Original Article

Association of Mallampatti score as a risk factor for obstructive sleep apnea

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Objectives: To determine the association of Mallampatti Score as a risk factor for Obstructive Sleep Apnea (OSA).

Methodology: This is a prospective questionnaire based survey included 103 individuals

Results: Mean BMI of patients was 23.83±6.03 kg/m^2. There were 28 (27.2%) overweight and 22 (21.4%) obese patients. High risk on Berlin questionnaire was found in 12 (11.7%) patients. Both Berlin Questionnaire and Epworth questioner showed a negative association with Mallampati; the low risk group of these variables in our study with a p-value of 0.034 & 0.016 respectively i.e they are good for exclusion of OSA if found negative. Comparison of general characteristics with Mallampatti score and snoring showed significant association among patients with >25 years of age (p=0.02), low risk of Berlin score (p=0.034) and normal Epworth Sleep Score (p=0.016). Fifteen (14.5%) of overweight & obese individuals had higher Mallampatti score III & IV but the P-values were not significant (0.283 & 0.386).

Conclusion: There is strong association between high Mallampatti score and O.S.A. Therefore we suggest that high mallampatti can be taken as a risk factor / screening tool limitation for O.S.A. (Rawal Med J 201;43:18-22).

Keywords: Mallampati score, obstructive sleep apnea, BMI.

INTRODUCTION

Obstructive sleep apnea (OSA) is a highly prevalent disease around 3-7% in general population.[1,2] It is characterized by hypoxia and retention of CO_2 which can lead to pulmonary hypertension, heart failure, bradycardia and hypoxia leading to left heart failure, cardiac arrhythmias sometimes leading to sudden death.[3,4] The reason behind OSA can be obstructive; central or mixed in nature, it frequently manifests as excessive day time somnolence, poor performance at work and increased predisposition to domestic and occupational accidents.[5,2] Identifiable risk factors include BMI, collar size, obesity and age above 40 years.[6]

OSA is diagnosed on basis of history and physical examination.[7,8] However, the gold standard for diagnosing OSA is polysomnography.[9] However, it requires over night hospital stay which is not patient friendly. Therefore, clinicians are looking for less costly and time consuming methods of screening the general population. The Epworth and Berlin questionnaire are designed to identify individuals at high risk for developing OSA.[10,11] Most individuals with OSA have been found to have a high Mallampatti on physical examination.[11]

In anesthesia, the ease of intubation is assessed using Mallampati Score.[7,11] It is yet unclear if high Mallampatti score is an independent risk factor for OSA. A study by Rodrigues et al has suggested that both difficult intubation and OSA are associated with high Mallampatti score.[11] Another study suggested that Mallampatti score is not an independent predictor of OSA, though it can be a predictor of difficult intubation in patient with OSA.[7,12] To our Knowledge there is paucity of research for OSA & its correlation with Mallampatti score in Pakistani population. Therefore, in order to find a cost effective screening tool we evaluated Mallampatti score as an independent risk factor for OSA.

METHODOLOGY

This is a prospective questionnaire based survey. The data was collected over a period of six months from January to June 2016. A sample of 103 individuals was selected randomly from medical

students and hospital staff. The Pakistani adult populations between 18-30 years of both genders were included in the study. The pregnant ladies, children, previous oral and dental surgery including tonsillectomy, epileptic disorder, acromegaly, facial fracture, cleft lip & palate, benign & malignant lesions of oral cavity and dental prosthesis were exclusion from the study. Mallampatti score was assessed along with Berlin questionnaire and Epworth sleeping scale. As the study population was English literate the questionnaires did not require be translating or validating. An IRB approval was taken from Dow University of Health Sciences and Informed consent was taken from all participants.

Berlin questionnaire includes questions on snoring, witnessed apnea, wake time sleepiness and hypertension. It is classified into 3 categories. Patients who satisfied the criteria in two or more categories were termed as high risk while others were considered low risk for OSA. Epworth sleepiness scale & Mallampatti score were used to assess snoring and difficulty in intubation, respectively.

