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Sleep Disturbances and Its Association With Obesity And Other Metabolic Risk Factors Among Egyptian Adults

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Abstract:

Background: Obesity is a high prevalence public health issue in different age groups related with diverse negative health consequences. Increased body weight has economic and social consequences besides direct health effects

Aim: to investigate the sleep disturbances and its relationship with Other Metabolic Risk Factors and Obesity among Egyptian people.

Subjects and methods: This cross-sectional survey research was conducted on 50 obese adults with sleep disturbances attending outpatient clinics.

Result: In the current study the regression analysis between Global Pittsburgh Sleep Quality Index (PSQI) total score, metabolic risk factors and other parameters demonstrated that there was no significant correlation PSQI total score and fasting blood glucose level, weight, diastolic BP, systolic BP and blood cholesterol while there was significant association between PSQI total score and BMI illustrated that obesity associated with sleep disturbance among Egyptian adults. The study revealed that 38% of patients experienced sleep disturbance within a year, 32% for 1-3 years, and 30% for more than 3 years. The majority had diabetes, high-tension, heart disease, hypercholesterolemia, and other diseases. COVID-19 affected 50% of patients, with obesity prevalent in advanced age 38%.

Conclusion: According to the study, among Egyptian adults, obesity is correlated with dysfunction throughout the day and poor sleep quality, while metabolic risk variables have minimal impact on sleep quality.

Keywords: Obesity; Metabolic risk; Egyptian adults; PSQI.

1. Introduction

Obesity is a high prevalence public health issue in different age groups related with diverse negative health consequences. Increased body weight has economic and social consequences besides direct health effects **(1)** .

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Studying the potential factors contributing to the high obesity prevalences has a big role on the health of population. The occurrence of obesity in a population may be the result of environmental and genetic factors **(2,3)**.

The usual explanations of excess body weight have focused on dietary habits including the quality, and quantity of food consumed, availability of low-cost high-calorie foods and physical inactivity. Other causal mechanisms have been suggested, involving poor quality of sleep and chronic partial sleep loss **(4)**.

Numerous metabolic syndromes, such as cardiovascular disease (CVD), hypertension, cardiovascular disease (CVD), and type 2 diabetes (T2D), were associated with obesity. Obesity has been identified as a contributing factor to premature deaths, in addition to its impact on adult populations**(5,6)** .

A new public health concern is the emergence of short sleep duration and sleep disorders. Despite the fact that the prevalence of insomnia symptoms varies from thirty percent to forty-five percent at any given time, only six percent of individuals with insomnia receive a diagnosis. The estimated prevalence of sleep apnea is twenty-seven percent to thirty-four percent among men and nine percent to twenty-eight percent among women between the ages of thirty and seventy. Both prevalent and incident obesity, also prevalent and incident type 2 diabetes, are associated with sleep disturbances and short sleep duration .**(7,8)** .

The objective of this study was to investigate the sleep disturbances and its association with Obesity and Other Metabolic Risk Factors among Egyptian Adults.

Subjects and method

This cross-sectional survey study was conducted on 50 obese adults with sleep disturbances attending outpatient clinics.

Type of sample and method of selection: A convenient sample of eligible patients included consecutively, until fulfilling the required sample size.

Inclusion criteria: Obese adults with sleep disturbances.

Exclusion criteria: Patients with liver, lung diseases, or kidney condition.

Methods

Study procedures

Everyone who took part received a well-organized questionnaire to gather data on their sleep patterns, sleep issues, medication usage, employment details (working hours, work status, desk or non-desk job, job title, etc.). Data on metabolic risk factors associated with obesity, such as cardiovascular diseases and type 2 diabetes mellitus, will be gathered from the participants.

