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How to cite this article:
Azhar ZI, Hassan MR, Jeffree MS. Sleep Duration and its Associated Factors among Residents of Hulu Langat, Selangor. *J Adv Res Med* 2016; 3(4): 12-17.

ISSN: 2349-7181

Sleep Duration and its Associated Factors among Residents of Hulu Langat, Selangor

Abstract

Background and Aims: Shorter and longer duration of sleep are known to be risk factors for diseases such as diabetes mellitus, hypertension and obesity. Most studies were done in the developed countries and there are limited population-based data from Malaysia regarding this topic. The objective of this study is to determine the prevalence of short sleeping duration among residents in the Hulu Langat district and determine its associated factors.

Methods: This was a cross-sectional study done in the year 2000. 7731 respondents in the Hulu Langat district were surveyed using a self-administered questionnaire. Short sleep duration was defined as having sleeping duration of less than 6 hours per day and long sleep duration as having sleeping duration of 6 hours or more per day.

Results: The prevalence of short sleep duration was 6.2%. The mean age of participants was 43.2 years (± 14.31) and 64.1% were females. Multiple logistic regression revealed significant association between short sleeping duration and younger age group (< 40 years old) (aOR=1.41, 95% CI: 1.15-1.73) and between short sleeping duration and smoking (aOR= 2.26, 95% CI: 1.57-3.26). Association between sleeping duration and gender, ethnicity, marital status, hypertension, diabetes and body mass index (BMI) were found to be not significant after multivariate analysis was done.

Conclusion: This study shows that shorter sleeping duration is significantly associated with younger age group (<40 years old) and smoking. Health promotion strategies should aim to educate the public regarding getting adequate sleep and stop smoking.

Keywords: Sleep duration, Hulu Langat, younger age, smoking.

Introduction

Many studies have shown that shorter sleep duration or longer sleep duration can lead to diseases such as diabetes mellitus, hypertension and obesity¹. Researchers have defined short sleep duration as sleeping for < 6 hours per night and this has been associated with various medical illnesses^{2,3}. On the other hand, sleeping for ≥ 9 hours is regarded as long sleeping duration^{3,4}. In terms of short sleeping duration watching television, surfing the internet and increased work demands to work till late at night are some of the common reasons identified in this modern day population.

Increased frequency of sleep complaints can be associated with diabetes mellitus. Finnish researchers identified a group of young men in a working age-group (19-29 years old) and noted that prolonged sleep restriction will cause glucose metabolism to experience changes and lead to higher risk of getting

diabetes⁵. Another study in India looked at 220 patients (men and women) with diabetes mellitus and revealed that they have reduced sleep compared to the general population⁶.

Regarding hypertension, it is still the major cause of death in developed countries but on the other hand, is the most common treatable risk factor for cardiovascular disease. A study published in 2008 revealed prevalence of this disease in Malaysia was 27.8% for those aged more than 15 years old⁷. In a Western New York Health Study, prevalence of hypertension was significantly higher in women who slept less than 6 hours per night⁸. Also in the USA, a Sleep Heart Health Study found an increase in risk of hypertension for those who had sleeping duration of <6 hours (OR = 1.66, 95% CI 1.35 – 2.04)⁹.

Obesity is one of the most obvious public health problems described by the World Health Organization (WHO) which comes as the sixth most important risk factor contributing to global burden of disease, but yet, the problem is still neglected in most parts of the world. Many studies, mainly cross-sectional types, have revealed association between short sleep duration and weight gain in children and adults¹⁰.

In a group of older adults in 6 clinical centres in the USA, those who slept for less than 5 hours was associated with higher odds of obesity compared to respondents who had an average sleeping duration of 7-8 hours. The odds was 3.7-fold greater (95% CI: 2.7-5.0) in men and 2.3-fold greater (95% CI: 1.6-3.1) in women¹¹.

Another important cardiovascular risk factor that can be related to sleeping duration is smoking. A range of sleeping disorders which includes shorter sleep duration and difficulty initiating or maintaining sleep has been shown to be associated with cigarette smoking. The well known factor causing sleep disturbance is nicotine contained in the cigarette. In a study done in the USA, former and current smokers are significantly associated with insufficient sleep (OR = 1.83, 95% CI: 1.63–2.06)¹². Another worrying finding is that passive smoker can also experience short sleeping duration that was found in a Japanese working population (OR = 1.81, 95% CI: 1.11-2.94)¹³.

The main objective of this cross-sectional study is to determine the prevalence of short sleeping duration among residents in the Hulu Langat district and also to determine the association between co-morbid risk factors with short sleeping duration.

Methods

According to the National Population and Housing Census, 2000, the district of Hulu Langat is considered to be the second most populated district in Selangor, next to Petaling Jaya, with a total population of 865,514. The district of Hulu Langat has an area of 82,922 km². It is one of the nine districts in the state of Selangor and it is divided into seven territories which are Cheras, Kajang, Semenyih, Ulu Semenyih, Beranang, Hulu Langat and Ampang.

