)	10(45.5)	54(63.5)	98(72.1)	34(63.0)	24(49.0)	
➤ Moderate	43(36.1)	20(41.7)	12(54.5)	30(35.3)	34(25.0)	18(33.3)	21(42.9)	
➤ Moderate	3(2.5)	1(2.1)	0(0.0)	0(0.0)	1(0.7)	1(1.9)	3(6.1)	

➤ difficulty								
➤ Sever difficulty								
Sleep time dysfunction (7)	10(8.4)	7(14.6)	4(18.2)	5(5.9)	23(16.9)	2(3.7)	8(16.3)	0.00*
➤ No difficulty	54(45.4)	25(52.1)	12(54.5)	21(24.7)	76(55.9)	23(42.6)	17(34.7)	
➤ Mild difficulty	43(36.1)	14(29.2)	2(9.1)	38(44.7)	32(23.5)	24(44.4)	17(34.7)	
➤ Moderate difficulty	12(10.1)	2(4.2)	4(18.2)	21(23.7)	5(3.7)	5(9.3)	7(14.3)	
➤ Sever difficulty								
Subject sleep quality (1)	33(27.7)	18(37.5)	8(36.4)	14(16.5)	43(31.6)	9(16.7)	16(32.7)	0.00*
➤ Very good	51(42.9)	23(47.9)	9(40.9)	34(40.0)	68(50.6)	30(55.6)	19(38.8)	
➤ Fairly good	32(26.9)	7(14.6)	3(13.6)	27(31.8)	22(16.2)	14(25.9)	10(20.4)	
➤ Fairly bad	3(2.5)	0(0.0)	2(9.1)	10(11.8)	3(2.2)	1(1.9)	4(8.2)	
➤ Very bad								
Sleep duration (3)	27(22.7)	12(25.0)	3(13.6)	20(23.5)	21(15.4)	11(20.4)	8(16.3)	0.02*
➤ >7h	55(46.2)	4(50.0)	9(40.9)	41(48.2)	84(61.8)	32(59.3)	17(34.7)	
➤ 6-7h	29(24.4)	11(22.9)	9(40.9)	15(17.6)	21(15.4)	6(11.1)	16(32.7)	
➤ 5-6	8(6.7)	1(2.1)	1(4.5)	9(10.6)	10(7.4)	5(9.3)	8(16.3)	
➤ <5h								
Sleep Medication use (6)	105(88.2)	40(83.3)	19(86.4)	75(88.2)	124(91.2)	48(88.9)	41(88.7)	0.00*
➤ Not during past month	6(5.0)	2(4.2)	0(0.0)	5(5.9)		1(1.9)	3(6.1)	
➤ Less than once a week	6(5.0)	3(6.3)	1(4.5)	3(3.5)	6(4.4)	3(5.6)	3(6.1)	
➤ Once or twice a week	2(1.7)	3(6.3)	2(9.1)	2(2.4)	3(2.2)	2(3.7)	2(4.1)	
➤ Three or more times a week					3(2.2)			

*p <0.05 there was a statistically significant difference yellow highest frequency of poor quality / green highest frequency of good sleep quality at the PSQI domain

The specialty is significantly affecting all the Pittsburgh Sleep Quality Index) PSQI domains except the sleep disturbance.

Table no (6) shows the relationship between the working status and the) Pittsburgh Sleep Quality Index(PSQI) domains.

