SLEEPINESS AND TIREDNESS AMONG DOCTORS WORKING IN A TERTIARY HOSPITAL: IS IT WORK RELATED OR IS THERE UNDERLYING SLEEP DISORDERS?

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ABSTRACT

Background

Doctors who work in a tertiary hospital may frequently complain of sleepiness and tiredness. Majority of trainee doctors attribute these symptoms to the nature of their work having to do frequent night shifts or more than 24 hours work shift causing irregular sleep patterns and sleep deprivation. There are still limited data regarding sleep disorders among trainee doctors. Hence this study is to look at prevalence of obstructive sleep apnea (OSA) among doctors working in a tertiary hospital and also to identify if the sleepiness and tiredness is caused by undiagnosed OSA.

Methods

A prospective cross-sectional study is performed among doctors working in a tertiary hospital. All doctors recruited will be required to fill up the demographic data, STOP-Bang and Epworth Sleepiness Scale questionnaires. A wristwatch pulse oximetry will be given to each participant for home nocturnal oxygen saturation monitoring during sleep. Participant will have to wear the wristwatch to sleep overnight till the next day. Participant with oxygen desaturation index (ODI) of 10 and above will be offered a home sleep apnea testing (ApneaLink ResMed) to further evaluate the apnea hypoapnea index (AHI) for diagnosis of moderate to severe OSA. The STOP-Bang and ESS scores will be compared and correlate with data collected from the wristwatch pulse oximetry.

Results

Among the 130 of doctors recruited in this study, 39 (30%) found to have ODI of >5 and 19 subjects with ODI >10. Further evaluation with home sleep study showed 4 (3.1%) doctors had moderate OSA and 6 (4.6%) confirmed to have severe OSA. The prevalence of excessive daytime sleepiness (ESS >10) was 21% , tiredness (51%) and perception of inadequate sleep (41%). However there is no association between tiredness or sleepiness and OSA. The predictors of perception of having inadequate sleep were snoring (OR= 0.32; *p=0.0015;* 95%CI:0.12-0.8) and average sleep time during on-call (OR=0.57; *p<0.001;* 95%CI:0.4-0.8). While BMI and snoring were the significant predictors for OSA with odd ratio (OR) of 1.33 (*p<0.001;* 95% CI:1.14-1.55) and 5.14 (*p=0.006;* 95% CI:1.59-16.67) respectively.

Conclusions

Our study have shown significant prevalence of undiagnosed moderate to severe OSA among young doctors. Snoring and BMI are the only independent predictors for OSA. STOP BANG is not so accurate to predict OSA in young, healthy and non-obese population. ODI from high resolution oximetry is a good screening tool to detect OSA. We have demonstrated that shorter average sleep during on-call time as well as snoring are predictors of perception of always having inadequate sleep among the doctors participated in this study.

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CHAPTER 1: INTRODUCTION

Sleep disorder is common health problem worldwide however, many adults with clinical significant sleep disordered breathing remained undiagnosed [1]. The most common sleep disorder is obstructive sleep apnea (OSA) which is a sleep related breathing disorder characterized by full or partial cessation in airflow that lasts more than 10 seconds despite a continuous effort to breath [3]. It can occur due to recurrent collapsed or obstruction of the upper airway caused by relaxation of the uvula and soft palate which leads to a hallmark of snoring and gasping pattern [3]. The blood oxygen levels will be reduced during this interruption of breathing that leads to occasional hypoxemia causing an individual to arouse from sleep a few times and hence ending with poor quality of sleep [2]. The common symptoms experienced by individuals with OSA include fatigue, excessive daytime sleepiness (EDS), insomnia, nocturia and morning headaches [2].

Diagnosis of OSA is confirmed with a polysomnography (PSG). The total number of apnoea plus hypopnoea events divided by total sleep hours is the Apnoea-Hypopnoea Index (AHI). If the AHI is 5 times/ hour or greater, a diagnosis of OSA is made. Despite PSG being the gold standard in diagnosing OSA, due to resource limited settings, there are several screening questionnaires and clinical modalities that have been developed to assess the risk of having OSA[3]. The snoring, tiredness, observed apnoea, high blood pressure, high BMI, age, neck circumference and male gender (STOP-Bang) questionnaire is an effective and concise screening tool which consist of eight dichotomous (Yes/No) questions[1]. The total score range from 0-8. Patients with STOP-Bang score of 0 to 2 can be classified as low risk for moderate to severe OSA while midrange score 3-4 and score of 5-8 has intermediate and high risk for moderate to severe OSA respectively [7].

