

ORIGINAL ARTICLE

Association between Sleep Quality and Body Weight Status in Adults during the COVID-19 Pandemic

Yokanantini Muniandy, Chin Yi Ying

School of Nutrition and Dietetics, Faculty of Health Sciences, Universiti Sultan Zainal Abidin, Gong Badak Campus, Kuala Nerus, Terengganu, Malaysia

ABSTRACT

Introduction: The COVID-19 pandemic is a new emerging situation that has dramatically impacted sleep quality and body weight status. This study aimed to determine the association between sleep quality and body weight status in Malaysian adults during the COVID-19 pandemic. **Methods:** An online cross-sectional study involved 427 Malaysian adults aged 18 to 59. The convenience sampling method was used. Sleep quality was assessed by Pittsburgh Sleep Quality Index (PSQI). Self-administered socio-demographic, height, and weight for BMI were obtained. Pearson correlation test was conducted to measure the association between sleep quality and body weight status using IBM SPSS Statistics for Windows version 22.0. **Results:** A total of 78.5% of them were females, and 84.8% of Malaysian adults reported poor sleep quality. The participants' mean global PSQI score and body mass index were 8.1 (± 2.7) and 24.6 (± 6.1) kg/m², respectively. 8.0% were underweight, followed by 55.5% of normal BMI, 17.5% overweight, and 19.0% obese. The study showed a significant and positive correlation between global PSQI score and body mass index ($r=0.137$, $p=0.005$). **Conclusion:** Sleep quality is significantly associated with body weight status. Adults with poorer sleep quality should be targeted when promoting healthy body weight. Future research on the interventions to improve adults' sleep quality is essential, particularly during the pandemic.

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Corresponding Author:

Chin Yi Ying, MSc

Email: chinyyiying@unisza.edu.my

Tel: +6012-9816800

INTRODUCTION

In December 2019, a new coronavirus disease or the COVID-19, an acute respiratory illness triggered by a recently identified SARS-CoV-2 virus, appeared (1,2). Thus, on March 11, 2020, the World Health Organisation (WHO) proclaimed it a widespread virus pandemic. The majority of countries across the globe have gone into a national lockdown after the announcement (3). Furthermore, Malaysia declared a Movement Control Order (MCO) on March 18, 2020, to prevent the infection from spreading. It has rapidly surged worldwide, and it went towards becoming a public health crisis. Globally, by February 22, 2022, a total of 427,044,825 cases of the COVID-19 have been recorded, including 5,912,793 deaths.

During the COVID-19 pandemic, an ever-rising obligation of psychological distress paralleled by impaired sleep quality and sleep habits has become a worldwide issue due to the lockdown containment

measures. On that account, a study conducted before the outbreak of COVID-19 concluded that a total of 65.2% of Columbia adults recorded the recommended period of healthy sleep with the highest prevalence (71.5%) of good sleeping duration among participants with a college degree or higher (4). However, about 45% of Malaysian adults experience inadequate sleep duration with an average of 5.95 hours of sleep and low sleep quality with a global PSQI rating of more than 5 (5). Furthermore, another study also revealed that nine out of ten Malaysians are suffering from sleep problems and that, on average, they get only six hours of sleep at night (6).

Amid the continuing COVID-19 pandemic, a Portuguese study reported that most participants practised regular sleeping habits, especially sleep duration (7). These results contradict the 25.7% of Malaysian adults had a poorer sleep quality during MCO (8). Moreover, little research was conducted to investigate the sleep quality of Malaysians during the COVID-19 outbreak. As a result, it is crucial to perform this study to provide a significant contribution to understanding the current sleep condition in Malaysia and the impact of the pandemic on both sleep quality and body weight status. Sleep is vital to the health of an individual. For healthy

people with regular sleep, the recommended sleep period for young adults (18 to 25 years) and adults (24 to 64 years) is seven to nine hours (9). Sleep duration is related to an increased risk of death and disorders varying from neurodegenerative diseases to obesity, diabetes mellitus, cancer, and depressive symptoms (10). This is consistent with a study that found that longer duration is linked to a higher risk of obesity (11). On the other hand, short sleep duration, which is fewer than seven hours per night, has been linked to decreased insulin sensitivity, increased metabolic dysfunction, and body weight gain, all of which can lead to diabetes mellitus and unfavourable cardiovascular consequences (12). According to the study, more than one-third of US individuals sleep less than seven hours per day, placing them at a higher risk of poor health consequences (13).

Maintenance of a healthy weight range is essential to minimise the risk of chronic diseases in adults. Maintaining a healthy weight throughout childhood may reduce the risk of becoming overweight or obese adults. Overweight or obese adults will benefit from a modest amount of weight loss, and the prevention of further weight gain is important. As reported, sleep quality is one of the associated predictors of body weight status amid the COVID-19 pandemic (3,7). Interestingly, the pandemic and ensuing curfews have resulted in a remarkable effect on the lifestyle behaviour of people around the world. Moreover, lockdown is expected to give the same, if not better, consequences to the Malaysians, especially sleep quality and sleep duration. However, the research was still relatively new in Malaysia and had an ongoing discussion. Hence, this study aimed to establish the correlation between sleep quality and body weight status in Malaysian adults amid the COVID-19 pandemic.