The study sample for this study is derived from the 2000 Hulu Langat Survey. This cross sectional study involved six territories in the district of Hulu Langat. By using the list of residential units obtained from the Ampang Jaya Municipal Office (MPAJ), Kajang Municipal Office (MPKJ) and the District Health Office, the number of traditional villages and housing estates was acquired. By using the Fisher random numbers, the sampling units were selected by stratified random sampling according to the type of residences. This study used the sample adult core component of this Hulu Langat Survey (respondents age 18 years old and above) and gave a total sample size of 7731 respondents.

The study tool consisted of a questionnaire which the respondents filled up. The validated and pre-tested questionnaire contains background information, demographic data, questions on general health, questions on women and men's health, questions on lifestyles and also burden of diseases. Sleep duration was assessed by asking participants the following question: "How many hours do you sleep in a day?". Short sleep duration was defined as having sleeping duration of less than 6 hours and long sleep duration was defined as sleep duration of 6 hours or more per day. BMI was classified as normal and abnormal. Normal BMI was defined as respondent who had BMI < 23kg/m² while abnormal BMI was defined as those who had BMI ≥ 23kg/m². Diagnosis of hypertension was made by asking the respondents the following question: "Are you taking any anti-hypertensive medications?" and diagnosis of diabetes mellitus was made by asking "Have you been told by a doctor that you have diabetes mellitus?". The two questions regarding hypertension and diabetes were given either a yes or no answer. Blood pressure level, blood glucose level and Body Mass Index (BMI) were measured by trained Research Assistants. House to house visit method was used to obtain the data.

Data analysis was performed using SPSS version 19.0. Categorical variables were presented as frequencies and percentages while quantitative variables were presented as mean \pm standard deviation (sd). Chi

square test was used in the univariate analysis. A p-value of < 0.05 was considered to be statistically significant. Multiple logistic regression was performed for multivariate analysis.

Results

Table 1. Sociodemographic characteristics of the respondents

Variable	Mean (SD)	n(%)
Sleep duration		
< 6 hours		479(6.2%)
≥ 6 hours		7248(93.8%)
Age (year)	43.2 (14.31)	7731(100%)
Gender		
Male		2774(35.9%)
Female		4957(64.1%)
Ethnicity		
Malay		6325(81.8%)
Non-Malay		1406(18.2%)
Marital status		
Married		6081(78.7%)
Not married		1650(21.3%)
Smoking status		
Yes		1436(18.6%)
No		6295(81.4%)
Hypertension		
Yes		1046(13.5%)
No		6685(86.5%)
Diabetes		
Yes		352(4.6%)
No		7379(95.4%)
BMI		
Normal		2189(28.9%)
Abnormal		5396(71.1%)

Table 1 shows the sociodemographic characteristics of the respondents. 6.2% of adults sleep less than 6 hours in the district of Hulu Langat. The mean and standard deviation for age was 43.2 ± 14.3 years. For gender, 64.1% of respondents were females. The majority of the respondents were Malays (81.8%) and most of them were married (78.7%). For smoking status, the majority of respondents never smoked (81.4%). Regarding co-morbid risk factors, 13.5% had hypertension, 4.6% were diabetic and 71.1% had an abnormal BMI.

Table 2 shows there is a significant association between sleep duration and age ($p=0.001$), gender ($p<0.001$), smoking ($p<0.001$), hypertension ($p=0.012$) and diabetes ($p=0.038$). Respondents who are ≥ 40 years old, female, non-smokers, diabetic and hypertensive are more likely to have sleeping duration of < 6 hours per day. There were no significant

associations found between sleeping duration with ethnicity, marital status and BMI.

Table 3 revealed results for multiple logistic regression and showed statistically significant relationship between short sleeping duration and younger age group (< 40 years old) with adjusted odds ratio (aOR) = 1.41 (95% CI: 1.15-1.73). This means that those who are less than 40 years old are 1.4 times more likely to have short sleeping duration. Relationship between short sleeping duration and smoking was also statistically significant with adjusted odds ratio (aOR) = 2.26 (95% CI: 1.57-3.26). This gives the interpretation that smokers are 2.3 times more likely to have short sleeping duration. There is no significant relationship between sleeping duration and gender, hypertension, diabetes, BMI, ethnicity and marital status.

