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The Association between BMI Level and Sleep Adequacy among Respondents in Salak, Sepang, Selangor, Malaysia

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ABSTRACT

Overweight and obesity is associated with chronic diseases and negatively affect sleep. Sleep problems may also contribute to overweight/obesity. Therefore, this study was conducted to determine the prevalence of overweight / obesity and the association with sleep adequacy among the respondents in Salak, Sepang, Selangor.

A cross sectional study was done among Malaysian, aged more than 18-year-old. Respondents that fulfill the inclusion & exclusion criteria were interviewed with validated questionnaires and data were analyze using SPSS.

Eighty-three percent of the respondents were overweight/obese. Majority were female, divorcee / widower, had primary education and government staff. They also have inadequate sleep duration.

Sleep is the 'most sedentary activity', that protects from weight gain. Therefore, more studies and awareness program on adequate sleep duration and its health effect, especially on overweight and obesity should be done.

Keyword: body mass index, overweight, obesity, prevalence, sleep adequacy

INTRODUCTION

In 2010, overweight and obesity already were estimated to cause 3.4 million deaths, 3.9% of years of life lost and 3.8% of disability adjusted life years (DALYs) globally. [1] Globally, the proportion of adults with a body mass index (BMI) of 25 or greater increased from 28.8% (95% UI: 28.4-29.3) in 1980 to 36.9% (36.3-37.4) in 2013 for men and from 29.8% (29.3-30.2) to 38.0% (37.5-38.5) for women. Increases were observed in both developed and developing countries. [2]

The prevalence of overweight in Southern China in 2014 was 25.8% while the obesity was 7.9%, [3] whereas based on Malaysia National Health and Morbidity Survey (NHMS) carried out in 2015, 30.0% were overweight and 17.7% were obese. [4] Overall, in 2016, World Health Organisation (WHO) reported that 39% of adult aged 18 and over were overweight, whereas 13% were obese. [5]

Overweight and obesity is associated with premature mortality at all ages, for both men and women. [6] Not only can being overweight or obese negatively affect sleep through sleep apnea and restless legs syndrome, but certain sleep problems may contribute to overweight /obesity. [7] A study on association between sleep duration and overweight/obesity showed that the overweight/obesity may be prevented with an optimal sleep duration of 7–8 hours. [8] Sufficient sleep duration requirements vary across the lifespan and from person to person. Individuals who habitually sleep outside the normal range may be exhibiting signs or symptoms of serious health problems or, if done volitionally, may be compromising their health and well-being. [9]

Thus, this study was designed to determine the prevalence of overweight / obesity and the association with sleep adequacy among respondents in Salak, Sepang, Selangor.

MATERIALS AND METHODS

A descriptive cross-sectional study was carried out in a residential area in

Salak, Sepang, Selangor, which consisted of approximately 250 populations with majority is Malay. The neighborhood comprises of single and double storey houses with total of 130 houses.

The housing area has been stratified earlier before systematic random sampling was conducted to choose the respondents' houses, followed by simple random sampling to select the respondent within the household. All Malaysian who were living in the area for at least six months, aged more than 18 years, not mentally retarded, deaf and mute, were selected as respondents. Respondents who refused to participate in the survey or were not there during the survey after three visits, will be considered as non-respondents

Data was collected through face to face interview using a validated questionnaire from National Health Morbidity Survey 2015. [10] The data has been analyzed using descriptive statistics to get the frequency and relative frequency (percentage) for Body Mass Index, blood pressure, diabetes mellitus and sleeping adequacy, and also sociodemographic variables.

The body mass index (BMI), was calculated and classified based on Clinical Practice Guideline (CPG) on primary & secondary prevention of cardiovascular diseases (CPG, 2017) into Normal (BMI <23kg/m^2), Overweight (BMI 23-27kg/m^2) and Obese (BMI ≥ 28 kg/m^2). [11] Hypertension is defined as persistent elevation of systolic blood pressure (BP) of 140 mmHg or greater and/or diastolic BP of 90 mmHg or greater. [12] The respondent is classified as having diabetes mellitus once he/she self-reported has previously been diagnosed with diabetes type 1 or 2 by health professionals. [10] Adequate sleeping is classified when they sleep 7 hours and more per day while inadequate sleeping is less than 7 hours. [9] The association between BMI level and sleep adequacy was determined by Chi square test. The level of significance was set at $p < 0.05$ and confidence level at 95%.

RESULT

A total of 125 participants participated in this study, giving an overall response rate of 86.2%.

Table 1: Prevalence of BMI level among respondents

BMI Level	n	%
< 23kg/m^2	21	16.8
≥ 23 kg/m^2	104	83.2
Total	125	100

Majority (83.2%) of the respondents have at least 23 kg/m^2 of BMI level (Table 1).