Questionnaire Parameters: Sleep quality was evaluated using the widely accepted Pittsburgh Sleep Quality Index score, which is a validated questionnaire designed to offer a dependable and standardized measure of sleep quality. the global Pittsburgh Sleep Quality Index distinguishes

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those who have "good" sleep and those who have "poor" sleep by utilizing easy questions that can be completed in five to ten minutes. The questionnaire comprises eighteen questions that fall under seven main components, including subjective sleep quality and sleep latency (i.e., the time it takes to fall asleep). III sleep period refers to the amount of time spent sleeping. Habitual sleep efficiency is the ratio of total sleep time to the time spent in bed. Sleep disturbances are disruptions or interruptions in sleep. VI refers to the utilization of sleep-inducing medications, whether they are prescribed by a doctor or purchased without a prescription. VII pertains to the impairment of daytime functioning, as reported for the previous month. The questionnaire's individual components were assigned scores ranging from zero to three, with higher scores indicating poorer quality. These scores were then combined to calculate a global PSQI score, which ranged between zero and twenty-one Research has shown that when the global PSQI score is higher than 5, it has a sensitivity of 89.6 percent and specificity of 86.5 percent in accurately distinguishing those who have good sleep and those who have poor sleep. The PSQI questionnaire in Arabic was utilized and verified for its validity.

Data collection methods and tools

A pre-designed structured questionnaire utilized for gathering data about demographic characteristics (gender, occupation, age, and residence); medical history (any Chronic medical condition, type II DM and Cardio vascular diseases). **Anthropometric measurements:** Weight, height, and body mass index. These measurements conducted using Standardized procedures to ensure adequacy. BMI estimated from the anthropometric assessment height and weight data utilizing the following formula: body mass index = Weight (kg)/Height (m^2). Participants classified as lean (body mass index = 18.5–24.9 kg/m^2), overweight (BMI = 25–29.9 kg/m^2), and those with obesity (body mass index ≥30 kg/m^2). With regard to obesity risk, Patients classified into: Class I/ moderate-risk (body mass index = 30–34.9 kg/m^2),class II/ severe-risk (body mass index = 35–39.9 kg/m^2) and class III/ very severe-risk (body mass index ≥40 kg/m^2)**(9)** .**Sleep Quality assessment tool**: PSQI score (**10)**.The Global Pittsburgh Sleep Quality Index was a validated self-reported tool that aims to assess sleep quality in a reliable and standardized manner. It distinguishes those who have good sleep and those who have poor sleep. The questionnaire is designed to be completed easily within five to ten minutes and consists of eighteen questions that fall under Seven main sections. The questionnaire assesses various aspects of sleep quality, including subjective sleep quality, sleep latency (the time it takes to fall asleep), sleep disturbances, sleep duration, habitual sleep efficiency (the ratio of total sleep time to time in bed), use of sleep-promoting medications (prescribed or over-the-counter), and daytime dysfunction. Each section is scored from zero to three, with higher scores indicating worse sleep quality. The total score, ranging from zero to twenty-one, is called the global The Arabic version of the PSQI questionnaire was utilized and confirmed to be valid.**(11)**.

Ethical considerations

The researcher requested the approval of the Ethics Committee at the High Institute of Public Health in order to carry out the study. The researcher adhered to the International Guidelines for Research Ethics. Obtained written consent from every participant in the study after providing them with an explanation of the goal and advantages of the research. Strict measures will be implemented to guarantee and uphold anonymity and confidentiality. There is no clash of interests.

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Statistical analysis

The collected data subjected to statistical analysis using suitable techniques to achieve the objectives of the study.

Results

Table (1): The distribution of the studied sample according to the socio-demographic data:

	Studied group (N=50)
Age (years)	
Mean± SD	31.18±4.01
Weight (kg)	
Mean± SD	106.44±15.08
Height (cm)	
Mean± SD	166.96±8.16
BMI (kg/m^2)	
Mean± SD	38.17±4.67
Sex	
Male	14(28%)
Female	36(72%)
Residence	
Urban	23(46%)
Rural	27(54%)
Occupation	
Employee	36(72%)
Unemployed	14(28%)
Smoker in house	27(54%)
No. person/house	
Mean± SD	3.52±1.28

SD: standard deviation,

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Table (1) shows that, the mean of age of the studied sample was 31.18±4.01 year, the mean of weight was 106.44±15.08 kg, the mean of height was 166.96±8.16 cm, the mean of BMI was 38.17±4.67 kg/m^2, 28 % were males, the majority were females 72%, 46% were urban, 54% were rural, 54% were smoker and the mean of No. person/house was 3.52±1.28.