MATERIALS AND METHODS

Study design and subjects

A cross-sectional study was conducted from March 1, 2021 until May 31, 2021, where all participants filled the bilingual questionnaire through the online survey. This study involved 427 Malaysian adults between ages 18 to 59.

Sampling method and sample size

The convenience sampling method was used in this study. The sample size determination was estimated using a single proportion formula (13). Considering a 10 % non-respondent, the largest sample size was 427 participants.

Data collection procedure

Participants were given a Google form link through social media platforms such as Whatsapp, Facebook, Twitter, Instagram, and Telegram. Malaysian adults meeting the criteria were requested to answer and fill in questionnaires in the Google form designed in

Bahasa Melayu or English. The survey was estimated to take about 10 to 15 minutes. The lists of the group on Telegram, Facebook, Twitter, and Instagram are shown in Table I.

Table I: Lists of Groups in Telegram, Facebook, Twitter, and Instagram

List of groups in Telegram	List of groups on Facebook	List of groups in Twitter	List of groups in Instagram
Mahasiswa Bersama MPP UniSZA	Perak Perak Ajee	@TwitPerak	Uploaded through post and story
Group orang Kedah, Perlis, Pulau Pinang		@Twt_selangor	
Group orang Sabah & Sarawak		@MyPahang	
Group orang Melaka & Negeri Sembilan		@twit_kedah	
Komuniti Johor Bahru		@YouthSarawak	
Group orang Kelantan, Terengganu, Pahang			
Komuniti Kuala Lumpur & Selangor			

Study instrument

The survey consists of socio-demographic related questions, anthropometry, including their usual weight and height measurements, and the sleep quality questionnaire from PSQI-M. As the survey was conducted online, all the answers were self-reported.

BMI below 18.5 kg/m² was categorised as underweight; between 18.5 kg/m² and 24.9 kg/m² were considered the normal range, while between 25.0 kg/m² and 29.9 kg/m² was overweight. BMI 30.0 kg/m² and above was considered obese (14). For the global PSQI score, full points of five or less than five points were categorised as "good quality of sleep", and "poor quality of sleep" was classified as more than five points. A higher global PSQI score suggested a lower quality of sleep (15,16).

Data analysis

The data obtained were analysed using IBM SPSS Statistics for Windows, Version 22.0. The socio-demographic characteristics, the prevalence of sleep quality and body weight status were descriptively presented as numbers and percentages. The height, weight, and BMI were presented as mean with standard deviation. Since the assumptions of normal distribution were not violated, parametric statistics, the Pearson correlation test, was preferably used to determine the association between sleep quality and body weight status.

Ethical approval

Ethical approval was acquired from the UniSZA Human Research Ethics Committee (UniSZA.C/2/UHREC/628-2 Jld 3 (27)).

RESULTS

Socio-Demographic Characteristics

A total of 427 participants remained after excluding the participants who did not meet the exclusion and inclusion criteria. Of all 427 Malaysian adults, 92 (21.5%) were males, and 335 (78.5%) were females. The participants'

mean age was 29.7 (± 11.0) years, ranging from 19 to 59 years old. Approximately half (57.8%) of the participants were 25 years old or younger. The majority of the sample was Malay (78.0%). The demographic characteristics of the participants are shown in Table II.

Table II: Socio-Demographic Characteristics of the Participants (n=427)

Variables	Frequency (%)
Age (years)	
Mean Age (SD)	29.7 (11.0)
Age Range	19 – 59
18 – 25	247 (57.8)
26 – 59	180 (42.2)
Total (n)	427
Ethnicity	
Malay	333 (78.0)
Indian	64 (15.0)
Chinese	13 (3.0)
Others	17 (4.0)
Total (n)	427
Height (cm)	159.0 (± 11.0)
Weight (kg)	60.0 (± 16.7)
Body Mass Index (kg/m ²)	23.0 (± 7.4)

Prevalence of Sleep Quality

Overall, 84.8% of the participants had a global PSQI score >5 , indicating a disturbance in sleep quality. Thus, poor sleep quality is more prevalent among Malaysian adults. The reported total sleep duration per night was 6.24 ± 3.05 hours. The prevalence of sleep quality of the participants is presented in Table III.

