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OBSTRUCTIVE SLEEP APNEA IN MIDDLE AGE MALE SMOKERS

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ABSTRACT:

OBJECTIVE: Obstructive sleep apnea is the most common type of sleep apnea. This was designed to establish the relationship between smoking and obstructive sleep apnea.

Methods: This cross-sectional study was conducted at the outpatient department of Pakistan Institute of Medical Sciences, Islamabad, Pakistan, from August 2018 to November 2018 (dates mentioned in methods are different) and comprised of males aged 30-50 years. Participants were divided into two groups of smokers and non-smokers and Berlin questionnaire was used to collect data employing systemic random sampling. SPSS 22 was used for analysis.

Results: There were 768 male participants in the study equally split between smokers and non-smokers. Mean age was 39±5.76 years. Percentage of high-risk group among smokers was 36.5% and among non-smokers was 16.7%. Percentage of low risk group among smokers was 63.5% and among non-smokers was 83.3%. The odds ratio of obstructive sleep apnea was 2.87 times more in smokers than non-smokers.

Conclusion: Long term smoking had a strong association with obstructive sleep apnea.

Keywords: Obstructive sleep apnea (OSA), Smoking, Berlin Questionnaire.

INTRODUCTION: Obstructive sleep apnea (OSA) is the most common type of sleep apnea. It is characterized by episodes of muscular relaxation during sleep causing soft tissues in the back of the throat to collapse and upper airway with partial reductions (hypopneas) and complete pauses (apneas) in breathing lasting at least 10 seconds and beyond which ultimately lead to a drop of oxygen saturation, in more severe cases up to 40% and more.. According to American Sleep Association, estimated 25 million people have significant OSA [(1)]. Due to lack of effective statistics, OSA prevalence is difficult to measure in Asia, but a study carried out in 2007 showed the prevalence of sleep apnea syndrome in the Asian population between 2.1-7.5% [(2)]. Long standing untreated OSA is known for developing many comorbid conditions including cognitive, behavioral, cardiovascular and brain diseases [(3-6)]. OSA has many known risk factors like age, obesity, structural defects of upper airways and alcohol abuse etc. [(3)]. One such suggested risk factor is smoking, but there is little evidence [(7)]. Smoking is thought to boost inflammation and fluid retention in upper respiratory tract which causes appealing change in neuromuscular function as well as changes in sleep pattern including an alarming increase in threshold of sleep arousal [(8-10)]. As part of management strategy, smoking status is not well understood in terms of the current guidelines for evaluation, management and longer-term care of OSA. The connection between smoking and OSA is lacking and not fully understood. The objective of this study is to look for any association between OSA and smoking in our community where 15-45% of men between 15-49 years have reported using tobacco according to the Pakistan Demographic and Health Survey [(11)]. The current study would focus on establishing a positive co-relation of OSA between two groups comprising smokers and non-smoker.

METHOD AND MATERIALS

This cross-sectional study was carried out in Pakistan Institute of Medical Sciences, Islamabad, Pakistan from August 2018 to November 2018. Since incidence of smoking higher in males so we added male non-smokers and smokers with a history greater than 10 pack years of smoking between 30-50 years of age were included. Males below 30 years and above 50 years with less than 10 pack years of smoking were excluded. BMI was calculated and TFT ensured normal range in both groups. Co-morbid status calculated in both groups. Total 384 were included in each group. Equal number of non-smokers of same age group were also to be interviewed. Data collection was started after getting approval from the ethics committee. Berlin questionnaire was used to interview the participants and it was translated into local language Urdu for the ease of locals. The Berlin questionnaire comprises three categories with participants divided by risk for development in OSA with those that have positive values characterized by high risk in two or more categories with positive results characterized by low risk in one category only. All participants in the Berlin questionnaire were identified with the risk of developing OSA. All participants ' confidentiality has been maintained and explicit consent has been obtained before an interview.

Statistical Analysis

Systemic random sampling was employed in selecting the participants and SPSS 22 was used for data analysis. Discrete variables were listed as counts or percentages and continuous variables were listed as means ± SD. Chi-square test was used for univariate analysis of categorical variables. Significance was set at $p<0.05$.

BERLIN QUESTIONNAIRE:

The Berlin questionnaire is the one of the pre-diagnosis screening tools that is used to identify the patients of sleep apnea, or patients at the risks of developing sleep apnea. We modified the Berlin questionnaire to include questions on smoking status and pack years of smoking. The Questionnaire was read out to the participants after their consent was verbally taken. Each question in the three categories is assigned specific marks. If there are two categories with a score of two or above are designated high risks for sleep apnea. If there is only one or no category with a score of two or above is designated low risk for sleep apnea.

RESULTS

The study was conducted in PIMS, Islamabad after ethical approval from hospital committee. Total 768 males (384 smokers and 384 non-smokers) in the age group of 30-50 years were assessed during the 3-month period using the Berlin Questionnaire for sleep apnea. Mean age was 39±5.76 years. Baseline characteristics were listed in table no.1/
of cutaneous allodynia in migraine population.