Table (2): The distribution of the studied cases regarding presence of comorbidities:

	Studied group (N=50)
Diabetes	35(70%)
HTN	32(64%)
Heart disease	18(36%)
Hypercholesterolemia	26(52%)
Others	16(32%)

Table (2) shows that, there were 70% of studied sample had diabetes, 64% of had HTN, 36% had heart disease, 52% had hypercholesterolemia and 32% of studied sample had other diseases.

Table (3): The distribution of the studied cases regarding their blood pressure and laboratory testes:

	Studied group (N=50)
SBP (mm Hg)	
Mean± SD	143.6±17.58
DBP (mm Hg)	
Mean± SD	89.6±14.7
Fasting blood glucose level (mg/dL)	
Mean± SD	154.78±50.7
Blood cholesterol (mg/dL)	
Mean± SD	233.8±42.38

SD: standard deviation,

Table (3) shows that, the mean of SBP was 143.6±17.58 (mm Hg), the mean of DBP was 89.6±14.7 (mm Hg), the mean of Fasting blood glucose level was 154.78±50.7 (mg/dL) and the mean of blood cholesterol was 233.8±42.38 (mg/dL).

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Table (4): The distribution of the studied cases regarding risk factor for sleep disturbance:

	Studied group (N=50)
Previous COVID infection	28(56%)
COPD (Chronic obstructive pulmonary disease)	25(50%)
Smoking (Cigarette or shisha or vibe)	7(14%)
Obesity onset	
With giving birth	6(12%)
Age advance	19(38%)
Childhood	17(34%)
adulthood	8(16%)
Problem with sleep cycle (sleep quality)	
Less than a year	19(38%)
1-3 years	16(32%)
More than 3 years	15(30%)

Table (4) shows that, there was 56% of studied sample had Previous COVID infection, there was 50% had COPD, there was 14% were smoker, obesity was found mostly with advanced age (38%), there was 38% of studied sample had Problem with sleep quality less than a year, there was 32% had Problem with sleep quality for 1-3 years and there was 30% had Problem with sleep quality more than 3 years.

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Table (5): The distribution of the studied cases regarding PSQI global score (Pittsburg Sleep Quality Index):

	Studied group (N=50)
Component 1	
0	1 (2%)
1	25 (50%)
2	20 (40%)
3	4 (8%)
Component 2	
0	1 (2%)
1	20 (40%)
2	24 (48%)
3	5 (10%)
Component 3	
0	2 (4%)
1	20 (40%)
2	23 (46%)
3	5 (10%)
Component 4	
0	2 (4%)
1	20 (40%)
2	21 (42%)
3	7 (14%)
Component 5	
0	4 (8%)
1	20 (40%)

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2	23 (46%)
3	3 (6%)
Component 6	
0	2 (4%)
1	27 (54%)
2	19 (38%)
3	2 (4%)
Component 7	
0	4 (8%)
1	23 (46%)
2	15 (30%)
3	8 (16%)
Total PSQI score	
Mean ± SD	10.94±4.3
Score interpretation	
Good sleep quality	4 (8%)
Mild sleep disturbance	22 (44%)
Moderate sleep disturbance	17 (34%)
Severe sleep disturbance	7 (14%)

SD: standard deviation,

Table (5) shows that the majority of studied sample was having mild sleep disturbance (44%), followed by those with moderate sleep disturbance (34%), then those with sever sleep disturbance (14%) and finally only 8% were having good sleep disturbance.