Epworth Sleepiness Scale (ESS) is the most commonly used questionnaire for measuring sleepiness via sleep propensity. The total ESS scores are based on eight different situational sleep propensities, which give an average sleep propensity. ESS values ranged from 0 (unlikely to fall asleep in any situation to 24 (high chance of falling asleep in all eight situations). ESS values of at least 10 were used to define excessive daytime sleepiness [15].

Nocturnal oximetry can be a simple alternative to polysomnography to detect sleep disordered breathing. Oxygen desaturation index (ODI) is the hourly average number of desaturations , which are defined at least 4% decrease in saturation from the average saturation in preceding 120 seconds, and lasting more than 10 seconds [4]. Alternatively ODI is a good predictor of AHI. ODI >10 has a high sensitivity (93%) and reasonable specificity (75%) to detect moderate and severe sleep disorder breathing [4].

Sleep disorders are important health issues that can reduced ones quality of life by affecting their performance and productivity in a detrimental way. Trainee doctors who frequently work in night shifts or 24hours shift commonly have irregular sleep patterns and sleep deprivation causing sleepiness and tiredness. When insufficient sleep coexist with shift work, an increased tendency to sleep poses a more serious problem especially during work. This also causes deterioration in neurocognitive functions such as attention, concentration ability and memory which may lead to serious job accidents. The data on prevalence of sleep disorders among resident doctors are still limited. Hence, more research needed to evaluate if the sleepiness and tiredness among doctors were due to the nature of their work or is there underlying sleep disorders which may contribute to the symptoms of undiagnosed of OSA.

CHAPTER 2: LITERATURE REVIEW

A systemic review has shown obstructive sleep apnea affects 2 percent of the women and 4 percent of men from the western communities. There are still minimal data about the prevalence of OSA among Asians [11]. The prevalence of OSA in adult Thai population were 15.4 percent men and 6.4 percent women [19]. In China, the prevalence of OSA was reported to be 8.4 percent, while in India it was reported to be 13.7 percent [18]. The prevalence of OSA among bus driver in Malaysia is 44.3 percent with mild, moderate and severe OSA prevalence of 28.7, 9.0 and 6.6 percent respectively[13]. The prevalence of moderate to severe OSA in multiethnic population in Singapore is approximately 30% [20].

Excessive daytime sleepiness (EDS) is one of the symptoms of OSA. It can be measured subjectively with Epworth Sleepiness Scale (ESS). The ESS is a self-administered questionnaire whereby respondents rate their usual chances of dozing off while engaged in eight different activities on a four point scale. The higher the ESS score the higher the average sleep propensity in daily life of the respondents or their 'daytime sleepiness''. In general the ESS score of 10 and above can be interpreted as having excessive daytime sleepiness. There are still conflicting views on severity of OSA and ESS score despite some evidence that both ESS score and severity of OSA correlate [15]. Studies have shown that STOP-BANG score of 3 and above has more than 93% sensitivity in detecting moderate to severe OSA [7]. Subjects with STOP BANG score between 0 to 2 can be classified as low risk for moderate to severe OSA [1,7]. Those scores between 5 to 8 are high risk group for moderate to severe OSA [1,7]. The midrange score of 3or 4 need further criteria such as BMI above 35 for classification of having moderate to severe OSA [7].

A healthy adult need an average of 7 hours of sleep. Study has shown that there is a decline in peak alertness in those who slept less than 5 hours per day [13]. Doctors are the frontier of the healthcare system. Literature review showed that doctors slept average of 2.8 hours during their on-call nights in the hospital [13]. The studies found significant decrements on the ability to perform at least one task after a night of reduced sleep [2,8]. There is also evidence that the loss of sleep caused by long hours of work can have effect on patient's safety and doctor's health [13].

There are still very few study to look at excessive daytime sleepiness and tiredness among doctors with obstructive sleep apnea. As mentioned, it is more common for doctors to attribute the cause of their sleepiness and tiredness to their erratic and long working hours. In this study, we aim to uncover the prevalence of undiagnosed OSA among doctors as well as the predictors to OSA in this population.