Table III: Proportion of Sleep Quality and Body Mass Index of the Participants (n=427)

Variables	Frequency (%)	
	Male (n = 92)	Female (n = 335)
Poor Sleep Quality (PSQI score >5)	79 (21.8)	283 (78.2)
Good Sleep Quality (PSQI score <5)	13 (20.0)	52 (80.0)
Total (n)	427	
Body Mass Index Category		
Underweight	5 (14.7)	29 (85.3)
Normal	49 (20.7)	188 (79.3)
Overweight	38 (24.4)	118 (75.6)
Obese	92 (21.5)	335 (78.5)
Total (n)	427	

Prevalence of Overweight and Obesity

The overall mean body weight and BMI of Malaysian adults aged 18 to 59 were 63.2 (± 16.7) kg and 24.6 (± 6.1) kg/m². The mean height of the participants was 160.1 (± 8.8) cm. In this cross-sectional study, the prevalence of underweight (BMI <18.5 kg/m²) was 8.0%, while another 55.5% had normal BMI (BMI 18.5 – 24.9 kg/m²). Then, followed by 17.5% of overweight (BMI 25.0 – 29.9 kg/m²). The remaining 19.0% is in the obese category, which falls into obese class 1, obese class 2, and obese class 3. Table II shows the prevalence of the body weight status of the participants.

Association between Sleep Quality and Body Weight Status

Based on correlation analysis, the study showed a statistically significant and positive correlation between sleep quality and body weight status ($r=0.137$, $p=0.005$). It suggests that the higher the global PSQI score, the greater the BMI. Hence, BMI was correlated with sleep quality. Table IV shows the association between PSQI global score and BMI.

Table IV: The Association between PSQI Global Score and Body Mass Index (n=427)

Global PSQI Score	Body Mass Index	
	r	p-value*
	0.137	0.005

* Pearson's Correlation

DISCUSSION

A higher Global PSQI score was significantly associated with overweight or obesity among young adults (17). Contrarily, prior studies have demonstrated that a greater percentage of young adults who practised a sleep duration of more than seven hours per night had a lower body weight (18). Besides, the research also indicated that women of average weight who sleep longer are well-rested. This could partly be explained because they are more productive and burn more fat due to reduced cortisol and increased serotonin levels during their awakening phase (18). According to a new study, long sleep duration did not affect obesity in young adults (19,20).

Our finding also seems to corroborate that of Sa et al. (21), which suggests a link between obesity and poor sleep quality among US college students. In addition, according to Wang et al. (22) and Du et al. (23), BMI was positively associated with sleep quality, indicating that higher BMI was associated with poorer sleep quality. Findings suggest a link between poor sleep quality and greater body weight status is supported by female students being more sensitive to sleep quality and BMI problems than male students (22).

Of particular interest is that women with a score of more than zero in subjective sleep quality were substantially less capable of losing weight. Notably, women who registered an "excellent" quality sleep score showed a reasonable probability of sustaining weight loss effectively at 12 and 18 months of loss (24, 25). Thus, PSQI global scores of more than five were related to a lower probability of successful weight loss in the long term. Furthermore, recent studies have highlighted the risk of obesity and susceptibility to related non-communicable diseases such as diabetes and cardiovascular disease impaired by insufficient sleep (26). This finding is supported by our results showing a significant association between poor quality sleepers and overweight or obese individuals. Moreover, findings suggest that insufficient sleep may lead to metabolic

diseases, including abnormalities in appetite control (26).

The present study found that as the global PSQI score increases, the BMI also increases. Findings are consistent with a recent study, which found that poor sleep is interrelated with higher BMI (27). Previous studies have also shown that males aged 18 to 29 with poor sleep quality can be obese (28). Similarly, a survey of the Korean population showed a positive association between poor sleep quality and obesity over underweight (29). An early study showed that lifestyle behaviours, including good sleep latency, were associated with a lower risk of weight gain (8).

Short and insufficient sleep periods contribute to driving weight gain (19) and increased BMI (30,31). A similar finding was reported earlier, whereby Singapore residents with obesity were also more likely to report less than six hours of sleep than seven to eight hours compared to their counterparts with normal BMI (32). This relationship is not related to sleep apnea (33). Sleep apnea may be a factor in obesity, but it is not associated with poor sleep quality or decreased sleep duration.

Several strengths exist in our study. This is the first study to assess the association between sleep quality and body weight status in Malaysian adults during the COVID-19 pandemic. Since this was a cross-sectional analysis, our research was conducted faster and inexpensively, and the data was collected only once. This study had several limitations. For instance, it did not involve objective sleep duration assessments, such as sleep actigraphy. Consequently, the recorded total sleep period and both self-reported height and weight may be less accurate and susceptible to recall in this analysis. As a result, subjects overestimate the number of hours they sleep, height, and weight. This bias could lead to misclassification and likely underestimate the association between sleep quality and body weight status. The research was restricted to the pandemic of COVID-19, and we used a web-based research method to prevent potential outbreaks. There are few recommendations for future study of sex-specific sleep quality versus body weight status. More research is recommended to examine the sex-specific sleep quality and an equal number of male and female subjects in future studies.

CONCLUSION

In summation, the present study findings revealed that eight out of ten Malaysian adults had poor sleep quality. Furthermore, the study showed a significant and positive correlation between sleep quality and body weight status. Hence, BMI was linked to sleep quality, with a greater BMI among poorer sleep quality individuals. Thus, it also provides healthcare professionals with the opportunity to continue promoting healthy weight management even during the pandemic of COVID-19.

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