Table No.1= Baseline Characteristics

Variable Name	Smoker n (%)	Non-Smoker n (%)
BMI (Kg/m^2)	26.2±5.0	
Normal (< 24 kg/m$^{2)}$	100(13%)	96(12.5%)
Over Weight (24–27.5 kg/m^2)	209(27.2%)	105(13.7%)
Obese (> 27.5 kg/m^2)	148(19.3%)	110(14.3%)
Diabetes	87(11.3%)	44(5.7%)
Hypertension	135(17.6%)	65(8.5%)

Among smokers 240(62.5%) were negative and 144(37.5%) were positive for category 1. In the group of nonsmokers 296(77.1%) were negative and 88(22.9%) were positive for category 1, with a p value of <0.05 (p=0.02).
Among smokers 244(63.5%) were negative and 140(36.5%) were positive for category 2. Among nonsmokers 300(78.1%) were negative and 84(21.8%) were positive for category 2, with a p value of <0.05 (p=0.026). Among smokers 276 (71.8%) were negative and 108 (28.1%) were positive for category 3. Among nonsmokers 312 (81.25%) were negative and 72 (18.75%) were positive for category 3, with a p value of > 0.05 (p=0.125).

Table No.2 = Categories between different group and p value

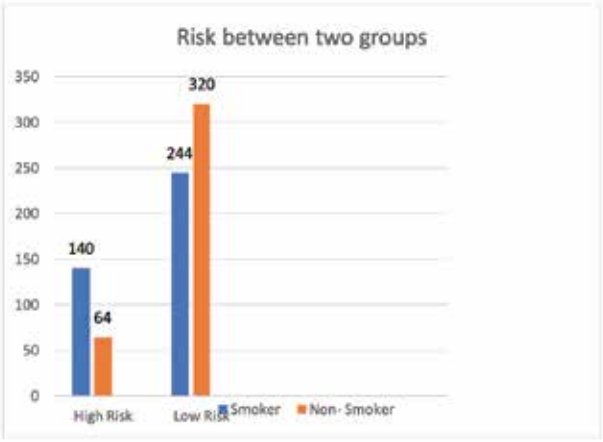
	Smoker Group		Non- Smoker Group		p-value
Categories	Negative	Positive	Negative	Positive	
Category I	240	144	296	88	**p=0.02**
Category II	244	140	300	84	**p=0.026**
Category III	276	108	312	72	p=0.125

Table No. 3 = Percentage of High-Risk/Low Risk among smokers and Non- Smoker

	Smoker Group	Non-Smoker Group
High Risk (n=204)	36.5% (n=140)	16.7% (n=64)
Low Risk(n=564)	63.5% (n=244)	83.5% (n=320)

The chi square value for High risk vs low risk and smokers vs non-smokers was 9.639 with a corresponding p value of 0. 002. The odds of OSA was 2.87 times more among smokers than non-smokers (OR= 2.87 CI=1.46-5.66).

Figure No.1= Risk Startification Between Smoker and Non- Smoker



DISCUSSION

According to our study smokers are at an increased risk of developing OSA. Although there is a lack of significant studies in the scientific literature that demonstrate relationship between smoking and OSA, our results are consistent with a few studies that have been conducted. A study carried in Nebraska, USA showed that there is higher percentage of patient of OSA who are smokers. Smokers are 2.5 times more likely to develop OSA than former smokers or non-smokers (ODDS Ratio = 2.5, CI 1.3-4.7, p = 0.0049) and 2.8 times more likely to have OSA than former smokers alone (ODDS Ratio = 2.8, CI = 1.4-5.4, p = 0.0028).[12] Another study conducted in China determined a positive relation between smoking and OSA[13].There are studies that suggests that the lung disease is related to OSA[14], and smoking is a potential risk factor[15], but there is no definite evidence. There is a lack of researches conducted on OSA in Pakistan. Despite this, there are researches which have targeted sleep apnea in Pakistan12 and the awareness regarding sleep apnea in Pakistan[16].There is need for studies and investigations on the effects of smoking cessation and OSA as currently smoking cessation is not a part of guidelines for evaluation and management of long term OSA. Our findings showed that the Berlin questionnaire can be used as a screening tool in the general population in view of its good sensitivity and high negative predictive value in ruling out severe OSA. However, the positive predictive value is low. A study conducted in 2003 stated that a significant percentage of Pakistani physicians are unaware of the clinical symptoms of sleep apnea and its risk factors. Furthermore, about eighteen percent of the doctors were prescribing sedatives for patients with sleeping disorders[17].

There are certain limiting factors that could potentially affect our investigation. these include the use of BQ: it is only a screening test for OSA, and cannot be a substitute for full OSA investigation[18]. Full diagnosis of OSA can only be established after polysomnography. Honesty of the patients in answering and reliability of sleep partner is important and partner was not interviewed. Only patients under 50 years were added, since prevalence of OSA increases with increasing age, shorter age bandwidth could have given false negative effect on this study.When we use a questionnaire, the questions may be interpreted and understood differently by different participants which could affect the results.

CONCLUSION

Long term smoking is associated with increased risk for development of obstructive sleep apnea. Moreover, beneficial effects of smoking cessation should be investigated in people suffering from chronic obstructive sleep apnea. We found that Berlin questionnaire may be used as screening tool in understanding of its good sensitivity and high negative predictive value to rule out severe OSA. Local physician needs to be trained about OSA treatment, diagnosis, management and complication.

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Muhammad Hassan; data collection, data analysis, manuscript writing, manuscript review
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Waleed Shahzad; data analysis, manuscript writing, manuscript review
Ehsanur Rehman; data analysis, manuscript writing, manuscript review
Omer Hassan Aftab Ahmed; data analysis, manuscript writing, manuscript review
Mazhar Badshah; concept, data analysis, manuscript review