Table 2. Factors associated with sleep duration

Sleep duration, n(%)				
Variables	< 6 hours	≥ 6 hours	χ ²	p
Age (years)				
< 40	165(5.1%)	3069(94.9%)	11.51	0.001
≥ 40	314(7.0%)	4179(93.0%)		
Gender				
Male	134(4.8%)	2639(95.2%)	13.89	< 0.001
Female	345(7.0%)	4609(93.0%)		
Ethnicity				
Malay	402(6.4%)	5919(93.6%)	1.54	0.214
Non-Malay	77(5.5%)	1329(94.5%)		
Marital status				
Married	380(6.3%)	5697(93.7%)	0.14	0.705
Not married	99(6.0%)	1551(94.0%)		
Smoking				
Yes	45(3.1%)	1391(96.9%)	28.50	< 0.001
No	434(6.9%)	5857(93.1%)		
Hypertension				
Yes	83(7.9%)	962(92.1%)	6.32	0.012
No	396(5.9%)	6286(94.1%)		
Diabetes				
Yes	31(8.8%)	321(91.2%)	4.31	0.038
No	448(6.1%)	6927(93.9%)		
BMI				
Normal	136(6.2%)	2052(93.8%)	0.01	0.981
Abnormal	336(6.2%)	5057(93.8%)		

Table 3. Factors associated with short sleeping duration (using multiple logistic regression)

Variables	Regression	S.E	p-value	Adjusted odds ratio	coefficient (β)	(95% CI)
Age < 40 (years)	0.342	0.104		0.001	1.41	(1.15-1.73)
Smoking	0.817	0.186	< 0.001	2.26		(1.57-3.26)
Constant	2.370	0.248	< 0.001			

Discussion

The prevalence of short sleep duration in this study (6.2%) was almost similar to findings in other studies, which was between 7.8% to 9.2%^{1,9,14}. Younger age group (< 40 years old) and smoking are associated with short sleep duration. This is not consistent with a study done in Singapore that found those who had short sleep were more likely to be older and postmenopausal women¹⁵. Decreased sleep among older people can be related to difficulty in initiating sleep or remaining asleep, increased arousal and their relevant brain areas have developed neuroanatomic changes with the aging process¹⁶.

Gender was found to be not significantly associated with sleeping duration. This is contrasting with a research that showed women are at higher risk of getting less sleep due to physical changes during

pregnancy and to provide frequent infant care during postpartum period¹⁷.

Ethnicity and marital status did not show a significant relationship with sleeping duration. Regarding ethnicity, this was not consistent with studies done in a population based setting in USA where findings for ethnicity factor revealed non-Hispanic blacks are more likely to report short sleeping duration compared to non-Hispanic whites^{2,4}. For marital status, this finding was also not consistent with a study done among 159, 856 participants across USA which found that married individuals reported less sleep complaints¹⁸.

A resident of Hulu Langat who is a smoker is more likely to report a short sleeping duration compared to non-smokers after multivariate analysis was done. This finding was consistent with studies which state

that smoking causes short sleeping duration^{12,19}. However, there is a large research done in the United States that revealed smoking can lead to the a person having long sleeping duration (≥ 9 hours), with adjusted odds ratio of 1.45 (95% CI: 1.32-1.59)¹⁴. Another study of a prospective cohort in Singapore (n=58,044) found that those who slept for 9 hours or more are likely to be older, smokers, diabetics and hypertensives¹⁵. Many studies have also linked long sleeping duration with hypertension^{4,9}, diabetes^{3,4} and obesity^{4,20}.

Regarding development of diabetes, short sleep duration was not significantly associated with this illness and differs from studies done in Japan, Europe and USA^{21,22,23}. The reason behind the pathophysiology of diabetes is likely due to insulin resistance that will increase sympathetic nervous activity and evening cortisol level as a result of short-term sleep deprivation¹⁷.

Hypertension was not significantly associated with sleeping duration. This is contrasting with findings from a large sample study in US where respondents who slept for 5 hours or less were associated with developing hypertension²⁴. Other studies reported the same association between hypertension and short sleep duration^{3,25}. Findings in this study also revealed no significant association between sleeping duration and BMI. This was not consistent with many studies which have linked obesity and short sleeping duration^{10,18,20}.

The strength of this study is the large sample size and population-based design. This will ensure that the results gathered from the study will represent the true population findings. Large sample size will give more respondents chance to participate in this study and eliminate selection bias.

However, this study does have its limitations. Firstly, the cross-sectional nature of the study design will limit the causal inferences between sleep duration and the associated factors. For example, short sleep duration can lead to smoking but it can also be vice-versa. Besides that, the sleep duration was self-reported by the respondents. This will definitely generate recall bias and the possibility of respondents giving an incorrect sleeping duration is high. To minimize the recall bias, objectively measured sleeping duration can be done in future studies but this will be more costly. Last but not least, other information related to sleep such as stress, working night shifts, sleep quality and sleep apnea were not taken. These are important points to take into

account as these factors can also contribute to short sleeping duration.

Conclusions

In conclusion, short sleeping duration of less than 6 hours per day is a significantly associated with younger age group (< 40 years old) and smoking. The best way to ensure adequate sleeping duration is through lifestyle modification and widespread health promotion by the public health team. Focus should be placed on conveying the message of importance of stop smoking to getting sufficient sleep among the population.

Conflict of Interest: None

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Date of Submission: 15th Jan. 2017

Date of Acceptance: 02th Mar. 2017