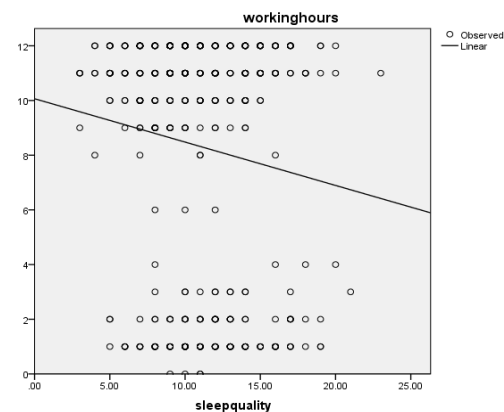
(PSQI) domain number ()	Not working No=89(17.3)	Trainers N0=79(15.4)	Affiliate function No=246(48.0)	Leadership function No=99(19.3)	P
Total sleep quality scor					
Mean+_SD	11.3+_2.9	11.6+_3.5	10.6+_3.6	10.3+_3.6	
Range	5-19	6-20	3-23	3-19	
Sleep latency (2)					0.87
➤ No difficulty	8(9.0)	8(10.1)	24(9.8)	10(10.1)	
➤ Mild difficulty	36(40.4)	32(40.5)	95(38.6)	40(40.4)	
➤ Moderate difficulty	28(31.3)	22(27.8)	86(35.0)	37(37.4)	
➤ Sever difficulty	17(19.1)	17(21.5)	41(16.7)	12(12.1)	
Habitual sleep efficiency (4)					0.04*
➤ >85%	2(2.2)	1(1.3)	5(2.0)	1(1.0)	
➤ 75-84%	0(0.0)	3(3.8)	14(5.7)	11(11.1)	
➤ 65-74%	14(15.7)	10(12.7)	26(10.6)	9(9.1)	
➤ <65%	73(82.0)	65(82.3)	201(81.7)	78(78.8)	
Sleep disturbance (5)					0.75
➤ No difficulty	1(1.1)	2(2.5)	5(2.1)	0(0.0)	
➤ Mild difficulty	60(67.4)	147(59.8)	147(59.8)	63(63.6)	
➤ Moderate difficulty	28(31.5)	88(35.8)	88(35.8)	34(34.3)	
➤ Sever difficulty	0(0.0)	6(2.4)	6(2.4)	2(2.0)	
Sleep time dysfunction (7)					0.00*
➤ No difficulty	4(4.5)	2(2.5)	32(13.0)	21(21.2)	
➤ Mild difficulty	28(31.5)	32(40.5)	120(48.8)	48(48.5)	
➤ Moderate difficulty	37(41.6)	35(44.3)	76(30.9)	22(22.2)	
➤ Sever difficulty	20(22.5)	10(12.7)	18(7.3)	8(8.1)	

Subject sleep quality (1)					0.00*
➤ Very good	14(15.7)	13(16.5)	80(32.5)	10(10.1)	
➤ Fairly good	40(44.9)	39(49.4)	113(45.9)	40(40.4)	
➤ Fairly bad	27(30.3)	23(29.1)	46(18.7)	37(37.4)	
➤ Very bad	8(9.0)	4(5.1)	7(2.8)	12(12.1)	
Sleep duration (3)					0.02*
➤ >7h	26(29.8)	13(16.5)	80(32.5)	34(34.4)	
➤ 6-7h	45(50.6)	44(55.7)	113(45.9)	42(42.4)	
➤ 5-6	11(12.4)	14(17.7)	46(18.7)	19(19.2)	
➤ <5h	7(7.9)	8(10.1)	7(2.8)	4(4.0)	
Sleep Medication use (6)					0.63
➤ Not during past month	80(89.9)	70(88.9)	221(89.8)	81(81.8)	
➤ Less than once a week	5(5.6)	2(2.5)	9(3.7)	7(7.1)	
➤ Once or twice a week	3(3.4)	4(5.1)	9(3.7)	6(6.1)	
➤ Three or more times a week	1(1.1)	3(3.8)	7(2.8)	5(5.1)	

*p <0.05 there was a statistically significant difference.

This tables shows that the working status is significantly associated with sleep duration, sleep time dysfunction, subjective sleep quality assessment and habitual sleep efficiency (p<0.05).

Fig no (6) scatter diagram shows the relationship between the sleeping hours and the total Pittsburgh Sleep Quality Index (PSQI) (r= -0.81) (p=0.00*).



Model Summary and Parameter Estimates

Dependent Variable: workinghours

Equation	Model Summary					Parameter Estimates	
	R Square	F	df1	df2	Sig.	Constant	b1
Linear	.016	7.509	1	468	.006	10.063	-.159

The independent variable is sleepquality.

Discussion:

Unfortunately, a significant portion of the population experiences altered sleep states that often result in a multitude of health-related problems. The public health burden of chronic sleep loss and sleep disorders coupled with the low awareness among health care professionals, and policy makers requires a well-coordinated strategy to improve sleep-related health care (28).

So this conducted to measure the quality of sleep among HCPs in Riyadh city, by a representative sample 65.9% were females, 49.7% aged 20-<30y and 33.9% aged 30-<40y old, the majority of them were Saudi, and their families lives in Riyadh (94.0)more than half were married (53.2%), and 43.9% were single ,48.0% working an affiliate functions, 26.5% were doctors and 23.2% were specialists, about 40% working in governmental hospitals, and with a median working hours of 5 ranged (1-16h/day). Which is considered a representative healthcare professional in Riyadh city (24). Which is differ from the composition of HCPs in other studies e.g. nurses comprised 61.1 % (50).