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CHAPTER 3: METHODS

3.1 Study Subjects

This quantitative study with prospective cross sectional method was conducted during the period of October 2018 till May 2019 after the approval by local ethics committee of University Malaya Medical Centre (MREC ID: 2018823-6615).Written informed consent obtained from all participants. All doctors working in a tertiary hospital with active calls or working night shifts were recruited. Doctors who are pregnant or already have been diagnosed with OSA were excluded.

All subjects required to fill up a set of questionnaires comprising of demographic data, STOP-BANG and Epworth Sleepiness scale. STOP-BANG consisted for 8 dichotomous questions: snoring (S), tiredness (T), observed apnea (O), blood pressure (P), body mass index (BMI)> 35, age above 50 (A), neck circumference more than 40cm and gender being male (G). One point is awarded for yes on each question. Subject with STOP BANG score of 3 and above are considered high risk for OSA. ESS consist of 8 questions looking at sleep propensities in various situation. ESS value of at least 10 defined excessive daytime sleepiness. Neck circumference (at cricoid level) and weight were directly measured by investigator. The participants giving study consent underwent pulse oximetry monitoring when asleep in their own home. Minimum of 4 hours of sleep is required for this study. Subjects with oxygen desaturation index of 10 and above were offered further evaluation of apnea hypopnea index with portable polysomnography.

3.2 Oximeter

Subjects are given a high resolution pulse oximeter wristwatch (PULSOX-300i, Konica Minolta Sensing, Inc. Osaka, Japan) for oxygen saturation monitoring overnight. The wristwatch is strapped on non-dominant hand with the oxygen probe placed on any fingers according to subject's own comfort. The sampling frequency of PULSOX 300i oximeter is 1 Hertz on memory interval and an averaging time of 3 seconds. The resolution 0.1% of $Sp0_2$ [4]. The data were downloaded into a personal computer the following morning and were processed with specifically designed computer program Profox (Profox Associates, Escandido, CA). Oxygen desaturation index (ODI), lowest saturation and average saturation were extracted from the oximetry data. ODI is the hourly average number of desaturation episodes which are define as at least 4 percent decrease in the saturation from then average saturation in the preceding 120 seconds lasting more than 10 seconds [4]. Data processing was performed by primary investigator blinded to questionnaires result.

3.3 Portable Polysomnography (PSG)

Subject with ODI of 10 and above underwent portable sleep apnea testing for one night with Apnealink™Plus type III device. Each participant was required to wear the following devices: (1)chest belt around the thorax to detect respiratory effort; (2) nasal cannula inside the nostril to detect respiratory flow; (3) oxygen probe is placed on the third finger of the non-dominant hand to detect oxygen saturation. Apnea events were defined using a 90% of reduction in flow for at least 10 seconds and they were differentiated into obstructive, central or mixed events using the effort belt information [21]. For final results the data from the portable PSG device were retrieved by primary investigator blinded to the pretest questionnaires result.

3.3 Statistical Analyses

Sample Size Estimation

Based on the Sample Size Calculator for Prevalence Studies by Naing et al., a sample of 203 doctor needed to achieve 3% precision in estimating 5% prevalence of OSA in previous study by Soylu et al.

Data Analysis

Statistical analysis was performed using SPSS software version 23.0. The demographic and questionnaires data, summary data from overnight pulse oximeter and portable PSG were presented with descriptive statistics. Categorical data were presented in frequency and percentage and the statistical significance was checked with Chi square or Fisher's exact test. The mean ± SD was used for numerical data with normal distribution and independent t test to check their statistical significance. The Pearson correlation between variable from ambulatory PSG and ODI from high resolution oximeter was analyzed. Output data from binary logistic regression is used to identify the predictors of OSA, tiredness and perception of having inadequate sleep in this study population. Independent numerical variables were tested for linear in logit to fit into the multiple logistic regression analysis. Collinearity was assessed by variance inflation factor with cutoff point at 10.