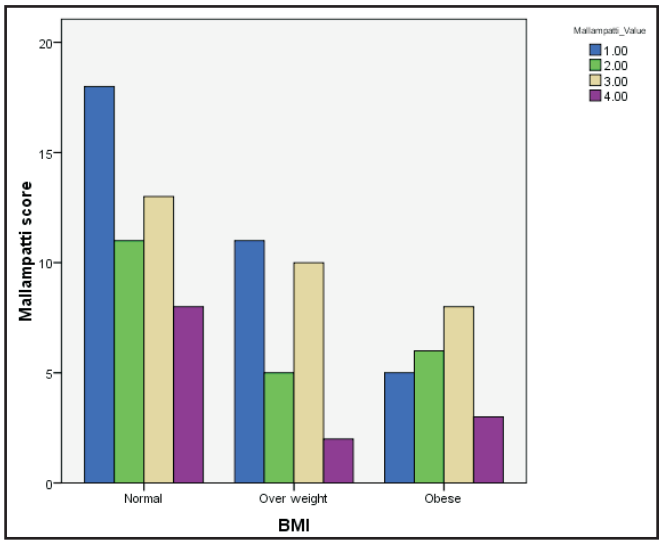
Mallampati classification is used to predict the ease of intubation in anesthesia. A high Mallampati score (3 or 4) is associated not only with difficult intubation but also higher probability of sleep apnea. We assessed the Mallampati score, while each individual was seated and asked to open his/her mouth and protrude the tongue as much as possible without using the tongue depressor. Anatomy of oral cavity was visualized in particular base of uvula, faucial pillars and soft palate. Scoring in our case was done without phonation, as tongue protrusion and phonation can affect the scoring. Modified Mallampati score: Class 1: Soft palate, uvula, fauces, pillars visible, Class 2: Soft palate, uvula, fauces, Class 3: Soft palate, base of uvula and Class 4: Only hard palate visible. The variables were analyzed with SPSS version 21.0. Frequencies and chi-square chart with P-value were calculated.

RESULTS

Out of total 103 patients, 78 (75.7%) were female as compared to 25 (24.3%) males. Mean age was 25.20±3.01 years. The females had a higher Mallampatti score for grade 3 & 4, 25(24%) and (8.7%) respectively as compared to males though the p-value was not significant 0.406.

Mean BMI of the patients was 23.83±6.03 kg/m^2. There were 28 (27.2%) overweight and 22 (21.4%) obese patients. Low risk of Berlin score was found in 91 (88.3%) while high risk was found in 12 (11.7%) patients. The association between Berlin score and Mallampati was significant 0.034 for low risk and 0.141 for high risk group.

Fig. 1. Association of Mallampatti score and BMI.

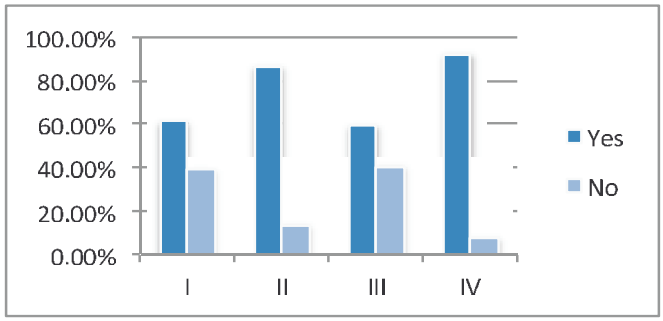


Mean Epworth Sleep Score was 7.53±3.98. There were 80 (77.7%) patients with normal Epworth Sleep Score, 13 (12.6%) with borderline and 10 (9.7%) with abnormal Epworth Sleep Score. However, significant association was seen between normal Epworth score and Mallampati (p=0.016).

Most of the normal BMI subjects had a higher Mallampati score of 3 & 4, which was 20% in our study population. The over weight and obese with higher Mallampati score (3 & 4) were 22.3%. (Fig. 1).

Snoring was observed in 72 (69.9%) patients. 58 (56.3%) presented with Low Mallampatti score while high Mallampatti score was observed in 45 (43.7%). Moreover, Mallampatti class I was observed in 36 (35%) of the patients followed by class III 32 (31.1%), class II 22 (21.4%) while class IV only 13 (12.6%) patients.

Fig. 2. Relationship between Mallampatti Score and Snoring (p=0.030).



Insignificant association of Mallampatti score was observed with gender (p=0.471), risk on Berlin score (p=0.407) and Epworth sleep score (p=0.758). However, significant association of Mallampatti score was observed with snoring (p=0.030) (Fig. 2). Both Berlin Questionnaire and Epworth questioner showed a negative association with Mallampati; the low risk group of these variables in our study with a p-value of 0.034 & 0.016, respectively i.e they are good for exclusion of OSA if found negative.

Table 1 Comparison of Mallampatti Score and snoring with respect to general characteristics of the patients (n=103)

