ORIGINAL ARTICLE

Subjects with Type 2 Diabetes may have Obstructive Sleep Apnoea even at Lower BMI Values

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Abstract

Aim was to evaluate subjects with type 2 diabetes at risk of obstructive sleep apnoea (OSA) using Epworth Sleepiness Scale (ESS). A total of 436 subjects (M/F=273:163) were evaluated and categorised as those unlikely to have significant OSA (ESS score <10; absence of snoring) and likely to have significant OSA (ESS score >10; presence of snoring). Body mass index (BMI), HbA1c and micro- and macrovascular complications were recorded. Among 436 subjects, 242 were unlikely to have significant OSA, of which 20% were randomly selected (*n*=58; Group 1) and compared with subjects (8.3%) likely to have OSA (*n*=36; Group 2). In all, 50% in Group 2 and 36% in Group 1 had hypertension (*P*=0.27). In Group 2, 2.8% had BMI (kg/m^2) <23, 5.6% had 23–23.9, 19.4% had 24–24.9, 25% were between 25 and 26.9, and 47.2% had e"27. Diabetic subjects even with normal BMI were at risk of OSA and more likely to have macrovascular comorbidity.

Keywords: Epworth Sleepiness Scale, Obstructive sleep apnoea, type 2 diabetes, BMI

Introduction

Obstructive sleep apnoea (OSA) is a common sleep disorder characterised by frequent episodes of upper airway collapse during sleep. OSA has been recognised as a major contributor to morbidity and mortality in developed countries[1,2]. The prevalence estimates in Asia suggests that this is common not only in developed countries but also in developing countries. Epidemiological studies from North India have reported varying prevalence rates of OSA, ranging from 9% to 13% among the general population[3]. Excess body weight is a well-recognised risk factor for OSA[4,5]. OSA is also associated with poor glucose metabolism in individuals without diabetes and is a highly prevalent comorbidity as well as a risk factor for type 2 diabetes[6]. There are population, clinic-based and laboratory studies as well suggesting that both type 2 diabetes and OSA may be associated independently of the degree of adiposity[7].

The gold standard diagnostic test for OSA is overnight polysomnogram, which involves simultaneous recordings of multiple physiologic signals during sleep. Identification of OSA using this test is expensive and may not be

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accessible in all clinical settings, so a practical approach might be to screen first using questionnaire for OSA. Questionnaire may identify people with an increased likelihood of having OSA. Those at high risk should undergo polysomnography to confirm the diagnosis.

The aim of this study was to evaluate subjects with type 2 diabetes who are at risk of OSA through history of snoring and assessment of daytime sleepiness and also to assess the associated risk factors.

Materials and Methods

A total of 436 subjects (273 males and 163 females) with type 2 diabetes attending a diabetes specialty centre from September 2009 to March 2010 were evaluated using the Epworth Sleepiness Scale (ESS), which is a short questionnaire used to assess daytime sleepiness[8]. Height and weight measurements were taken and body mass index (BMI; kg/m^2) was calculated. HbA1c values and details on other micro- and macrovascular complications were recorded. Presence or absence of snoring was also recorded. Institutional Ethical Committee approved the study and written consent was obtained from each study subject. Subjects were identified as those who were less likely to have significant OSA (ESS score <10 and absence of snoring) or more likely to have significant OSA (ESS score ≥10 and presence of snoring).

Statistical analysis

Means and proportions were reported for continuous and categorical variables, respectively. Pearson chi-square and Student's independent sample '*t*'-test were used appropriately to test the associations using SPSS version 16.0. *P*-value of <0.05 was considered to be significant.

Results

Of the 436 subjects evaluated, 242 (55.5%; M/F=145:97) subjects were identified as those who were unlikely to have significant OSA (score <10 and absence of snoring). Out of 242 subjects, 20% were randomly selected (*n*=58; M/F=34:24; Group 1) and were compared with subjects who were likely to have significant OSA with score ≥10 and with positive history of snoring. (*n*=36; M/F=24:12; 8.3%; Group 2). There was no gender difference observed among those at risk of OSA (men versus women: 16.5% versus 12.3%; *P*=0.477). The remaining study subjects with the absence of snoring and score ≤10; (*n*=15; 3.4%) and the presence of snoring but with score <10; *n*=143 (32.6%) were considered to be at low risk and excluded for comparison.