Although the recommended sleep hours for healthy adults is between 7-8 hours per night in order to feel rested with optimal sleep quality (29, 30). The reported average sleep duration per night was 6.9±1.6 hours (h) in northeast China(31).And was 6.5±1.7 h (32).The self-reported mean of sleep duration in HCPs was be 6.23+_1.22h . The reported prevalence of short sleep duration <7 hours is about 80%, which is higher than many other reported studies among

general adults (24.1%-41.6%) (33, 34). We found no studies on sleep duration among adults in Saudi population.

Although the prevalence of reported sleep disorders (SD) was 55.2%, only 1.3% of them diagnosed by specialist because they do not routinely bring concerns about DS and they relied more on their own practice and colleagues. Given these findings and the complexities of detecting DS in HCP that consists with other studies (15, 35)

This study reported that; the most common sleep disorders in descending order were (sleep scheduled disorders and wake up ,insomnia, partial fatigueetc.) which contradict Saudi studies which reported that ; Insomnia is most prevalent among Saudi women and the elderly Saudi population(52).

According to the(PSQI) score 85.9% of the studied HCPs had a poor quality of sleep out of them 55.2% self-reported sleep disorders (DS) ,and only 1.3% diagnosed by specialists this is because HCPs lack awareness regarding DS and sleep interventions also , the inaccurate belief that reduced hours of sleep and decreased ability to sleep well “normal” aspects of advancing age (36).This mistaken belief on the part of both healthcare providers and the general public, reluctance to seek help for sleep issues, contributes to the under diagnosis and under treatment of DS in this high need population (15) .

The overall stressors (work (41.9%)and social /family(35.5%) were the main factor (77.4%)that reported to affect the sleep quality ,because the reported long working hours average =5 (3-16),as Stress is a physiological response to demands placed

on individuals [37]. That classically, influenced by two neural circuits the autonomic sympathetic-adrenal system (releases norepinephrine and epinephrine) and the hypothalamic-pituitary-adrenal axis (release corticotrophin-releasing hormone (CRH), adrenocorticotrophic hormone (ACTH) that promotes glucocorticoids release), that attenuated in sleep-restricted rats [38,39], and inhibit IL-1 β that increase sleep latency and attenuate NREMS in rabbits (40)

There was a statistical significant association ($p < 0.01$) between the self-rated health status and the subjective sleep assessment, in consisted with (41). Sleep and health have a strong relationship; both have an effect on the other. Poor sleep can increase the risk of having poor health

It is interesting to note that poor sleep quality was more common in female students (3). Females have a higher prevalence of sleep disorder (latency and efficient and subjective sleep assessment) than males, which relates to another local study in a non-medical student population (47). On medical students' study, reported no gender dominance, but other study had shown more sleep disorders in females than males (48). It seems that men complain about sleep quality, whereas females concentrate more on single symptom (49). There was no difference in sleep duration hours between males and females as regards the sleep duration, this study agreed with Al-Hazzaa et al 2016. (51). This is because women tend to work shorter hours than men do, presumably because they retain primary responsibility for the majority of housework and childcare, significantly having less vacation time, worked more days per week and took more work home (53).

The medical students, nurses, and then doctors are the main HCPs that suffering from sleep disorders, while the pharmacists significantly use sleep medications than others. Because High proportions of stress have been reported among medical students in different countries, for example in Pakistan (60%), Thailand (61%), Malaysia (42%), and the United States (57%) (42,43,44,45). Locally, the prevalence of stress among medical students is reported as 63% at King Saud University (46), and 53% at King Faisal University [3]. so that they are significantly higher in the total sleep quality as regards (latency, efficiency, and subjective sleep quality assessment).

There was a strong indirect relationship ($r = 0.81$) between the working hours and the total score of sleep quality, because Longer working hours are associated with poorer mental health status and increasing levels of anxiety and depression symptoms. There was a positive correlation between these symptoms and sleep disturbances (53). Generally, there is agreement that long hours of work adversely affect sleep [54]. Working as HCPs is important for economic self-sufficiency and a meaningful way of living. However, as illustrated in this study, can also be associated with problems such as an increased risk of sleep disorders (53). Our findings suggest that we still need to improve the HCPs environment and lifestyle in order to preserve health and well-being

Strength: Representativeness of survey participants to all HCPs sectors, all age groups, both sex and different working places, and working positions in Riyadh city and the large sample size. **Limitation:** the study was conducted only among Riyadh HCPs.

