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HIGH PREVALENCE OF OBSTRUCTIVE SLEEP APNEA AMONG PEOPLE WITH TYPE 2 DIABETES MELLITUS IN A TERTIARY CARE CENTER

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Abstract:

Objective: *Untreated obstructive sleep apnea (OSA) is a risk factor for hypertension and cardiac events and is associated with an increase in mortality. Recent studies indicate that most people with type 2 diabetes also have OSA. The goal of this study was to evaluate the prevalence and severity of OSA and the risk factors that contribute to it among people with chronic and severe type 2 diabetes.*

Methods: *203 people with type 2 diabetes (mean age: 54 ± 8 years, 145 men, 58 women, HbA1c ≥7% [53 mmol / mol]) were included in the study who attended a specialized hospital for diabetes; all underwent a complete diabetic evaluation and the apnea-hypopnea index (AHI) was used to evaluate the OSA.*

Results: *23.65% of the study subjects had OSA (IAH ≥15). OSA was more frequent among men than women. BMI was significantly higher among subjects with OSA (P = 0.01). People with OSA had a higher percentage of diabetic complications such as cardiovascular disease (CVD), retinopathy and neuropathy. Hypertension has been identified as an independent predictor of OSA.*

Conclusions: *the prevalence of OSA has been higher in this study than in the other studies so far. Since OSA is treatable, people with diabetes should be screened for this condition to reduce the risk of CVD.*

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INTRODUCTION:

Sleep Apnea refers to respiratory abnormalities that occur during sleeps and is mainly composed of obstructive sleep apnea, central sleep apnea and mixed sleep apnea. OSA is characterized by repetitive upper airway obstructions leading to intermittent hypoxia and sleep fragmentation. Due to poor sleep quality, people with OSA experience daytime fatigue, sleepiness, functional impairment and overall reduction in quality of life. OSA is a common disorder found in people with obesity, diabetes, hypothyroidism and CVD. According to reports from the National Sleep Foundation, the prevalence of sleep apnea in the adult population of the United States. UU. They are about 18 million.1 Although there are no national studies on the prevalence of OSA, cross-sectional studies have been conducted in the pakistani population and in different subpopulations, with a prevalence of 13.7% among adults2 and 7.5% between middle-aged city men. 3 Type 2 diabetes has reached an epidemic and in pakistanwith over 6 million people currently diagnosed with the disease. 4 Most people with type 2 diabetes have also been reported to have OSA. 5 Since intermittent hypoxia has been shown to have adverse effects on glucose metabolism, OSA not only increases the risk of developing type 2 diabetes. 2, but also contributes to poverty. Glycemic control in people with existing diabetes.6 A recent follow-up study in the Chinese population has shown that poor sleep quality and short sleep duration have contributed substantially to an increased risk of type 2 diabetes, which is independent of possible confusing factors such as age and obesity, family history of diabetes, etc. 7 In addition, the European sleep apnea cohort study showed that people with severe OSA diabetes had higher levels of HbA1c than people with non-apneic diabetes. 8 Moderate to severe OSA is also a risk factor. Significant for cardiovascular events.9 Both diabetes and OSA contribute independently to the incidence of cardiovascular events and the coexistence of both conditions can promote cardiovascular morbidity and mortality among these subjects. While few researchers have studied the prevalence of OSA among some pakistani populations based on age and gender, studies on the prevalence of OSA among people with diabetes are sparse..10 There are no studies in pakistan on the prevalence of OSA among people with diabetes, especially those with severe and chronic diabetes. Therefore, we conducted a study to evaluate the prevalence and severity of OSA and the risk factors contributing to it among people with inadequately controlled type 2 diabetes.

METHODS:

The study was conducted in Mayo hospital lahore. The study was approved by ethics comitee and informed consent was obtained from all participants. 275 subjects of both sexes who attended the hospital with HbA 1c ≥ 7% [53 mmol / mol] were considered and willing to participate in the study. Subjects taking sleep medications were excluded from this study. The subjects were selected for OSA by ResMedApneaLinkTM Plus (ResMed Germany Inc., Germany). The apnea-hypopnea index (AHI) was used to determine the OSA (night time assessment, minimum duration: 5:30 hours) and daytime sleepiness was assessed using the Epworth Sleepiness Scale (ESS).