CHAPTER 4: RESULTS

4.1 Demographic Characteristics

Total of 130 doctors working in a tertiary hospital were recruited into the study. All subjects completed the questionnaires and 4-6 hours of nocturnal pulse oximetry monitoring. The mean age was 33.1 SD (2.6)years. Gender distribution was 61% male and 39% female respectively. 88 (68%) subjects are anesthetic trainees and specialist. 24% of the subjects are surgeons from various discipline (general surgery, ENT, orthopaedic and obstetrics and gynaecology) The remaining 8% participants are from Emergency and Ophthalmology department. Among the participants, 51.5% were Chinese, 33.1% were Malay, 15.4% were Indian and other native races. 90% percent of the doctors have no history of any medical illness. 6.2 % of the study population has asthma and only less than 2% with underlying hypertension. The mean BMI was 25.0 SD (4.4) kg/m^2 and mean neck circumference was 35.8 SD (4.0)cm. The doctors did average of 3 calls per month and the mean duration of sleep during oncall as 2.7 SD(1.3) hours. Table 1 shows the basic demographic data of the study population.

Table 1: Demographic Data of the participant. Values are number or mean (SD)

Demographic data	
Age (years)	33.2 ± 2.6
Race	
Chinese	67 (51.5)
Malay	43 (33.1)
Indian	17 (13.1)
Others	3 (2.3)
Gender	
Male	79 (60.8)
Female	51 (39.2)
Department	
Anesthesia	88 (67.7)
Surgery	14 (10.8)
Orthopedic	8 (6.2)
O&G	9 (6.9)
Others	11 (8.5)
Medical Conditions	
No Medical Illness	117 (90.0)
Hypertension	2 (1.6)
Asthma	8 (6.2)
Heart Disease	2 (1.6)
Epilepsy	1 (0.8)
Weight (kg)	71.2 ± 15.2
Height (m)	1.68 ± 0.09
BMI	25.0 ± 4.4
Neck Circumference (cm)	35.8 ± 4.0
Number of calls per month	3.2 ± 1.2
Average of sleep during oncall (hours)	2.7 ± 1.3
Perception of feeling of inadequate sleep	
Never	3 (2.3)
Sometimes	74 (56.9)
Always	53 (40.8)

4.2 STOP-BANG and Epworth Sleepiness Scale Data

The results distribution of the STOP BANG and ESS scores were demonstrated in Table 2. There are 36.2% of the participants that snores and about 5% claimed that someone had witnessed them having apnea during their sleep. Only 3% of the subjects had BMI of more than 35 and 10.8% of the doctors with neck circumference more than 40cm. More than half of the study admitted of having tiredness or fatigue during daytime. The mean STOP BANG score is 1.6 while the mean score for ESS is 6.7 SD(3.7). 20.8% of the subjects had excessive daytime sleepiness (ESS scoring of more than 10).

4.2 Pulse Oximetry and Apnealink™ Data

30% of the doctors have ODI >5. Out of the 30%, 19 subjects detected to have ODI above 10. All 19 subjects agreed to undergo overnight home sleep study test with ApneaLink. From the data, 7.7% of the study population found to have moderate to severe OSA. The mean average $Sp0_2$ is 96.2 SD (1.1)% and the mean lowest $Sp0_2$ 80.4 SD (9.6) % The mean duration of sleep is 356.7 SD (72.9) minutes. There is a significant linear correlation between ODI and AHI (*$p<0.001$).* The observed correlation coefficient between ODI and AHI is r^2= 0.824, which suggests positive and high correlation.

Table 2: STOP BANG and ESS Data. Values are number or mean (SD)

STOP-BANG Data	
SNORING	
Yes	34 (36.2)
No	96 (73.8)
TIREDNESS	
Yes	66 (50.8)
No	64 (49.2)
OBSERVED APNEA	
Yes	7 (5.4)
No	123 (94.6)
PRESSURE (HYPERTENSION)	
Yes	2 (1.5)
No	128 (98.5)
BMI > 35	
Yes	4 (3.1)
No	126 (96.9)
AGE > 50	
Yes	0 (0.0)
No	130 (100.0)
NECK CIRCUMFERENCE >40	
Yes	14 (10.8)
No	116 (89.2)
GENDER MALE	
Yes	79 (60.8)
No	51 (39.2)
STOP-BANG SCORE	1.6 ± 1.2
Epworth Sleepiness Scale (ESS)	
Score	6.5 ± 3.7
ESS > 10	27 (20.8)

Table 3: Oximetry and ApneaLink™ Data. Mean (SD)

Pulse Oximetry Data	
Oxygen Saturation (%)	
Average	96.2 ± (1.1)
Lowest	80.4 ± (9.6)
Heart Rate	
Highest	119.1 ± (35.3)
Lowest	45.2 ± (11.4)
Mean	65.0 ± (8.7)
Duration of sleep (minutes)	356.7 ± (72.9)
Oxygen Desaturation Index (ODI)	5.1 ± (7.1)
ODI ≥10	19 (14.6)