Recommendations: Future studies are recommended to identify HCP's sleep pattern, to determine evidence-to-practice gaps, and to guide development of knowledge translation (KT) strategies. For better management of DS in

HCPs its recommended to: (1) Improving the knowledge and practice about the SD and its related risk factors, (2) Including the basic sleep-related screening questions in the routinely adult and geriatric assessments, (3) Studying the participants' use, and perceptions about practicality of non-pharmacological sleep interventions (NPSI) among HCPs especially risky groups (females, nurses, and leaders) to identify opportunities for improving their overall health status and productivity.

Conclusion: Poor sleep quality is highly prevalent among HCPs in Riyadh city, and significantly associated with a lower self-rated health status. Sleep efficacy, sleep disturbance, and sleep latency were the main disturbed domains at Pittsburgh (Sleep Quality Index (PSQI).

Acknowledgments: This work was Supported by the General Directorate of Clinical Health Education, Assistant Agency of Public Health, Ministry of Health, in Saudi Arabia. In addition, special thanks to the Assistant Deputy Ministry of health for Primary Health Care Dr. Hisham I. Al-Khashan, for his unlimited support.

Abbreviations:

(Pittsburgh Sleep Quality Index (PSQI).

Corticotrophin-releasing hormone (CRH).

Adrenocorticotrophic hormone (ACTH).

Non-pharmacological sleep interventions (NPSI).

knowledge translation (KT).

Primary Health care centers (PHCCs).

Ministry Of Health (MOH).

Cardiovascular disease (CVD).

health care providers (HCPs).

The International Classification of Sleep Disorders-3 (ICSD-3

Conflict of interest: was no.

The references:

1. Ghalichi L¹, Pournik O, Ghaffari M, Vingard E. (2013). Sleep quality among health care workers. Arch Iran Med. 2013 Feb;16(2):100-3. doi: 013162/AIM.0010.
2. Anwar E. Ahmed, Fares Al-Jahdali, MBBS, Abdulaziz AlAlwan, et al, 2017. Prevalence of sleep duration among Saudi adults. Saudi Med J. 2017 Mar; 38(3): 276–283. doi: 10.15537/smj.2017.3.17101. PMID: 28251223
3. HAMZA M. ABDULGHANI1, NORAH A. ALROWAIS1, NORAH S. BIN-SAAD2, NOURAH M. AL-SUBAIE3, ALHAN M. A. HAJI4 & ALI I. ALHAQWI5 (2012). Sleep disorder among medical students: Relationship to their academic performance. 2012; 34: S37–S41
4. National Institute of Health (2018) : <https://www.nhlbi.nih.gov/health-topics/sleep-deprivation-and-deficiency>
5. Chervin RD. 2003. Epworth sleepiness scale. Sleep Med 4(3):175–176
6. Zielinski MR, Krueger JM (2011). Sleep and innate immunity. Front Biosci (Schol Ed) 2011;3:632–642. [PMC free article] [PubMed] [Google Scholar]
7. Etinger U, Kumari V (2015). Effects of sleep deprivation on inhibitory biomarkers of schizophrenia: implications of drug development. Lancet Psychiatry. 2015;2:1028–1035. [PubMed] [Google Scholar]
8. Bonne Gwrman, World Health technical meeting on sleep health 22-24 ju (2004):

