Research Article

Determinants of Patients at Risk of Developing Obstructive Sleep Apnea in a Primary Care Clinic

Radzniwan Rashid 1, Saharuddin Ahmad 1, Aida Jaffar 1, Fairuz Ali 1, Norliza Paidi 2

1 Department of Family Medicine, Universiti Kebangsaan Malaysia Medical Centre, Kuala Lumpur,
2 Klinik Kesihatan Segamat, Segamat district office, Segamat Johor.

Correspondence should be addressed to Radzniwan Rashid, mradzniwan@yahoo.com

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ABSTRACT

Introduction
Obstructive sleep apnea (OSA) is associated with multiple medical and psychosocial impacts. Current evidence on individuals at risk of developing OSA in Malaysia particularly at primary care setting is scarce. This study aimed to determine the magnitude of patients at risk of developing OSA attended an suburban primary care clinic and associated factors in southern Malaysia.

Methodology:
This was a cross sectional study of adults ≥ 18-year old using systematic random sampling. Berlin Questionnaire was used to determine the risk of developing OSA in Malaysia. Respondent’s socio-demographic characteristics and clinical parameters including body mass index, weight, blood pressure, neck and waist circumference were obtained. Data was analyzed using SPSS version 20.0.

Results:
Out of 160 participants, 65.6% were females with the median (IQR) age of 55.6 (27.75) years and 81.9% were obese. Self-reported hypertension and diabetes was 55.6% and 35.60% respectively. One-fifths (19.4%) had high risk of developing OSA. Regarding symptoms described in the Berlin questionnaire, 37.5% reported snoring and 10.6% had excessive daytime sleepiness. The risk of developing OSA is associated with gender (p=0.008), neck circumference (p=0.010) and diastolic blood pressure (p=0.015). Multivariate logistic regression found the only factor significantly associated with at high risk of developing OSA is diastolic blood pressure (p=0.031).

Conclusions:
This study found that the risk of developing OSA was lower compared to western population. Interestingly, diastolic blood pressure is an independently factor found associated with at high risk of developing OSA. Further study is needed to understand this relationship.

Keywords: Obstructive sleep apnea, primary care, Berlin Questionnaire.
1. Introduction

Obstructive sleep apnea (OSA) is a chronic disorder which has detrimental impact physically and socially not only for the sufferers but also the general public. It is characterized by sleeping symptoms (snoring, frequent arousals, restlessness and repetitive pauses in breathing during sleep) which affect daytime functions and alertness that can be manifested as poor concentration, fatigue and daytime somnolence [1]. As it shares the same risk factors for other lifestyle diseases, it is closely associated with cardiovascular complications[2,3]. As we are progressing to a modernized society, these conditions are becoming more prevalent.

The prevalence of OSA worldwide was estimated at 2-4% of the population[4]. In addition the epidemiology data in 1996, has reported that about 1-5% adult men in communities has sleep apnea syndrome. In Asian region the prevalence of symptomatic Obstructive Sleep Apnea differs among themselves[4]. Nonetheless it is still lower compared to the prevalence in the developed countries [5,6]. Ironically despite evidence showing an increment of OSA prevalence, most Asian and developing countries still had limited number of facilities available for proper identifications of OSA [4].

The commonest clinical symptoms of OSA are snoring, breathing pauses during sleep, and excessive daytime sleepiness[2]. Clinically patients with hypertension, larger neck circumference, obesity and those who had reported awakenings with choking during their sleep should be screen for OSA as these are significant risk factors for the disorder[3]. Other important risk factors include older age, male gender[5-9] and other co morbidities such as hypertension, diabetes, cardiac diseases and even mental illness. In Malaysia, to date there is limited data on obstructive sleep apnea neither on its prevalence nor the screening measure of this disorder. The lack of availability to gain access the gold standard tool of Polysomnography services is one reason of this occurrence. This service is only available in established tertiary hospital in Malaysia. Early diagnosis and treatment of OSA are crucial to alleviate the associated morbidity and mortality [10].