RESMED Data	
Mild Sleep Apnea (5≤ AHI <15)	4 (3.1)
Moderate Sleep Apnea (15≤AHI<30)	4 (3.1)
Severe Sleep Apnea (AHI≥ 30)	6 (4.6)

Correlation between ODI and AHI

Variance	Mean± SD	r²	*P Value*
ODI	5.1 ± 7.1	0.824	<0.001*
AHI*	3.7 ± 13.3	0.824	<0.001*

Pearson Correlation *p <0.05 statistically significant

4.3 Comparison of Factors Associated with OSA

The study has shown that categorical factors which are more significant in OSA group were male gender (*p=0.0038)* and snoring (*p= 0.0037)*. The mean neck circumference in OSA group was higher 37.8cm compared to the non-OSA cohort with mean next circumference of 34.9cm. The mean BMI was also higher among subjects with OSA (27.6) . Overall, our study demonstrated that BMI and snoring were the significant predictors for OSA with odd ratio (OR) of 1.33 (*p<0.001;* 95% CI:1.14-1.55) and 5.14 (*p=0.006;* 95% CI:1.59-16.67) respectively. The predictors of perception of having inadequate sleep were snoring (OR= 0.32; *p=0.0015;* 95% CI:0.12-0.8) and average sleep time during on-call (OR=0.57; *p<0.001;* 95% CI:0.4-0.8).

Table 4: Categorical Variables Associated with OSA

Factors (Categorical Variables) Associated with Obstructive Sleep Apnea (OSA)					
Variables	***n***	**OSA** ***n*** **(%)**	**No OSA** ***n*****(%)**	x^2**statistic**[a] ***(df)***	***P*** **value**[a]
Gender					
Male	79	29 (36.7)	50 (63.3)	4.32 (1)	0.038*
Female	51	10 (19.6)	41 (80.4)		
Ethnicity					
Malay	43	14 (32.6)	29 (67.4)	0.20 (1)	0.687
Others	87	25 (28.7)	62 (71.3)		
Snoring					
Yes	34	15 (44.1)	19 (55.9)	4.37 (1)	0.0037*
No	96	24 (25.0)	72 (75.0)		
Tiredness					
Yes	66	10 (15.2)	56 (84.8)	0.031 (1)	0.0861
No	64	9 (14.1)	55 (85.9)		
Observed Apnea					
Yes	7	4 (57.1)	3 (42.9)	-	0.196[b]
No	123	35 (28.5)	88 (71.5)		
Hypertension					
Yes	2	0 (0.0)	2 (100.0)	-	1.000[b]
No	128	39(30.5)	89 (69.5)		
Excessive Daytime				-	1.000[b]
Sleepiness	27	6(11.1)	21 (89.9)		
Yes	103	33 (32.0)	70 (68.0)		
No					

[a]Chi-square test for independence   [b] Fisher's exact test   *****p <0.05 statistically significant

Table 5: Numerical Variables Associated with OSA

Comparing Numerical Variables Between OSA and Non OSA Subject

Variable	OSA *(n=14) Mean(SD)*	Non OSA *(n=116) Mean(SD)*	Mean Diff (95% CI)	*t statistics (df)*[a]	*P* value[a]
Neck Circumference(cm)	37.8 (3.97)	34.9 (3.6)	-2.9 (-4.3,-1.5)	-4.0 (128)	<0.001*
BMI	27.6 (4.8)	23.9 (3.6)	-3.7 (-5.2,-2.2)	-4.8 (128)	<0.001*
ESS Score	6.4 (3.2)	6.5 (4.0)	0.1 (-1.3, 1.5)	0.2 (128)	0.863

[a] Independent test *p <0.05 statistically significant

Table 6: Predictors for OSA

Factors associated with obstructive sleep apnea (using multiple logistic regression)

Variable	Adj. OR	(95% CI OR)	*X^2stat (df)*[a]	*P value*
Snoring	5.14	(1.59, 16.67)	7.80 (1)	0.006*
BMI	1.33	(1.14 ,1.55)	19.41 (1)	<0.001*

Adj.OR= Adjusted odd ratio [a]Likelihood Ratio (LR) test *p <0.05 statistically significant