- http://www.euro.who.int/__data/assets/pdf_file/0008/114101/E84683.pdf
9. **Mark R. Zielinski,^{1,*} James T. McKenna,¹ and Robert W. McCarley(2106).** **Functions and Mechanisms of Sleep aims Neurosci.** Author manuscript; available in PMC 2017 Apr 21. Published in final edited form as: *AIMS Neurosci.* 2016; 3(1): 67–104. Published online 2016 Apr 21. doi: 10.3934/Neuroscience.2016.1.67.PMCID: PMC5390528.NIHMSID: NIHMS853261.PMID: 28413828
 10. **Watson NF, Badr MS, Belenky G, et al (2015).** Recommended amount of sleep for a healthy adult: a joint consensus statement of the American Academy of Sleep Medicine and Sleep Research Society. *Sleep.* 2015;38(6):843–844. [PMC free article] [PubMed] [Google Scholar]
 11. **Daniel J. Buysse, 2014.** **Sleep Health: Can We Define It? Does It Matter?** *Sleep.* 2014 Jan 1; 37(1): 9–17. Published online 2014 Jan 1. doi: 10.5665/sleep.3298.PMCID: PMC3902880,PMID: 24470692
 12. **Banks S, Dinges DF(2007) .** Behavioral and physiological consequences of sleep restriction. *J Clin Sleep Med.* 2007;3:519–528. [PMC free article] [PubMed] [Google Scholar]
 13. **Angelika Anita Schlarb,* Anja Friedrich,* and Merle ClaBen (2017)** Sleep problems in university students – an intervention neuropsychiatr Dis Treat. 2017; 13: 1989–2001. Published online 2017 Jul 26. doi: 10.2147/NDT.S142067
 14. **Roth T, Coulouvrat C,Hajak G, Lakoma MD, Sampson NA, et al. (2011)** Prevalence and perceived health associated with insomnia based on DSM-IV-TR; International Statistical Classification of Diseases and Related Health Problems, Tenth Revision; and Research Diagnostic Criteria/International Classification of Sleep Disorders, Second Edition criteria: results from the America Insomnia Survey. *Biol Psychiatry* 69:592–600.
 15. **Cary A. Brown,¹ Patricia Wielandt,² Donna Wilson,³ Allyson Jones,⁴ and Katelyn Crick(2014).** Healthcare Providers' Knowledge of Disordered Sleep, Sleep Assessment Tools, and Nonpharmacological Sleep Interventions for Persons Living with Dementia: A National Survey *Sleep Disorders Volume 2014, Article ID 286274, 9 pages* <http://dx.doi.org/10.1155/2014/286274>
 16. **International classification of sleep disorders-third edition (ICSD-3). AASM Resource Library (2014)**
 17. **Goran Medic,Micheline Wille, and Michiel EH Hemels (2017)** Short- and long-term health consequences of sleep disruption. *Nat Sci Sleep.* 2017; 9: 151–161. Published online 2017 May 19. doi: 10.2147/NSS.S134864.PMCID: PMC5449130.PMID: 285798421
 18. **Lipinska G, Timol R, Thomas KG.** The implications of sleep disruption for cognitive and affective processing in methamphetamine abuse. *Med Hypotheses.* 2015;85(6):914–921. [PubMed] [Google Scholar]
 19. **Kim TW, Jeong JH, Hong SC.** The impact of sleep and circadian disturbance on hormones and metabolism. *Int J Endocrinol.* 2015;2015:591729. [PMC free article] [PubMed] [Google Scholar]