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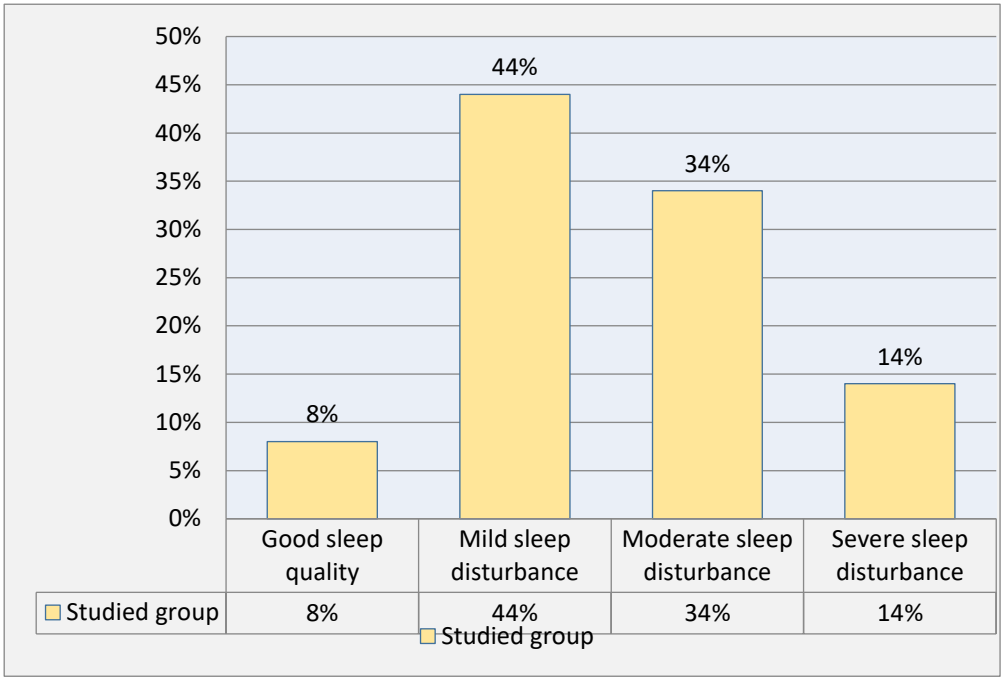

Figure (1): Distribution of the studied cases regarding score of PSQI.

Scoring of PSQI: zero to five: Excellent sleep quality, sex to ten: Slight sleep disruption. eleven to fifteen: There is a moderate level of sleep disturbance, and sixteen to twenty one: there is a severe level of sleep disturbance.

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Table (6): Association between the sleep score interpretation and different variables including several comorbidities, sleep disturbance since COVID, sleep disturbance and smoking:

Variable	Score interpretation (N=50)						99% Confidence Interval	
	Good	Mild	Moderate	Severe	Statistical test	*P value*	LL	UL
Diabetes (N=50)	N=4	N=22	N=17	N=7				
No	2 (50%)	8 (36.4%)	5 (29.4%)	0 (0.0%)	0.289	> 0.05 (0.396) *(a)*	0.383	0.408
Yes	2 (50%)	14 (63.6%)	12 (70.6%)	7 (100%)				
HTN	N=4	N=22	N=17	N=7				
No	2 (50%)	7 (31.8%)	5 (29.4%)	4 (57.1%)	0.250	> 0.05 (0.604) *(a)*	0.592	0.617
Yes	2 (50%)	15 (68.2%)	12 (70.6%)	3 (42.9%)				
Heart disease	N=4	N=22	N=17	N=7				
No	4 (100%)	16 (72.7%)	7 (41.2%)	5 (71.4%)	0.385	> 0.05 (0.094) *(a)*	0.086	0.101
Yes	0 (0.0%)	6 (33.3%)	10 (85.8%)	2 (28.6%)				
Hypercholesterolemia	N=4	N=22	N=17	N=7				
No	3 (75%)	12 (54.5%)	6 (35.3%)	3 (42.9%)	0.291	> 0.05 (0.389) *(a)*	0.376	0.401
Yes	1 (25%)	10 (45.5%)	11 (64.7%)	4 (57.1%)				
Others disease	N=4	N=22	N=17	N=7				
No	4 (100%)	19 (86.4%)	4 (23.5%)	7 (100%)	0.693	<0.05 (0.000) *(a)*	0.000	0.00046
Yes		3 (14.6%)	13 (76.5%)	0 (0.0%)				