However the ability to identify them early has proven to be difficult, where most of the patients receiving confirmatory polysomnography are already in the late stages of the disease [11]. Nevertheless, OSA patient is increasingly being identified by primary care doctors evidenced by a 12-fold increase in the diagnosis of sleep apnea in 9 years period from primary care clinics [12]. Yet, this airway disorder is generally still under diagnosed and unrecognized [7]. Therefore primary care clinic should be the platform centre in identifying and referring patients with OSA for further treatment in the early stages. This study hence aimed to determine the magnitude of participants at risk of developing OSA and its associated factors in a government primary health care clinic in the southern part of Malaysia.

2. Material and methods

This was a cross sectional study conducted in Bandar Mas health clinic, Kota Tinggi Johore, Malaysia from June 2011 to March 2012. Bandar Mas health clinic was chosen as it is one of the main referral health clinic in the district. 170 adult patients were approached based on systematic randomized sampling. Written informed consent was obtained before answering 2 parts of self administered questionnaire. Part 1 is the Berlin Sleep Apnea Questionnaire (BSAQ) and part 2 gathered information on sociodemographic and clinical characteristic of the respondents; Part 1 : Berlin Sleep Apnea Questionnaire (BSAQ) This questionnaire was used to classify the respondents into high or low risk of developing Obstructive Sleep Apnea (OSA). It has been validated with a sensitivity of 86%, specificity of 77%, and positive predictive value of 0.89 and a likelihood ratio of 3.79.

The questionnaire consists of 3 categories related to the risk of having obstructive sleep apnea:

a) In category 1, items 1,2,3,4 and 5 (mainly about snoring) were asked. A point system was used. Where one point given to ‘yes’ for item 1, one point to ‘c’ or ‘d’ response in item 2. One point given for either ‘a’ or ‘b’ response in item 3, one point if ‘a’ response in item 4 and one point assigned to either ‘c’ or ‘d’ response in item 5. Category 1 considered positive if the total score was 2 or more points.

b) In category 2, daytime sleepiness was assessed. One point was given for ‘a’ or ‘b’ response in item 6, one point for ‘a’ or ‘b’ response in item 7, and one point for ‘a’ response in item 8. It was considered positive if the score is 2 or more.

c) In category 3, it was positive if the response is ‘yes’ or if the participants body mass index is greater than 30.

From the scoring, high risk was defined if 2 or more categories were score positive whereas low risks if only 1 or no category was score positive.

This questionnaire had been used in many countries, including US, Indian, Europe and Pakistani populations [1,10,17]. However there is no validated questionnaire
yet for Malaysian population. In that regards, the question-
naire had undergone validation process prior embarking
the study which included forward and backward translated
to Malay and English by two researchers independently
and adjustment of the content validity. The content validity
has been conducted in stages by an ENT surgeon and two
of Family Medicine Specialists. The final version of the
translated questionnaire was piloted on 20 participants who
fulfilled inclusion criteria of the study at a different Health
Clinic with a similar background of population. The Cron-
bach’s alpha which measures Internal consistency ob-
tained by the pilot study was good (α = 0.79).

Part 2
Socio demographic data of the participant including age,
gender, ethnic group monthly household income, educa-
tional level and employment status and marital status were
asked. Participant’s clinical characteristic including smoking
status, hypertension and diabetes mellitus as well as basic
clinical examination including body mass index, waist and
neck circumference were obtained. Medical records of
these participants were used to complete the clinical data
which were not available in the self administered question-
naire.

Results
A total of 170 participants were approached during the pe-
riod of the study. However only 160 participants were finally
analyzed as six participants refused the study and another
4 participants did not complete the questionnaire making
the recruitment rate of 94.1%. The youngest participant
was 19 years old and the oldest was 78 years old. More
than two third (65.5%) were female and married (70%)
(Table 1). The prevalence of participants at high risk of
developing OSA was 19.4%. As for the snoring pattern,
out of 60 participants who snored, most reported the snor-
ing as loud as breathing and most didn’t think that they had
bothered others. Interesting to note that majority didn’t have breathing pauses during sleep. (Table 2)

Out of 17 participants who reported to have exces-
sive daytime sleepiness, more than half (58.8%) felt “tired
or fatigued after sleep” almost every day and about a third
(53.3%) had felt tired during waking time almost everyday.
It was an alarming finding when close to half (41.2%) had
fallen asleep during driving a vehicle and when they had it
majority has it for 1-2 times per month. With regards to the
risks of developing obstructive sleep apnea the study
found, by bivariate analysis, that gender (male), neck cir-
cumference and diastolic blood pressure had significant
association with the risk of developing OSA(Table 3). How-
ever further multivariate analysis, the study only found the
diastolic blood pressure was independently associated with
risk of developing OSA (p=0.037). From the result, it ex-
plained that with increment of 1 mmHg in diastolic blood
pressure, there is a 1.055% (95% CI: 1.055-1.108) chance of
having risk for developing OSA (Table 4).