According to the American Academy of Sleep Medicine (AASM), a threshold of 15 events (AHI or RDI) per hour with or without symptoms or 5 events per hour with symptoms were considered OSA. In the present study, type 4 polysomnography was used and the AHI was used for the diagnosis of OSA with a limit of 15.11. The oxygen desaturation index (ODI) was measured by oximetry. The ESS score> 10 was considered abnormal, indicative of sleep disturbances at night. The result obtained by Apnea Link has been correlated with ESS. Subjects whose evaluation time was less than the established minimum duration were excluded from the study. Eventually, 203 evaluation criteria (145 men, 58 women) were included in this study. Anthropometric measurements were recorded including height, weight, BMI, waist circumference, hip circumference and neck circumference (for each variable the average of two consecutive measurements was considered). Other clinical data collected included a history of hypertension, duration of diabetes, current therapy and the presence of complications of diabetes such as retinopathy, neuropathy, nephropathy, peripheral vascular disease (PVD), CVD (known history of myocardial infarction, coronary artery bypass grafting, coronary angioplasty) and stroke. Self-sufficient snoring habits and the presence of dental deformities have been documented. Dent deformity refers to the presence of malocclusions (crooked or clenched teeth), and this was identified by a dentist. The lipid profile, the parameters of the liver function test and the parameters of the kidney function test were estimated.in the blood using BS-400 Mindray Chemistry Analyzer and HbA1c has been estimated by HPLC (Biorad). The data were analyzed using SPSS 19.0. Categorical variables are represented as percentages and measurable variables as mean ± standard deviation. The chi-square test was performed to compare categorical variables, while the t-test was performed to compare quantitative variables between subjects with and without OSA.

ANOVA was performed to compare variables between subjects classified into different groups based on the severity of the OSA (normal, mild, moderate and severe). Value P. <0.05 was considered significant multiple logistic regression analyzes were used in all analyzes to identify confounding factors.

RESULTS:

Clinical characteristics:

The mean age of the total study subjects was 54 ± 8 years. The average duration of diabetes was 12 ± 8 years and 72.1% of the subjects had a family history of diabetes. 78.8% were non-smokers and 80.3% did not consume alcohol. Their average body mass index was 28.3 ± 5.2 kg / m2, the waist circumference was 100.5 ± 12 cm, the hip circumference was 100.4 ± 13.3 cm and the circumference of the neck was 38.6 ± 5.4 cm. 75.8% of the subjects reported snoring and 29.1% were identified with dental deformities. The mean HbA1c% was 9.6 ± 2.0 (81 ± 15 mmol / mol), [range: 7-19.4 (53 - 189 mmol / mol)] and dyslipidemia was prevalent in 70% of these subjects. When comparing anthropometric measurements of men and women, the BMI and hip circumference were significantly higher among women, while the height and circumference of the neck were greater among men (P <0.001, Table 1).

Prevalence of the FBO and confounding factors:

The prevalence of OSA was 23.65% among the study subjects. The FBO showed a weak positive correlation with the ESS score (r = 0.29). I A HIA An OSA was more frequent among men than women (73.46% against 26.53%). Among the usual snorers, 83.33% had OSA, while only 16.66% of subjects had OSA among those who did not snore (P = 0.013). The prevalence of OSA among subjects with dental deformities was not significantly higher than those without dental deformities (P = 0.34). The percentage of hypertension among OSA subjects was higher (79.16%) than those without OSA (66.89%), but their numbers did not differ significantly between the two sexes. Although the coexistence of diabetic complications and OSA was analyzed, it was observed that 66.6% of subjects with neuropathy, 37.5% with nephropathy, 37.5% with retinopathy and 25% with CVD they had the OSA.