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	0 (0.0%)							
Sleep disturbance Since COVID **No** **Yes**	N=4 4 (100%) 0 (0.0%)	N=22 19 (86.4%) 3 (14.6%)	N=17 7 (41.2%) 10 (85.8%)	N=7 2 (28.6%) 5 (71.4%)	0.408	> 0.05 (0.06) *(a)*	0.054	0.066
Obesity **Adulthood** **With aging** **Childhood** **With giving birth**	N=4 0 (0.0%) 1 (25%) 2 (50%) 1 (25%)	N=22 3 (13.6%) 12 (54.5%) 3 (13.6%) 4 (18.2%)	N=17 4 (23.5%) 4 (23.5%) 9 (52.9%) 0 (0.0%)	N=7 1 (14.3%) 2 (28.6%) 3 (42.9%) 1 (14.3%)	0.371	<0.05 (0.044) *(a)*	0.038	0.049
Sleep disturbance **1-3 years** **Less than a year** **More than 3 years**	N=1 0 (0.0%) 1 (100%) 0 (0.0%)	N=22 7 (31.8%) 6 (27.3%) 9 (40.9%)	N=17 7 (41.2%) 7 (41.2%) 3 (17.6%)	N=7 1 (14.3%) 4 (57.1%) 2 (28.6%)	0.534	<0.05 (0.0002) *(a)*	0.000	0.000564
COPD **No** **Yes**	N=4 4 (100%) 0 (0.0%)	N=22 17 (77.3%) 5 (22.7%)	N=17 1 (5.9%) 16 (94.1%)	N=7 3 (42.9%) 4 (57.1%)	0.704	<0.05 (0.000) *(a)*	0.000	0.000460
Smoking	N=4	N=22	N=17	N=7				

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No **Yes**	4 (100%) 0 (0.0%)	19 (86.4%) 3 (14.6%)	15 (88.2%) 2 (11.8%)	5 (71.4%) 2 (28.6%)	0.235	> 0.05 (0.591) *(a)*	0.578	0.603

*p value (<0.05) was considered significant using When you can apply the Phi and Cramer's V test (a)

Table (6) shows that Significant associations ($p < 0.05$) are observed for "Others" (moderate positive, p=0.000, CI 0.000-0.00046), "Obesity" (low positive, p=0.044, CI 0.038-0.049), "Sleep Disturbance" (moderate positive, p=0.0002, CI 0.000-0.000564), and "COPD" (high positive, p=0.000, CI 0.000-0.000460). For all these significant results, the confidence intervals do not include zero, confirming the findings. Non-significant associations ($p > 0.05$) are observed for "Diabetes" (negligible positive, p=0.396, CI 0.383-0.408), "Hypertension" (negligible positive, p=0.604, CI 0.592-0.617), "heart disease" (low positive, p=0.094, CI 0.086-0.101), "Hypercholesterolemia" (negligible positive, p=0.389, CI 0.376-0.401), "Sleep Disturbance Since COVID" (low positive, p=0.06, CI 0.054-0.066), and "Smoking" (negligible positive, p=0.591, CI 0.578-0.603). For these non-significant results, the confidence intervals include zero, indicating no substantial association.

Discussion

This research shows that, the mean age of the studied sample was 31.18±4.01 year,

which goes in concordance with the study **Raouf et al.(12)** reported that the majority of patients with Poor sleep quality was females (66.9%) with mean age of the cases with was 41.77± 16.39 years. There was no significant correlation between mean sleep quality and age, but female sex has significant correlation with poor sleep quality.

This study shows the mean weight was 106.44±15.08 kilogramme, the mean of height was 166.96±8.16 centimeters, the mean of BMI was 38.17±4.67 kg/m^2,

However, **Elhefny et al. (13)** showed that the mean body mass index of sleep disorder population in our research was 30.5 ± 5.13 kg/m2. Also**, Sweed et al. (14)**showed that the mean BMI in the participants with sleep disorders was 34.56 ± 8.17 kg/m2.

Also, this study shows that 28 % were males, the majority were females 72%, 46% were urban, 54% were rural, 54% were smoker and the mean of No. person/house was 3.52±1.28.

In agreement with the current study **Elhefny et al.(13)** showed that higher prevalence of sleep disorders was observed among individuals residing in rural areas.Also, **Elsary et al.(15)**showed that among patients with sleep disorders, there were (53.9%) lived in rural areas. However, **Abd ElHafeez et al.(16)** showed that the majority of patients with low sleep quality lived in urban area 604 (88.3%).

