

ORIGINAL RESEARCH ARTICLE

OBSTRUCTIVE SLEEP APNEA SYNDROME: A COMPARISON BETWEEN TWO ETHNIC GROUPS PRESENTING TO TERTIARY HOSPITAL IN NEPAL

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ABSTRACT

Background: Obstructive sleep apnea is a common problem with many health-related consequences. Factors such as age, sex, ethnicity, obesity, upper airway anatomy are risk factors for obstructive sleep apnea. This study was aimed to compare the pattern of obstructive sleep apnea between two ethnic groups of Nepal in a tertiary care center.

Methods: A cross-sectional study was conducted among the patients with obstructive sleep apnea at Kathmandu Medical College and Teaching Hospital. Seventy patients between the age of 18 to 65 years diagnosed as obstructive sleep apnea were included in the study by using convenience sampling method. The patients were divided into Aryan and Mongol group. Data was presented in the form of mean, standard deviation, median and interquartile range. Chi-square, student's t-test and Mann-Whitney U test were used. Statistical analyses were performed using Statistical Package for the Social Sciences (SPSS) version 16.

Results: Out of 70 patients, 35 patients were Aryan group and 35 in the Mongol group. Male patients were predominantly present in both the groups. Patients were more in the age group of 41-60 years. Enlarged tonsils were present in 15 (42.9%) of Aryans and 14 (40.0%) of Mongols. Among that, grade 2 tonsil, 8 (22.9%) was present in majority of both Aryans and Mongols. There was statistically significant association observed between Aryan group and Modified Mallampati score.

Conclusions: Obstructive sleep apnea has variation among the ethnicity. However, in this study only significant difference between Modified Mallampati Score and ethnicity as observed.

INTRODUCTION

Repeated episodes of partial or complete obstruction of upper airways is recognized as Obstructive sleep apnea (OSA). The resultant effect is intermittent hypoxia, frequent night time arousal and fragmentation of sleep. It is a chronic disease commonly affecting middle age people and mostly males. It is a global public health problem.¹⁻³

Several risk factors have been shown to be associated with OSA. Factors such as obesity, male gender, age, craniofacial and upper air abnormalities have been suggested as potential risk factors. Apart from these factors' ethnicity have also been claimed as risk factor. In a study conducted in 211 Hispanic and 246 white Americans and 978 Japanese, the prevalence of OSA was higher in Hispanics and whites than Japanese.⁴ This was later correlated to the difference in BMI distribution. In another study performed in Sao Paulo, Brazil between Japanese descendants and white males it was observed that the Japanese descendants had a lower BMI than while males highlighting that ethnicity other than BMI also plays role in the severity of OSA in Japanese individuals.⁵ Alkhazna et al on their study done between African-American and white men and women reported a higher BMI to be responsible for higher AHI.⁶

Growing evidence suggest that OSA is also associated with ethnic variation. The main difference may be dependent upon the morphology of craniofacial skeleton and orofacial musculature. However, there is paucity of data in South Asian belt and especially in Nepalese population. Hence this study was planned with the aim to compare the pattern of OSA between two ethnic groups of Nepal in a tertiary care center.

METHODS

A cross-sectional study was conducted among the patients coming to Kathmandu Medical College and Teaching Hospital with signs and symptoms of Obstructive sleep apnea. Data was collected from August 2020– June 2021. Patients between the age of 18 to 65 years diagnosed as OSA were included in the study. While patients with other respiratory diseases, undergone tracheostomy, with clinical suspicion of other sleep disorders and having other comorbidities and neoplasms were excluded from the study.

In total 70 patients were included in the study by using convenience sampling method. Ethical clearance for the study was obtained from KMC-IRC (Ref: 1709202006). After obtaining ethical clearance, study information was

explained to the patients and informed consent was taken. The patients were divided into Aryan (n=35) and Mongol (n=35) based from the reported information obtained from the proforma. Then they were examined by the principle investigator. In detail evaluation of the study participants were carried out with predesigned proforma, which included age, gender, and ethnicity. All patients underwent clinical history and otorhinolaryngological examination and completed a questionnaire scale called Epworth sleepiness scale (ESS) and anthropometric measurements (BMI, neck circumference and Modified Mallampati Score).

BMI, the most commonly used method to measure obesity was calculated by taking weight in kilogram and height in centimeter; then dividing weight by the square of height. According to BMI patients were distributed as Normal when BMI was less than 24.9, Overweight when BMI was between 25 to 29.9, Obese when 30-34.9 and Extremely Obese when more than 35. Neck circumference was measured in centimeters at the level of cricothyroid cartilage, with non-stretchable plastic tape with the subjects standing upright. In men with a laryngeal prominence (Adam's apple), it was measured just below the prominence.