Discussion
Our study looks at a rural population in the southern part of
Malaysia where majority of the population were lower class
with elderly Malays working mainly in the oil palm estate
industry. We found that the prevalence of them having high
risk of developing OSA is 19.4%. This finding was higher
compared to a study done in Pakistan[13] but lower com-
pare to other studies done elsewhere [8, 9, 15-17]. How-
ever most of these studies were done in the western popu-
lation. The lower prevalence of high risk of developing OSA
found in this study does not mean that it is to be taken
lightly as it is associated with significant morbidity.

Out of the 160 people assessed, one third (37.5%) admitted to have snoring problems. This is not uncommon
as previous local studies had reported that nearly 50% of
the population was aware that they have some form of
snoring problems [18]. This may seems trivial to some,
but snoring causes substantial social disharmony espe-
cially those with sleeping partners. In addition, 11% of the
population reported they experience daytime symptoms of
OSA such as daytime somnolence and poor alertness dur-
ing their waking hour. Another 11% even admitted that
their driving alertness have been affected from this condi-
tion. These findings are crucial as it can lead to motor vehi-
cle accidents which are one of the main contributors of
mortality in Malaysia and this should be addressed appro-
riately.

OSA mainly affects males [8]. It is believed that this
has to do with their anatomical structure and different hor-
monal composition as compared to their counterpart [19].
Our study found similar findings where through bivariate
analysis males have more significant association with high
risk of developing OSA. In addition to that males tends to
be more aware of their sleeping antics and are more willing
to report their snoring episodes when compared to woman
[19]. Despite this certain physiques which is more related
to males such as high body mass and neck size has been
also be linked to OSA [20-23]. This is in keeping with our
study whereby through bivariate analysis those with larger
neck circumference are associated with high risk of devel-
oping OSA. However we could not establish significant as-
sociation of body mass index and risk of OSA in our study
despite the vast amount of evidence available linking the
two. This may be attributed to our limitation of a small sam-
ple size, which was also skewed towards a single race
population. Other than obesity, OSA is also related with other lifestyle related metabolic conditions such as diabetes [16, 24-25] and hypertension [9, 13, 19]. In spite of this, the causal correlation between OSA and developing these diseases are still being studied. In our study, half (55.6%) of our participants are hypertensive and nearly one third are diabetics (35.6%). Nevertheless, we could not find any significant association between these two conditions and risk of OSA compared with other previous study [13, 16, 19-20, 24-25]. Despite unable to show any relationship between high risk of developing OSA with these co morbidities the risk is still relevant in detecting those at risk of OSA.

Our study has found one interesting finding when it was noted that diastolic blood pressure is the only significant factor by multivariate analysis relating to developing high risk of OSA. However, there is no previous study reported similar finding specifically on diastolic component of hypertension. Most previous studies which didn’t examine the diastolic aspect found the strong association between OSA and hypertension [9, 13, 19]. Therefore this finding need to be interpreted with caution as our studies were heterogeneous in nature and only assess the possible relationship between the diastolic and the risk of developing OSA. Considerably more work involving other settings and with larger population needs to be conducted to determine these associations in future in order to get a better picture on the true prevalence and characteristic of individual at risk of OSA. Furthermore, this study was performed only in a single health care centre in district Kota Tinggi. Nonetheless the finding in this study is important as it is one of its kind which has assessed the magnitude and pattern of OSA in rural are in southern Malaysia. We know that people with OSA are prone to become a victim of road traffic accident, had poor work performance and at higher risk of developing cardiovascular consequences. Therefore, health education and promotion on the pathogenesis, risk factors, diagnosis and treatment of Obstructive Sleep Apnea should be addressed optimally to reduce these major morbidities especially from the primary care and community level. Those at risk should be referred for sleep study for confirmatory of diagnosis and treatment should be commenced immediately and appropriately.

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**Conflict of interests:**
None to declare

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