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It was reported that smoking has negative impact on sleep quality **(17). Ramaswamy et al.(18)** reported that smoking status was found to be a significant indicator of poor sleep quality. The current study showed that 14% of the studied cases were smokers.

Regarding occupation, the current research found that 18% of the studied cases were Unemployed.

This study shows that, there were 70% of studied sample had diabetes, 64% of had HTN, 36% had heart disease, 52% had hypercholesterolemia and 32% of studied sample had other diseases.

In line with the current study, **Sivanesan et al.(19)** showed that the most common comorbid conditions among patients with poor sleep quality was DM and hypertension followed by Musculoskeletal disorders. Moreover, the study showed that The study identified several morbidities that were strongly linked to poor sleep, including musculoskeletal disorders, bronchial, diabetes, asthma/Chronic Obstructive Pulmonary Disease (COPD), and persistent cough lasting over a month.

This study shows that, the mean of SBP was 143.6±17.58 (mm Hg), the mean of DBP was 89.6±14.7 (mm Hg), the mean of Fasting blood glucose level was 154.78±50.7 (mg/dL) and the mean of blood cholesterol was 233.8±42.38 (mg/dL).

In agreement with the current study **Yang et al.(20)** showed that Poor subjective sleep quality is significantly correlated with prevalent hypertension and higher blood pressure (BP). Also, **Lo et al. (21)** showed that Poor sleepers had higher average SBP (P value = .09) and DBP (P value = .32) than normal sleepers without statistical significance. cases with hypertension had significantly bad sleep quality scores (P value < .01).

This study shows that, there was 56% of studied sample had Previous COVID infection, there was 50% had COPD, there was 14% were smoker, obesity was found mostly with advanced age (38%), there was 38% of studied sample had Problem with sleep quality less than a year, there was 32% had Problem with sleep quality for 1-3 years and there was 30% had Problem with sleep quality more than 3 years.

The current study showed that there was 56% of patients had sleep disturbance Since COVID19.

However, **Raouf et al.(12)** showed that 44.6% of the participants had poor sleep quality during COVID19 pandemic.

The current study showed that there was 50% of patients had COPD. However, **Wang et al.(22)** revealed that 12 of participants with poor sleep quality have COPD, the study also demonstrated significant association between poor sleep quality and COPD.

The current study showed that obesity was found mostly with advanced age (38%), this may be justified by the reduced physical activity in patients with advanced age. There was 38% of patients had sleep disturbance less than a year, there was 32% of patients had sleep disturbance for 1-3 years and there was 30% of patients had sleep disturbance more than 3 years.

This was supported by **Huayi et al.(23)** who revealed that mean BMI and body weight gradually rise during most of adult life and reach peak values at fifty and fifty-nine years of age in both women and men. Also, **Luo et al.(24)** demonstrated significant association between age and BMI,

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the study also revealed that The age at which obesity begins is inversely correlated with the likelihood of developing diabetes.

This study shows that the majority of studied sample was having mild sleep disturbance (44%), followed by those with moderate sleep disturbance (34%), then those with sever sleep disturbance (14%) and finally only 8% were having good sleep disturbance.

Comparable with the current study **Abd ElHafeez et al., (16)** showed that among participants with sleep disorders the mean of total PSQI score was 9.61±3.03%, 2.1% had very good sleep quality, 47.9% had fairly good sleep quality, 24.1% had fairly bad sleep quality, 25.2% had had verry bad sleep quality according to PSQI.