History suggestive of subjective daytime sleepiness was assessed and recorded according to the Epworth Sleepiness Scale (ESS). Scores higher than 10 were considered sleepiness. Detailed Otorhinolaryngologic physical examination of the upper airway was done by the primary author and findings were noted. Nasal examination was performed via anterior Rhinoscopy and internal nasal pathology were evaluated such as septal deviation, turbinate hypertrophy and obstructive lesions such as polypus. Mandibular retrognathism was evaluated in accordance with the position of the pogonion when a virtual imaginary line between the vermilion line and the chin on a patient sitting in a Frankfort horizontal position is taken into consideration. The examinations of the oral cavity started with an inspection of the relative position of the hard and of the soft palate of the tongue inside the mouth without tongue protrusion using Modified Mallampati Score (MMS). This ranges from Class 1-4, with Class 1 representing the highest visibility (palatine tonsils, pillars and soft palate visible); and Class 4 representing the lowest level of visibility (only hard palate being visible) of the posterior oropharynx. The tonsils were graded according to hypertrophy from Degree I to Degree IV. They were Grade I when they were barely seen behind the anterior pillars, Degree II when they occupied 25% of the oropharynx; Degree III when they occupied 50 % of the oropharynx and; Degree IV when they almost in the midline and occupied at least 75% of the oropharynx. Tongue base sizes were examined with 70degree rigid endoscope and Graded. Grade 1, when vallecula was partially visible; Grade 2, when vallecula was invisible and tongue base touched the epiglottis and Grade 3, when it pushes the epiglottis.

Each patient was subjected for full night in laboratory diagnostic polysomnography test and findings were noted. Sleep was recorded and scored according to standard methods. AHI (Apnoea – Hypopnoea Index) was measured per hour of sleep. Patients were characterized as Mild, moderate and

severe according to AHI events. AHI between 5-15 was Mild sleep apnoea, 15-30 was Moderate sleep apnoea and >30 was Severe sleep apnoea.

Data were analyzed to identify the difference between the two ethnic groups. Data was presented in the form of mean, standard deviation, median and interquartile range. To determine relationship between the study variables and ethnic groups, Chi-square, student's t-test and Mann-Whitney U test were used. Statistical analyses were performed using Statistical Package for the Social Sciences (SPSS) version 16. A p-value of <0.05 was considered statistically significant.

RESULTS

The study enrolled 70 patients in which 35 patients belonged to Aryan group and 35 in the Mongol group. Male patients were predominantly present in both the groups. Patients were more in the age group of 41-60 years. Enlarged tonsils were present in 15 (42.9%) of Aryans and 14 (40.0%) of Mongols. Among that, grade 2 tonsil, 8 (22.9%) was present in majority of both Aryans and Mongols. About 11 (31.4) Aryans were found to be obese and 11 (31.4) were extreme obese while 11 (31.4) Mongol patients were overweight and another 11 (31.4) were extreme obese (Table 1).

Table 1: Socio-demographic and clinical characteristics in Aryans and Mongols

Variables		Aryan	Mangol
		Frequency (%)	Frequency (%)
Gender	Male	27 (77.1)	26 (74.3)
	Female	8 (22.9)	9 (25.7)
Age Groups (Years)	18-40	10 (28.6)	11 (31.4)
	41-60	21 (60.0)	17 (48.6)
	>60	4 (11.4)	7 (20.0)
Nasal problems	Yes	17 (48.6)	22 (62.9)
	No	18 (51.4)	13 (37.1)
Oral cavity	Yes	3 (8.6)	1 (2.9)
	No	32 (91.4)	34 (97.1)
Tonsil Enlarged	Yes	15 (42.9)	14 (40.0)
	No	20 (57.1)	21 (60.0)
Tonsil Grade	Degree 1	0	2 (5.7)
	Degree 2	8 (22.9)	8 (22.9)
	Degree 3	5 (14.3)	4 (11.4)
	Degree 4	1 (2.9)	0
Base of the tongue	Grade 1	4 (11.4)	2 (5.7)
Retrognathism	Yes	0	1 (2.9)
	No	35 (100)	34 (97.1)
BMI	Normal	0	5 (14.3)
	Overweight	9 (25.7)	11 (31.4)
	Obese	15 (42.9)	8 (22.9)
	Extreme obese	11 (31.4)	11 (31.4)
ESS Score	Mean±SD	15±3.077	14.60±3.59

Table 2 showed that there was statistically significant association between Aryan group and Modified Mallampati score.