Table 1: Comparison of anthropometric data of men and women

Variable	Gender	Mean ± SD	P value*
Height (cm)	Men	167±6	
	Women	153±9	0.001
	Total	163±9	
Weight (kg)	Men	76.74±12.13	
	Women	73.02±19.15	0.12
	Total	75.75±14.36	
BMI (kg/m²)	Men	27.44±4.10	
	Women	30.75±7.01	<0.001
	Total	28.31±5.22	
Waist (cm)	Men	100.05±12.06	
	Women	101.54±11.92	0.44
	Total	100.48±12.00	
Hip (cm)	Men	98.38±11.73	
	Women	105.56±15.63	<0.001
	Total	100.44±13.32	
Neck (cm)	Men	39.92±5.66	
	Women	35.29±2.70	0.001
	Total	38.58±5.40	

Table 2: Comparison of anthropometric measurements and biochemical estimations between subjects with and without OSA

Variable	Without OSA (<15)	With OSA (≥15)	95% CI of the difference		P value
			Lower	Upper	
BMI (kg/m²)	27.7±4.9	30.51±5.7	-4.57	-1.06	0.002
Waist (cm)	98.61±12.15	106.57±9.59	-11.92	-4.00	0.001
Hip (cm)	99.51±12.86	103.7±14.81	-8.79	0.42	0.075
Neck (cm)	38.55±5.77	38.8±4.44	-2.14	1.63	0.790
ESS	5.63±4.15	6.45±4.56	-2.33	0.70	0.288
HbA1c% (mmol/mol)	9.69±2.19	9.23±1.89	-0.26	1.16	0.209
AST (U/L)	25.77±29.98	24.29±17.88	-8.27	11.23	0.765
ALT (U/L)	31.4±25.24	28.41±20.14	-5.53	11.50	0.490
Urea (mg/dL)	32.44±23.27	37.1±26.24	-12.51	3.18	0.242
Creatinine (mg/dL)	1.16±0.79	1.26±0.87	-0.36	0.16	0.458
Total cholesterol (mmol/L)	165.68±51.77	165.89±51.58	-19.75	19.33	0.983
Triglycerides (mmol/L)	184.37±191.2	153.58±78.85	-33.77	95.35	0.348
HDL-cholesterol (mmol/L)	38.97±9.64	41.28±7.08	-5.72	1.10	0.183
LDL-cholesterol (mmol/L)	90.98±31.25	93.84±38.64	-15.04	9.33	0.644

Mean ± SD: Standard deviation, CI: Confidence interval, kg/m2: kilogram per metre square, cm: centimetres, mmol/mol: millimoles per mol, U/L: International units per litre, mg/dL: milligrams per decilitre, mmol/L: millimoles per liter

The mean age of subjects with OSA was greater than those without OSA (P = 0.020). Weight, BMI and waist circumference was also significantly greater among OSA subjects (P = 0.004, 0.002 and 0.01 respectively). Biochemistry parameters analyzed such as HbA1c, liver enzymes: alanine aminotransferase (ALT) and aspartate aminotransferase (AST), serum urea, serum creatinine, total cholesterol, triglycerides, HDL cholesterol and LDL cholesterol did not differ significantly between those with and without OSA (Table 2).Multiple logistic regression analysis showed that the BMI contributing to the FBO among our study subjects (P = 0. 01). When a separate analysis was performed for both sexes, the presence of hypertension was found to be associated with OSA among men (0.03) and BMI among women (0.05).