This study shows that Significant associations ($p < 0.05$) are observed for "Others" (moderate positive, p=0.000, CI 0.000-0.00046), "Obesity" (low positive, p=0.044, CI 0.038-0.049), "Sleep Disturbance" (moderate positive, p=0.0002, CI 0.000-0.000564), and "COPD" (high positive, p=0.000, CI 0.000-0.000460). For all these significant results, the confidence intervals do not include zero, confirming the findings. Non-significant associations ($p > 0.05$) are observed for "Diabetes" (negligible positive, p=0.396, CI 0.383-0.408), "Hypertension" (negligible positive, p=0.604, CI 0.592-0.617), "heart disease" (low positive, p=0.094, CI 0.086-0.101), "Hypercholesterolemia" (negligible positive, p=0.389, CI 0.376-0.401), "Sleep Disturbance Since COVID" (low positive, p=0.06, CI 0.054-0.066), and "Smoking" (negligible positive, p=0.591, CI 0.578-0.603). For these non-significant results, the confidence intervals include zero, indicating no substantial association.

In the current study the regression analysis between PSQI total score, metabolic risk factors and other parameters showed that there was no significant correlation PSQI total score and Systolic BP, Weight, Fasting blood glucose Diastolic BP, level and Blood cholesterol while there was significant association between PSQI total score and BMI illustrated that Obesity associated with sleep disturbance among Egyptian Adults.

Consistent with the current study **Elhefny et al.(13)** showed that risk of sleep disorder increased with the increase of BMI in a study of 159 cases who were employed as a health care worker at Fayoum University hospitals.

Also, in agreement with the current study **Eshak.(25)** found that there was significant association between poor sleep quality and higher BMI in both males and females in a sample of Three thousand one hundred forty-three Egyptian public officials.

Conclusion

the current study showed that obesity is correlated with poor quality of sleep with resultant significant daytime dysfunction among Egyptian adults. Metabolic risk factors have no significant impact on sleep quality, but this relation need to be re-evaluated in larger studies.

Recommendations

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The study recommends guidelines for reducing belly fat and preventing central obesity, including intervention programs and health education modules. Future research should use objective measures, large, representative samples, longer follow-up periods, and multicenter studies.

References

Wang Y, Zhao L, Gao L, Pan A, Xue H. Health policy and public health implications of obesity in China. The lancet Diabetes & endocrinology. 2021 Jul 1;9(7):446-61.

Albuquerque D, Nóbrega C, Manco L, Padez C. The contribution of genetics and environment to obesity. British medical bulletin. 2017 Sep 1;123(1):159-73.

Endalifer ML, Diress G. Epidemiology, predisposing factors, biomarkers, and prevention mechanism of obesity: a systematic review. Journal of obesity. 2020;2020(1):6134362.

Abdallah AA, Mahfouz EM, Mohammed ES, Emam SA, Abd-El Rahman TA. Sleep quality and its association with body weight among adults: an epidemiological study. Malaysian Journal of Public Health Medicine. 2021 Apr 24;21(1):327-35.

Shariq OA, McKenzie TJ. Obesity-related hypertension: a review of pathophysiology, management, and the role of metabolic surgery. Gland surgery. 2020 Feb;9(1):80.

Piotr, D., Aleksander, P., Alina, K., Alicja, B., Paweł, B., Krzysztof, C. et al. Metabolic syndrome-a new definition and management guidelines: A joint position paper by the Polish Society of Hypertension, Polish Society for the Treatment of Obesity, Polish Lipid Association, Polish Association for Study of Liver, Polish Society of Family Medicine, Polish Society of Lifestyle Medicine, Division of Prevention and Epidemiology Polish Cardiac Society, Club 30 Polish Cardiac Society, and Division of Metabolic and Bariatric Surgery Society of Polish Surgeons.

St-Onge MP, Grandner MA, Brown D, Conroy MB, Jean-Louis G, Coons M, et al. Sleep duration and quality: impact on lifestyle behaviors and cardiometabolic health: a scientific statement from the American Heart Association. Circulation. 2016 Nov 1;134(18): e367-86.

Aernout E, Benradia I, Hazo JB, Sy A, Askevis-Leherpeux F, Sebbane D, et al. international study of the prevalence and factors associated with insomnia in the general population. Sleep Medicine. 2021 Jun 1; 82:186-92.

Casadei K, Kiel J. Anthropometric Measurement StatPearls. 2019 Treasure Island (FL) Stat Pearls Publishing Available from: https://www. ncbi. nlm. nih. gov/books/NBK537315. Last updated on. 2019.