Table 2: Clinical differences between Aryan and Mongol group

Variables		Aryan	Mangol	p-value
Age		46.68±11.25	48.62±11.78	0.483
Gender	Male	27 (77.1)	26 (74.3)	0.78
	Female	8 (22.9)	9 (25.7)	
ENT Examination	Positive finding	28 (80.0)	28 (80.0)	1.0
	Negative finding	7 (20.0)	7 (20.0)	
Modified Mallampati Score	Class 1	5 (14.3)	8 (22.9)	0.007
	Class 2	6 (17.1)	13 (37.1)	
	Class 3	20 (57.1)	6 (17.1)	
	Class 4	4 (11.4)	8 (22.9)	
Polysomnographic results	Mild	8 (22.9)	6 (17.1)	0.515
	Moderate	3 (8.6)	6 (17.1)	
	Severe	24 (68.6)	23 (65.7)	
ESS result	Higher normal	2 (5.7)	4 (11.4)	0.72
	Mild	7 (20.0)	5 (11.3)	
	Moderate sleepiness	9 (25.7)	11 (31.4)	
	Severe sleepiness	17 (48.6)	15 (42.9)	
AHI		44.08±24.67	48.19±38.34	0.52
Neck circumference (inches)		40 (41-38)	39 (40-38)	0.386

DISCUSSION

A lot of risk factors have been studied in relation to OSA. Studies have also reported the role of ethnic variation in relation to OSA. Few studies have also correlated obesity, neck circumference to play a role in ethnic variation. This is one of the first study to the best of authors' knowledge to report the ethnic variation in relation to OSA among Nepalese population. This study has revealed several findings regarding the clinical presentation of patients diagnosed with OSA between two ethnicities, Aryans and Mongols of Nepal. Among patients diagnosed with OSA, race did not show any association between many OSA predictors. However, this study showed association between the ethnicity and Modified Mallampati score. Apart from this there were similarities and differences between both the ethnicities. Both the groups had male predominance. The severe form of PSG result was present in both groups, severe sleepiness was also shown by both groups. Most of the Aryans were obese while the Mongols were both overweight and extreme obese. The mean AHI was more in Mongols.

Shape and size of upper airway also play role in pathogenesis of OSA. The Modified Mallampati score has been used from a long time by anesthesiologist for otorhinolaryngological examination during intubation.⁷ This is a simple and noninvasive procedure requiring no instruments and takes less time to complete. Our study also showed association between the studied ethnicity and Modified Mallampati Score. Majority of Aryans had Class 3 and Mongols had Class 2 Modified Mallampati Score. Higher grades of Modified Mallampati Score (Class 3 and 4) have been correlated with increased severity of OSA.⁸⁻¹⁰ A meta-analysis has also correlated Modified Mallampati Score with severity of OSA.¹¹

Studies have shown OSA to be more common in male

than female.¹²⁻¹⁴ The less prevalence in female has been suggested to be due to pattern of fat deposition, result of gender hormones and menopause.^{14,15} Consistent with other studies,¹⁶⁻¹⁹ this study found majority of participants in both ethnic groups to be male reflecting male predominance. In addition to gender, differences in age has also been attributed for OSA manifestation. In this study majority of the patients belonged to age groups 41-60 years in both the groups. The mean age of the patients was 46.68±11.25 years for Aryans and 48.62±11.78 years for Mongols. This finding was in consistent with other studies.²⁰⁻²³

Obesity is another risk factor for OSA.¹⁷ BMI greater than 28 kg/m² has increased risk for OSA.²⁴ Slight difference in pattern of BMI was observed in the two ethnic group as most of the Aryans were obese followed by xtreme obese while the Mongols were both overweight and extreme obese. However, they both signify that they had higher BMI.

Neck circumference has also been considered as important predictor for OSA. The larger the neck circumference has been correlated with deposition of fat around the neck promoting OSA.¹⁵ Mehra et al. reported males have larger neck circumference than females with severe OSA.¹⁴ The current study found no significant association between the neck circumference and the ethnicity. Both the ethnic group had almost similar neck circumference.

Hypertrophy of tonsil is also reported to cause OSA. However, studies performed on tonsillar size and severity of OSA have shown both negative^{25,26} and positive correlation.²⁷⁻²⁹ Although tonsillar enlargement was observed in both ethnicities, this study also did not find association supporting the findings of previous studies.^{25,26}

This study is not devoid of limitation. The main limitation is use of smaller sample size. The author would like to emphasize on larger sample size in future studies in relation to obstructive sleep apnea. Another limitation is the study site. As it is single center study, the result of the study cannot be generalized to the whole Nepal. The authors would have used cephalograms and other radiographs to study the additional variable which would have put an additional strength to the study.

CONCLUSION

Obstructive sleep apnea has variation among the ethnicity. Male predominance was observed in both ethnicities. However, in this study only significant difference between Modified Mallampati Score and ethnicity as observed.

CONFLICT OF INTEREST: None

FINANCIAL DISCLOSURE: None

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