 20. **Watson NF, Badr MS, Belek G, et al(2015) .** Joint Consensus Statement of the American Academy of Sleep Medicine and Sleep Research Society on the recommended amount of sleep for a healthy adult: methodology and discussion. *Sleep.* 2015;38(8):1161–1183. [PMC free article] [PubMed] [Google Scholar]
 21. **American College Health Association(2012).** American College Health Association: National College Health Assessment II Reference Group Executive Summary Spring 2012. Hanover, MD: American College Health Association; 2012. [Accessed February 20, 2014]. Available from: http://www.acha-ncha.org/docs/ACHA-NCHA-II_ReferenceGroup_ExecutiveSummary_Spring2012.pdf. [Google Scholar]
 22. **Shelley D Hershner and Ronald D Chervin (2014).** Causes and consequences of sleepiness among college students *Nat Sci Sleep.* 2014; 6: 73–84. Published online 2014 Jun 23. doi: 10.2147/NSS.S62907 .PMCID: PMC4075951.PMID: 25018659
 23. **Institute of Medicine, Committee on Sleep Medicine and Research, Board on Health Sciences(2006)** Policy . Sleep Disorders and Sleep Deprivation: An Unmet Public Health Problem. Washington, DC: National Academies Press; 2006. [Google Scholar]
 24. **General Authority for Saudi Statistics ,2015**
 - 25.
 26. **Aljohara S. Almeneessier, and Ahmed S. BaHammam,(2017) .** Sleep Medicine in Saudi Arabia. *J Clin Sleep Med.* 2017 Apr 15; 13(4): 641–645. Published online 2017 Apr 15. doi: 10.5664/jcsm.6566.PMCID: PMC5359344.PMID: 28212693
 27. **Carole Smyth MSN, APRN, BC, ANP/GNP, Montefiore Medical Center(2012).** The Pittsburgh Sleep Quality Index (PSQI) : Issue Number 6.1, Revised 2012 Series Editor: Marie Boltz, PhD, GNP-BC Series Co-Editor: Sherry A. Greenberg, MSN, GNP-BC New York University College of Nursing
 28. **Buysse, DJ, Reynolds CF, Monk TH, Berman SR, Kupfer DJ(1989).** The Pittsburgh Sleep Quality Index (PSQI): A new instrument for psychiatric research and practice. *Psychiatry Research* 28:193–213, 1989
 29. **Alvah T. Wickboldt,¹ Alex F. Bowen,,Aaron J. Kaye,^{**} Adam M. Kaye, PharmD,[‡]Franklin Rivera Bueno,^{**§} and Alan D. Kaye (2012)** Sleep Physiology, Abnormal States, and Therapeutic Interventions *Ochsner J.* 2012 Summer; 12(2): 122–134. PMCID: PMC3387837 PMID: 22778676D
 30. **Ferrie JE, Shipley MJ, Cappuccio FP, Brunner E, Miller MA, Kumari M, et al.** A prospective study of change in sleep duration: associations with mortality in the Whitehall II cohort. *Sleep.* 2007;30:1659–1666. [PMC free article] [PubMed] [Google Scholar]
 31. **Watson NF, Badr MS, Belenky G, Bliwise DL, Buxton OM, Buysse D, et al.** Joint Consensus Statement of the American Academy of Sleep Medicine and Sleep Research Society on the Recommended Amount of Sleep for a Healthy Adult: Methodology and Discussion. *J Clin Sleep Med.* 2015;11:931–952. [PMC free article] [PubMed] [Google Scholar]
 32. **Xiao Q, Arem H, Moore SC, Hollenbeck AR, Matthews CE. A(2012)** large prospective investigation of sleep duration, weight change, and obesity in the NIH-AARP Diet and Health Study cohort. *Am J Epidemiol.* 2013;178:1600–1610. [PMC free article] [PubMed]