Table 2: BMI level bysocio-demographic (N=125)

Socio-demography	BMI Level(kg/m^2)		
	< 23 n (%)	≥ 23 n (%)	Total n (%)
Age*(p=0.196)*			
< 20	2 (66.7)	1 (33.3)	3 (100)
20 - 29	6 (22.2)	21 (77.8)	27 (100)
30 - 39	7 (20.0)	28 (80.0)	35 (100)
40 - 49	2 (7.4)	25 (92.6)	27 (100)
50 - 59	3 (12.5)	21 (87.5)	24 (100)
≥ 60	1 (11.1)	8 (88.9)	9 (100)
Gender*(p=0.284)*			
Male	11 (20.8)	42 (79.2)	53 (100)
Female	10 (13.9)	62 (86.1)	72 (100)
Education*(p=0.251)*			
Primary	0	4 (100)	4 (100)
Secondary	11 (21.6)	40 (78.4)	51 (100)
Tertiary	10 (14.3)	60 (85.7)	70 (100)
Occupation*(p=0.253)*			
Private	9 (23.7)	29 (76.3)	38 (100)
Government	0	35 (100)	35 (100)
Self employed	3 (18.8)	13 (81.2)	16 (100)
Unemployed	2 (15.4)	11 (84.6)	13 (100)
Retiree	2 (22.2)	7 (77.8)	9 (100)
Housewife	2 (28.6)	5 (71.4)	7 (100)
Student	3 (42.9)	4 (57.1)	7 (100)
Marital status*(p=0.491)*			
Single	8 (25.8)	23 (74.2)	31 (100)
Married	13 (14.4)	77 (85.6)	90 (100)
Divorcee / widower	0	4 (100)	4 (100)
Monthly household income *(p=0.491)*			
< RM 5000	11 (18.9)	47 (81.1)	58 (100)
≥ RM 5000	10 (15.0)	57 (85.0)	67 (100)

The higher prevalence of the respondents with23 kg/m^2 of BMI level are in the age group of 40-49 years (92.6%), female (86.1%), monthly household income more than RM 5000 (85%), primary education (100%), government staff (100%) and divorcee / widower (100%) (Table 2).

Table 3: Prevalence of sleeping adequacy among respondents

Sleeping duration	n	%
< 7 hours	74	59.2
≥ 7 hours	51	40.8
Total	125	100

Majority (59.2%) of the respondents sleep less than seven hours per day (Table 3).

Table 4a: Association between BMI level and sleep adequacy

BMI level (kg/m^2)	Sleep adequacy		Total n (%)	P value
	Adequate n (%)	*Inadequate n (%)*		
< 23	10 (47.6)	11 (52.4)	21 (100)	0.257
≥ 23	41 (39.4)	63 (60.6)	104(100)	

Among the respondents who have at least 23 kg/m^2 of BMI level,60.6% are having inadequate sleeping status. However, statistically there is no significant association between BMI level and sleep adequacy among the respondents (P > 0.05) (Table 4a).

Table 4b: Association between BMI level and Hypertension status

BMI level (kg/m^2)	Hypertension status		Total n (%)	P value
	Yes n (%)	*No n (%)*		
< 23	2 (9.5)	19 (90.5)	21 (100)	0.465
≥ 23	22 (21.2)	82 (78.8)	104(100)	

Table 4c: Association between BMI level and Diabetes Mellitus status

BMI level (kg/m^2)	Diabetes Mellitus status		Total n (%)	P value
	Yes n (%)	*No n (%)*		
< 23	1 (4.8)	20 (95.2)	21 (100)	0.465
≥ 23	15 (14.4)	89 (85.6)	104(100)	

Prevalence of having hypertension and diabetes mellitus are twice and three times higher among respondents with BMI level more than 23 kg/m^2 (Table 4b and 4c).

DISCUSSION

Majority of our respondents were at least overweight and the prevalence was higher with decreases level of education. This was supported by previous studies which stated that the prevalence of overweight was highest for those with primary education (31.90%) [13] and the higher the individual's education relative to his or her peers, the lower is the probability of the individual being obese. [14] The positive effect of education on obesity can summarily be attributed to greater access to health-related information and improved ability to handle such information by the educated, and have clearer perception of the risks associated with lifestyle choices. [15]

Previous study [16] also has reported that 22.7% of married respondents were overweight and this was consistent with our study, where 85.6% of married respondents, 71.4% of housewife and 86.1% of female were overweight /obese. This might be due to women who are not engaged in any income-generating activities such as housewives, are more likely to be overweight or obese than working women. [17] Probably as a result of menopausal changes, decreasing physical activity and high fat diet. [18]

The divorced/widower respondents in our study also have high prevalence of overweight/ obesity. Studies have shown that the divorced/separated respondents were having the worst sleep quality (53%), followed by the widowed (47%) and this could be due to impacted psychological distress and worries. [19] A high prevalence of poor sleep quality (76%) and stress (53%) were found to have a statistically significant association (p < 0.001). [20]

Majority of our overweight /obese respondents, were having inadequate sleeping status. The short-sleep duration and poor-sleep quality contribute to the risk of higher BMI and was significantly associated with higher levels of adiposity markers including BMI, body fat, and waist circumferences, in which increase in ghrelin that may result in increases food intake and causes weight gain. [21-23]

The higher state of unemployment rates is associated with more sleeping time, as they felt there was no reason to get up in the morning when no one was expecting them. [24,25] Job loss also was associated with a decline in psychological well-being and may experiencing sleep-loss due to worry. [26] All these determinants including dietary pattern and physical inactivity were contributed to higher prevalence of overweight /obesity among unemployed respondents. [27,28]

The older adults (60 years old and above) were also have higher prevalence of overweight (88.9%).Inefficient sleeping in older adults is characterised by long periods

spent in bed but not asleep and due to the biological aging process. [29,30]

Studies conducted in Malaysia have reported that the prevalence of diabetes and hypertension increases with age and is at peak among the elderly (60 years old and above). [4,31] These were consistent with our findings where the prevalence of diabetes and hypertension were higher among respondents with overweight /obese.

CONCLUSION

Majority of the respondents were overweight/obese and have inadequate sleep duration.

Sleep is the 'most sedentary activity', yet may be the only one that protects from weight gain. Therefore, more studies and awareness program on adequate sleep duration and its health effect, especially on overweight and obesity should be done.

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