Table 1 shows the characteristics of the study subjects with and without risk for OSA. The mean age was similar between the groups (Group 1 versus Group 2; 55.2±9.8 versus 53.5±10;*P*=0.419). Group 2 subjects had higher mean BMI values in comparison with Group 1 subjects (27.2±3.1 versus 25.9±3.8 kg/m^2; *P*=0.08). Majority of the study subjects (~80%) belonged to the middle-income category. Mean HbA1c values were above 9.0% and the mean duration of diabetes was more than 10 years in both the groups.

Table 1: Comparison of characteristics of study subjects with and without risk for OSA

Characteristics	Group 1 (absence of snoring and score <10) *n*=58 (M/F=34:24)	Group 2 (presence of snoring and score ≥10) *n*=36 (M/F=24:12)	*P*-value
Age (years)	55.2±9.8	53.5±10	0.419
BMI (kg/m^2)	25.9±3.8	27.2±3.1	0.088
HbA1c (%)	9.6±2.4	9±2	0.213
Duration of diabetes (years)	11.7±7	10.9±6.7	0.585
Income group (*n* (%)			
High	8 (13.8)	7 (19.4)	
Middle	49 (84.5)	29 (80.6)	0.575
Low	1 (1.7)	–	
Mean ESS score	3.7±2.6	12.6±2.5	<0.001
Complications (*n* (%))	21 (36.2)	18 (50%)	0.270
Hypertension	18 (31)	14 (38.9%)	0.577
Dyslipidemia	7 (12.1)	5 (13.9%)	0.951
Cardiovascular	19 (32.8)	5 (13.9%)	0.072
disorder	13 (22.4)	8 (22.2%)	0.816
Neuropathy	16 (27.6)	8 (22.2%)	0.737
Nephropathy			
Retinopathy			

The mean ESS score was significantly higher in Group 2 in comparison with Group 1 (12.6±2.5 versus 3.7±2.6; *P*<0.001).

Hypertension was present in 50% in Group 2, whereas it was 36% in Group 1 (*P*=0.27). Dyslipidaemia (Group 1 versus Group 2; 31% versus 38.9%), cardiovascular disorders (12.1% versus 13.9%) and neuropathy (32.8% versus 13.9%) and the presence of other microvascular complications such as nephropathy and retinopathy were similar between the groups. In Group 2, the proportion of subjects in age (years) categories were 0% (<30), 16.7% (30–40), 16.7% (40–50) and 66.7% (>50) and in BMI (kg/m^2) categories were 2.8% (<23), 5.6% (23–23.9), 19.4% (24–24.9), 25% (25–26.9) and 47.2% (≥27).

Discussion

The current study showed that 8.3% of the subjects with type 2 diabetes were at high risk of OSA based on simple history and questionnaire format, which would help identify and treat these patients early. Similarly, overall prevalence of individuals who had high risk for sleep apnoeas was observed between 10 and 12.4% in Pakistan based on Berlin questionnaire[9]. In another study, Robert *et al*. reported that 16.3% were at high risk of OSA and 9.9% were at low risk based on Berlin questionnaire and the same subjects when subjected to polysomnography revealed that the prevalence of OSA among Indian subjects with diabetes was 24.3%[10]. So there is a possibility of under estimation of the presence of OSA if the evaluation was based on questionnaire and an overnight polysomnography only can reveal the exact prevalence of OSA. Moreover, screening questionnaires for OSA have poor sensitivity and specificity and have not been validated in diabetes populations[11]. A higher mean BMI in high-risk group observed in our study was similar to the BMI reported in the above study by Robert *et al*.[10] The present study showed a higher proportion of subjects with hypertension in at risk group of OSA compared to control group (50% versus 36.2%). Another hospital-based study conducted in Hyderabad also reported that 80% of subjects with confirmed OSA by polysomnography had hypertension[12].

The present study highlights that subjects with type 2 diabetes of Indian origin even with lower BMI values were likely to have OSA. Nearly, 28% of high-risk group fall under BMI category <25 kg/m^2 and 67% of high-risk group were aged above 50 years. In addition, a trend towards increased macrovascular comorbidity was also observed in our study. However, larger studies have to be planned to further define the association of these factors with OSA among people with type 2 diabetes using polysomnography. Polysomnography may not be feasible in some settings due to limited resources, especially, in developing countries. So it is ideal to screen the subjects first using questionnaire and those who are highly susceptible should undergo polysomnography testing.

In conclusion, 8.3% of the subjects with type 2 diabetes were at risk of OSA based on questionnaire. Subjects with diabetes from Indian origin may have OSA even at lower BMI values.

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