Bertolazi AN, Fagondes SC, Perin C, Schonwald S, John AB, De BM,et al .Validation of the Pittsburgh sleep quality index in the Brazilian Portuguese language. InSleep 2008 Jan 1 (Vol. 31, pp. A347-A347). ONE WESTBROOK CORPORATE CTR, STE 920, WESTCHESTER, IL 60154 USA: AMER ACAD SLEEP MEDICINE.

Alhowimel AS, Alenazi AM, Alshehri MM, Alqahtani BA, Al-Jamaan A, Alodaibi F, et al. Translation and Validation of the Arabic Version of the Athlete Sleep Screening Questionnaire. InHealthcare 2023 May 22 (Vol. 11, No. 10, p. 1501). MDPI.

ISSN: 2663-2187

Raouf NR, Fekry CM. Sleep quality and its associated factors among rural adults in Egypt: A community-based study. Minia Journal of Medical Research. 2024 Jan 1;35(1):55-64.

Elhefny RA, El Mously S, Sobhi S, Wahed WY. Evaluation of sleep related breathing problems and sleep disturbances among health-related employees at Fayoum University Hospitals. Egyptian Journal of Chest Diseases and Tuberculosis. 2016 Jul 1;65(3):667-72.

Sweed RA, Wahab NH, El Hooshy MS, Morsy EY, Shetta DM. Obstructive sleep apnea in patients with type 2 diabetes mellitus in Egyptian population. The Egyptian Journal of Bronchology. 2023 Oct 5;17(1):55.

Elsary AY, El-Sherbiny N. Sleep disorders; Prevalence, risk factors and its impact on functional outcomes among young adults in Faiyum; A community-based study. The Egyptian Journal of Community Medicine. 2024 Apr 1;42(2):114-22.

Abd ElHafeez S, e Cruz MM, Gouda S, Nofal M, Fayed A, Ghazy RM, Mekky J. Sleep quality and anxiety among Egyptian population during covid-19 pandemic. Sleep Science. 2022 Mar;15(01):8-16.

Zhang HS, Li Y, Mo HY, Qiu DX, Zhao J, Luo JL et al. A community-based cross-sectional study of sleep quality in middle-aged and older adults. Quality of Life Research. 2017 Apr; 26:923-33.

Ramaswamy G, Premarajan KC, Kar SS, Narayan SK, Thekkur P. Prevalence and determinants of sleep disorders in a community in rural southern India. National Medical Journal of India. 2020 May 1;33(3).

Sivanesan S, Rao CR, Mallya SD, Kumar U, Kamath A. Descriptive analysis of sleep quality and its determinants among rural population of coastal Karnataka. Indian Journal of Community Health. 2022 Dec 31;34(4):554-9.

Yang Z, Heizhati M, Wang L, Li M, Pan F, Wang Z, Abudureyimu R, Hong J, Yao L, Yang W, Liu S. Subjective poor sleep quality is associated with higher blood pressure and prevalent hypertension in general population independent of sleep disordered breathing. Nature and Science of Sleep. 2021 Oct 8:1759-70.

Abdelaal M, le Roux CW, Docherty NG. Morbidity and mortality associated with obesity. Annals of translational medicine. 2017 Apr;5(7).

Wang P, Song L, Wang K, Han X, Cong L, Wang Y, Zhang L, Yan Z, Tang S, Du Y. Prevalence and associated factors of poor sleep quality among Chinese older adults living in a rural area: a population-based study. Aging clinical and experimental research. 2020 Jan; 32:125-31.

Huayi Z, Gang X, Laiyuan L, Hui H. Age-and sex-related trends in body composition among Beijing adults aged 20–60 years: a cross-sectional study. BMC Public Health. 2023 Aug 10;23(1):1519.

Luo J, Hodge A, Hendryx M, Byles JE. Age of obesity onset, cumulative obesity exposure over early adulthood and risk of type 2 diabetes. Diabetologia. 2020 Mar; 63:519-27.

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Eshak ES. The prevalence and determining factors of sleep disorders vary by gender in the Egyptian public officials: a large cross-sectional study. Bulletin of the National Research Centre. 2022 Sep 3;46(1):240.