DISCUSSION:

OSA is characterized by fragmented sleep due to microactivations that cause unrefreshing sleep due to poor sleep quality. OSA and diabetes share numerous risks in the early years such as age, obesity, etc. 12 In many populations there is much information to demonstrate the link between OSA and diabetes and there are studies that have shown the negative impact of reduced sleep duration on glucose metabolism, even among normal subjects. 13 different pathophysiological mechanisms such as high activity of the sympathetic nervous system, intermittent hypoxia, deregulation of the hypothalamic-pituitary axis, etc., have been proposed to cause this alteration. 6 Our study focused on the prevalence and associated factors of OSA among people with poorly controlled type 2 diabetes mellitus. The prevalence of OSA in this study was higher than that reported among people with diabetes from other studies. This could be due to the fact that we study a population with chronic and severe diabetes, and it has been shown that glycemic status is highly correlated with OSA.14 A hospital study by Ekka et al., Showed that among 325 subjects with diabetes Type 2 In northern India, the prevalence rate of OSA was 24.3% .15 Another study of western India among people with diabetes, with a smaller sample size (n = 33), showed that OSA was present in 27% of the studied population. The highest prevalence of OSA reported so far, 86%, came from a study conducted on obese subjects with type 2 diabetes mellitus in the United States.17 The highest prevalence of OSA among men compared to women has been recognized by several international researchers. This is true even among the pakistani population, 15,18 and the results of our study agree with these results.Snoring has been established to be a symptom or confounding factor for OSA19. There are several studies that have shown that habitual snoring causes irregularities in glucose metabolism, such as reduced insulin sensitivity and high levels of HbA1c20,21. Context that a high percentage of the subjects in our study had the three related conditions, namely snoring, OSA and poorly controlled diabetes. In addition, a high percentage of men who reported habitual snoring in this study had OSA. The relationship between the duration of diabetes and the OSA has not been well studied. Our results indicate that the severity of OSA may increase with a longer duration of diabetes, which is consistent with the results of the study by Ekka et al. 15 Hypertension was present in 76.16% of subjects with OSA in this study. Previous research has reported that hypertension prevails among approximately 60% of people with OSA and OSA can lead to persistent systemic hypertension. 22 The Wisconsin sleep study reported that this relationship is independent of other confounding variables such as BMI. 23 Hypertension was found to have an independent association with OSA and was gender related in ourstudy.indi. People with severe OSA had a higher prevalence of chronic diabetic complications, especially CVD, in this study. A prospective 11-year study from California shows that the CVD mortality rate was approximately double among people with moderate to severe OSA compared to those with mild or absent OSA.24 Treatment of OSA among subjects with CVD would be beneficial since that these people have higher levels of risk of manifesting themselves seriously Cardiovascular consequences and mortality.The mean age of OSA subjects was higher in this study and the prevalence of any type of sleep apnea (central or obstructive) has been shown to increase with age, 25 although an independent relationship is not well established. The positive association between OSA and factors such as BMI, neck circumference and waist circumference was observed among the subjects in this study. BMI had a high association with OSA among women, while this relationship had not been observed among men. Obesity is an obvious risk factor for OSA and a high percentage of people with OSA have a high BMI. Mayer et al. In their study of subjects with and without OSA they showed that the anatomy of the upper airway differs significantly between people with a high body mass index, which contributes to respiratory abnormalities in them during sleep. A previous study by our group showed that OSA was widespread among people with type 2 diabetes (28%) even when their body mass index was low.27 Waist circumference, a confounding factor for l obesity was significantly higher among women in this population. Visceral adiposity has been shown to be independently related to OSA among men, but not previously among

women.28 Our study has some important limitations. The study was conducted on subjects with inadequately controlled diabetes and therefore the results may not be directly applicable to a population with good or fair glycemic control. Although the study provides some useful ideas about OSA among diabetic people, being a hospital study, the results cannot be generalized. We do not use the gold standard, polysomnography, to evaluate the OSA among the subjects of our study that may have influenced the accuracy of the test results.

CONCLUSIONS:

Our study shows that OSA is widespread among people with type 2 diabetes with adequate glycemic control. The high rate of OSA observed among the subjects of our study ensures that diabetic people must undergo detection and treatment tests of OSA, since the coexistence of these two conditions increases the risk of CVD. BMI, neck and waist circumference, male gender, presence of hypertension, etc. They have been identified as risk factors contributing to OSA in this population. Prospective studies in this direction are needed to find out whether improving blood pressure control, BMI, neck circumference and waist size would reduce the incidence of OSA among diabetics.

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