- [Google Scholar]
33. **Zizi F, Pandey A, Murraray-Bachmann R, Vincent M, McFarlane S, Ogedegbe G, et al(2012)**. Race/ethnicity, sleep duration, and diabetes mellitus: analysis of the National Health Interview Survey. *Am J Med.* 2012;125:162–167. [PMC free article] [PubMed] [Google Scholar]
 34. **Resnick HE, Redline S, Shahar E, Gilpin A, Newman A, Walter R, et al(2003)**. Diabetes and sleep disturbances: findings from the Sleep Heart Health Study. *Diabetes Care.* 2003;26:702–709. [PubMed] [Google Scholar]
 35. **Tuomilehto H, Peltonen M, Partinen M, Seppa J, Saaristo T, Korpi-Hyovalti E, et a(2008)**. Sleep duration is associated with an increased risk for the prevalence of type 2 diabetes in middle-aged women - The FIN-D2D survey. *Sleep Med.* 2008;9:221–227. [PubMed] [Google Scholar]
 36. **R. J. St George, K. Delbaere, P. Williams, and S. R. Lord**, “Sleep quality and falls in older people living in self- and assisted-care villages,” *Gerontology*, vol. 55, no. 2, pp. 162–168, 2009. View at Publisher · View at Google Scholar · View at Scopus
 37. **J. Ellis, S. E. Hampson, and M. Cropley**, “The role of dysfunctional beliefs and attitudes in late-life insomnia,” *Journal of Psychosomatic Research*, vol. 62, no. 1, pp. 81–84, 2007. View at Publisher · View at Google Scholar · View at Scopus
 38. **Koolhaas JM, Bartolomucci A, Buwalda B, et al**. Stress revisited: a critical evaluation of the stress concept. *Neurosci Biobehav Rev.* 2011;35:1291–1301. [PubMed] [Google Scholar]
 39. **Meerlo PI, Koehl M, van der Borgh K, et al**. Sleep restriction alters the hypothalamic-pituitary-adrenal response to stress. *J Neuroendocrinol.* 2002;14:397–402. [PubMed] [Google Scholar]
 40. **Novati A, Roman V, Cetin T, et al**. Chronically restricted sleep leads to depression-like changes in neurotransmitter receptor sensitivity and neuroendocrine stress reactivity
 41. **Sanchez Mejia RO, Ona VO, Li M, et al**. Minocycline reduces traumatic brain injury-mediated caspase-1 activation, tissue damage, and neurological dysfunction. *Neurosurgery.* 2001;48:1393–1399.[PubMed] [Google Scholar]
 42. in rats. *Sleep.* 2008;31:1579–1585. [PMC free article] [PubMed] [Google Scholar] <https://www.mentalhealth.org.uk/blog/importance-sleep>
 43. **C.T. Sreeramareddy, P.R. Shankar, V.S. Binu, C. Mukhopadhyay, B. Ray, R.G. Menezes.(2007)**. Psychological morbidity, sources of stress and coping strategies among undergraduate medical students of Nepal *BMC Med Educ*, 7 (2007), p. 26, 10.1186/1472-6920-7-26 [Google ScholarR.](#)
 44. **among medical students in a Thai medical school** *Med Teach*, 25 (2003), pp. 502-506, [10.1080/0142159031000136716](#) [Cross Ref](#) [View Record in Scopus](#) [Google Scholar](#)
 45. **M.S. Sherina, L. Rampal, N. Kaneson.(2004)**. Psychological stress among undergraduate medical students *Med J Malaysia*, 59 (2004), pp. 207-211 [View Record in Scopus](#) [Google Scholar](#)
 46. **T.H. Mosley, S.G. Perrin, S.M. Neral, P.M. Dubbert, C.A. Grothues, B.M. Pinto** Stress, coping, and well-being among third year medical students. (1994). *Acad Med*, 69 (1994), pp. 765-767 [View Record in Scopus](#) [Google Scholar](#) H.M. Abdulghani, A.A. Al
 47. **Kanhal, E.S. Mahmoud, G.G. Ponnampereuma, E.A. Alfaris (2011)**. Stress and its effects on medical students: a cross-sectional study at a college of medicine in Saudi Arabia *J Heal Popul Nutr*, 29 (2011), pp. 516-522 [View Record in Scopus](#) [Google Scholar](#)
 48. **Alotair H, Bahammam A. 2008**. Gender differences in Saudi patients with obstructive sleep apnea. *Sleep Breath* 12(4):323–329. Bahammam AS, Al-Khairy OK, Al-Taweel AA. 2005. Sleep habits and patterns among medical students. *Neurosciences* 10(2):159–162.
 49. **Parkerson Jr GR, Broadhead WE, Tse CK. 1990**. The health status and life satisfaction of first-year medical students. *Acad Med* 65(9):586–588.
 50. **iemi PM, Vainiomaki PT. 2006**. Medical students’ distress – quality, continuity and gender differences during a six-year medical programme. *Med Teach* 28(2):136–141.
 51. **A.G. Abdel Rahman, B.N. Al Hashim, N.K. Al Hiji, Z. Al-Abbad(2013)**. Stress among medical Saudi students at College of Medicine, King Faisal University *Prev Med Hyg*, 54 (2013), pp. 195-199 [View Record in Scopus](#) [Google Scholar](#)
 52. **Al-Hazzaa HM, Musaiger AO, Abahussain NA, Al-Sobayel HI, Qahwaji DM.(2012)**. Prevalence of short sleep duration and its association with obesity among adolescents 15- to 19-year olds: A cross-sectional study from three major cities in Saudi Arabia. *Ann Thorac Med.* 2012;7:133–139. [PMC free article] [PubMed] [Google Scholar]
 53. **Anwar E. Ahmed, Hamdan AL-Jahdali, Abdulhamid Fatani, Khalid Al-Rouqi, Fares AL-Jahdali, Abdullah Al-Harbi, (2015)**. The effects of age and gender on the prevalence of insomnia in a sample of the Saudi population. Pages 285-294 | Received 04 Aug 2015, <https://doi.org/10.1080/13557858.2016.1244624>
 54. **P. Afonso M. Fonseca J. F. Pires (2017)**. Impact of working hours on sleep and mental health. *Occupational Medicine*, Volume 67, Issue 5, July 2017, Pages 377–382, <https://doi.org/10.1093/occmed/kqx054>
 55. Harrington J . Health effects of shift work and extended hours of work. *Occup Environ Med* 2001;58:68–72. [Google Scholar](#) [Crossr](#)