	Mallampatti Score				
Snoring	**I- n (%)**	**II- n (%)**	**III-n (%)**	**IV- n (%)**	**p-value†**
Yes	22 (62.9)	19 (86.4)	6 (85.7)	0 (0)	0.109
No	13 (37.1)	3 (13.6)	1 (14.3)	0 (0)	
Yes	0 (0)	0 (0)	13 (52)	12 (92.3)	0.02*
No	1 (100)	0 (0)	12 (48)	1 (7.7)	
Yes	8 (72.7)	3 (100)	5 (71.4)	4 (100)	0.487
No	3 (27.3)	0 (0)	2 (28.6)	0 (0)	
Yes	14 (56)	16 (84.2)	14 (56)	8 (88.9)	0.066
No	11 (44)	3 (15.8)	11 (44)	1 (11.1)	
BMI, Kg/m2					
Yes	10 (52.6)	10 (90.9)	9 (60)	7 (87.5)	0.088
No	9 (47.4)	1 (9.1)	6 (40)	1 (12.5)	
Yes	9 (81.8)	4 (80)	5 (50)	2 (100)	0.283
No	2 (18.2)	1 (20)	5 (50)	0 (0)	
Yes	3 (50)	5 (83.3)	5 (71.4)	3 (100)	0.386
No	3 (50)	1 (16.7)	2 (28.6)	0 (0)	
Risk on Birlin Score					
Yes	21 (61.8)	15 (83.3)	14 (51.9)	11 (91.7)	0.034*
No	13 (38.2)	3 (16.7)	13 (48.1)	1 (8.3)	
Yes	1 (50)	4 (100)	5 (100)	1 (100)	0.141
No	1 (50)	0 (0)	0 (0)	0 (0)	
Epworth Sleep Score					
Yes	14 (51.9)	15 (83.3)	15 (87.7)	9 (100)	0.016*
No	13 (48.1)	3 (16.7)	11 (42.3)	0 (0)	
Yes	5 (100)	2 (100)	1 (33.3)	2 (66.7)	0.139
No	0 (0)	0 (0)	2 (66.7)	1 (33.3)	
Yes	3 (75)	2 (100)	3 (100	1 (100)	0.644
No	1 (25)	0 (0)	0 (0)	0 (0)	

All data presented as number (%), †Chi-square test applied, *significant

Comparison of general characteristics with Mallampatti score and snoring showed significant association among patients with >25 years of age (p=0.02), low risk of Berlin score (p=0.034) and normal Epworth Sleep Score (p=0.016) (Table 1).

DISCUSSION

Obstructive sleep apnea is an important systemic disorder, which involves the whole body in its progression. With the increase in obesity, the prevalence of OSA might also increase.[4] The age range of our participants was 26-30 years. Fifty three individuals belonged to normal BMI group, twenty eight to overweight group and twenty two to obese group, they did not have a significant p-value, which was 0.283 and 0.386 for overweight and obese individuals. The increased obesity or high BMI is a major emerging health issue worldwide. In USA alone there has been a 10% increase in obesity.[4] It is seen to be on the rise even in children.[13]

In our study, the females were associated with higher Mallampatti scores as compared to males predominance in other studies,[13] though their p-value was not significant. Higher Mallampatti score has been associated strongly in a study of 202 individuals with high BMI with p-value of 0.01 and nasal obstruction with p-value of 0.001.[14] The obese males had higher association with low Vitaminn D3 and BMI.[15] In our study, the association between Mallampati and BMI was not found to be significant.

The gold standard for diagnosis of sleep apnea is polysomnography (PSG) but it expensive and a lengthy procedure requiring admission in hospital for the various tests.[16,17] Clinicians are trying to develop other parameters from non-invasive method from screening of OSA before performing the PSG, such as Mallampatti, Epworth score, Berlin questionnaire.[18] Berlin questionnaire had a significant association of obese individuals with sleep apnea.[12,19] For the Berlin questionnaire and Epworth score are important emergency tools for screening.[20] The Epworth sleep score showed abnormal score in 9.7% patients with abnormal BMI in our study. In other studies, the sensitivity of Epworth sleep score was 93.4%.[21,22] This could be due to the fact the 51.4% of our study population

belonged to the normal BMI group. It is also seen that those individuals have low risk in Berlin sleep score & Epworth score can be screened out of OSA.[20] In our study, both Berlin and Epworth sleep scores had a significant p-value with the low risk groups 0.034 & 0.016, respectively.

Snoring has come up as an independent risk factor for OSA. In our study, 69.9% patients complained of snoring. There was a strong positive association of Mallampatti with snoring as well (p=0.030). This variable also showed significant association with >25 years of age p-value 0.02 which means that as the age increases the Mallampatti score and snoring also increase which is an independent marker for OSA. In other studies, the association was of snoring independently not found to be significant.[23,24]

It was observed that the 15 (14.5%) of over weight and obese individuals had higher Mallampatti score III & lV but the p-value were not significant (0.283 & 0.386). In another study, the association of Mallampatti and BMI was significant (p=0.0079).[18]

In the study by Myers et al Mallampatti score had a positive predictive value of 9.3.[17] This is a single center study. More studies with more subjects should be done to establish Mallampatti as a screening tool. Polysomnographic correlation would also establish, to determine its effectively as a screening tool.

CONCLUSION

There is strong association between high mallampatti score and OSA. Therefore, we suggest that high Mallampatti can be taken as a risk factor/screening tool for OSA.

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