Table 7: Predictors for Perception of Inadequate Sleep

Factors associated with perception of inadequate sleep (using multiple logistic regression)

Variable	Adj. OR	(95% CI OR)	*X^2stat (df)*[a]	*P value*
Snoring	0.32	(0.12, 0.80)	6.51 (1)	0.015*
Averagesleep during call times	0.57	(0.40, 0.80)	12.53 (1)	<0.001*

Adj.OR= Adjusted odd ratio [a]Likelihood Ratio (LR) test *p <0.05 statistically significant

CHAPTER 5: DISCUSSION

Overall the prevalence of OSA among doctors (30%) in our study was in line with the prevalence from previous studies from various Asian countries ranging from 13 to 40% [16]. We have scouted doctors with occult moderate to severe OSA with prevalence of 3.1% and 4.6% respectively. Snoring and BMI were demonstrated in our study to be independent predictors of OSA. Although the mean BMI of our study population was non-obese, our analysis have shown the higher BMI group have 1.24 times of odds having OSA compared to those with lower BMI. Previous studies have shown prevalence of OSA in non-obese patient had increasingly diagnosed in Asian population due to their craniofacial differences such as smaller and more retrognathic mandible as well as smaller maxilla[10]. Therefore smaller craniofacial features should be taken into consideration in non-obese person if there is high suspicion of OSA clinically [16]. Our study did not show STOP BANG to be a significant predictor for OSA as our subjects were generally young (age<50), non-obese (BMI<35) and non-hypertensive. Hence STOP BANG may not be a useful screening tool for OSA in younger and non-obese population. We have demonstrated that ODI from nocturnal oximetry correlates strongly with the AHI from ambulatory PSG ApneaLink™. Similarly to previous study, with ODI > 10, it effectively identified subjects with moderate to severe OSA [4]. ODI from high resolution oximetry is a simple and practical tool to detect undiagnosed OSA in a young an non obese population.

The prevalence of excessive daytime sleepiness in our study was higher (21%) compared to the study by Yasin et.al which was 15.4%. Nearly half of the study population acknowledged to always have feeling of inadequate sleep (41%) and tiredness (51%). On contrary, our study did not demonstrate OSA to be the predictor for tiredness or feeling inadequacy of sleep. The significant factors associate with perception of always having inadequate sleep was snoring and shorter average oncall sleep time. Comparatively to Yasin et al., our study subjects had less number of calls per month (3) with shorter duration of average sleep during the calls (2.7 hours). The doctors participated in this study were mainly anesthesia and surgical based trainees such as surgery, orthopaedic, obstetrics and gynaecology. The scope of work during on-call could involved long hours in the operating theater with minimal break time (compared to those in internal medicine department). The anesthetic team were frequently exposed to inhalational gas. Both can be confounding factors to the tiredness and always feeling having inadequate sleep in this study population.

LIMITATIONS

Although the sample size collected (130) was less than the calculated sample size (203), our study had shown interesting findings which reflected in other OSA studies in Asian populations. ODI from high resolution oximeter and home sleep apnea test (ApneaLink) are effective screening tools but these devices are not validated to be diagnostic tool for OSA. The gold standard to confirm OSA is still in-laboratory polysomnography. Craniofacial structure measurements via lateral cephalometry should be included in further study since we have detected significant percentage of moderate to severe OSA in our young, healthy and non-obese doctors. We recruited doctors from various specialties which involved different scope of work and responsibilities. This may cause difficulty in interpreting our result as a whole. Ideally, further study using in-laboratory PSG with larger and same number of sample size for each department will be useful in expanding our findings.

CHAPTER 6: CONCLUSION

Our study have shown relatively significant prevalence (7.7%) of undiagnosed moderate to severe OSA among young doctors. Snoring and BMI are the only independent predictors for OSA. STOP BANG is not so accurate to predict OSA in young, healthy and non-obese population. ODI from high resolution oximetry is a good screening tool to detect OSA. We have demonstrated that shorter average sleep during on-call time as well as snoring are predictors of perception of always having inadequate sleep among the doctors participated in this study. Awareness regarding sleep disorders due to OSA need to be emphasized among doctors especially those who experienced increasing BMI or received complaints about worsening snoring from their partners during their sleep. Job performance may still be affected because of underlying sleep disorder due to OSA.

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