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Research Article

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Detection of OSA in Patients with Type 2 Diabetes Mellitus

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Abstract

Objective: *Detection of OSA by results of the Stop-bang questionnaire in patients with type 2 diabetes mellitus.*

Material and Methods: *Total of 300 patients was examined (mean age was 59.4 ± 6.66 years). All examined were divided to male and female. 150 female patients mean age 57.4 ± 7.6 years, mean body mass index (BMI) 31.2 ± 5.0 kg / mI, neck circumference, (mean 38.04 ± 2 cm). 150 male patients, men with type 2 diabetes (mean age 54 ± 8.3 years), mean BMI - 28.9 ± 7.2 kg / mI, neck circumference 41.8 cm ± 3 cm.*

Results: *According to the results of the questionnaire, it was noted that 45.4% of men had a snore in a dream, 75.7% had a female among those suffering from T2DM. In each group, 87% of the patients complained of weakness during the day. In 25.7% of women and 10.6% of men, periodic respiratory arrest in a dream was detected. A direct correlation between T2DM, BMI and sleep apnea (p <0.01).*

Conclusions: *According to the Stop-bang questionnaire, the high risk of developing OSA among men and women in the Uzbek nationality. 37.5% of men with T2DM and 40.9% of women with T2D who had a high risk of developing sleep apnea. Given that the quality of life indicator is an indicator of the state of health, any violation of them dictates the need for timely detection and correction of OSA. The results obtained make it possible to recommend further investigation of patients with a polysomnography to determine the diagnosis of OSA and treatment.*

Keywords: Type 2 Diabetes Mellitus, Obstructive Sleep Apnea, Stop-Bang Questionnaire, and Polysomnography.

Abbreviations

Type 2 diabetes mellitus-T2DM
Obstructive sleep apnea-OSA
Body mass index-BMI
Health life style-HLS.

Introduction

Over the past decades, diabetes mellitus (diabetes), along with cardiovascular and oncological diseases, is becoming an increasingly common pathology and by the current moment has become a "non-communicable epidemic". In Uzbekistan for 2017, 182,865 patients with diabetes mellitus were registered. The actual number of patients is more than 10 times registered, for the last 18 years the number of patients with diabetes on appeal in Uzbekistan has increased by 2.4 times (Ministry of Health of the Republic of Uzbekistan).

Type 2 diabetes mellitus (T2DM) and obstructive sleep apnea (OSA) are two common, chronic conditions that are associated with both prevalent and incident cardiac disease. Although T2DM and OSA share a common risk factor, i.e. obesity, accruing evidence over the last two decades has demonstrated that there is an independent association between OSA and T2DM. Estimates on the prevalence of OSA in type 2 diabetics are indeed staggering with studies showing that well over 50% of type 2 diabetics have OSA [1, 2]. Epidemiological evidence has demonstrated a high prevalence of OSA in patients with Type 2 DM. In a cross-sectional study, up to 23% of a diabetic population was found to have OSA [3].

Conversely, studies have also indicated a high prevalence of DM or insulin resistance in OSA patients. In a large clinic-based cross-sectional study, 30.1% of OSA patients had Type 2 DM, while 20% had impaired glucose tolerance [4].

Additionally, a recent meta-analysis of prospective studies has found that moderate-to-severe OSA was associated with an increased incidence of Type 2 DM [5].

The mechanisms of insulin resistance and pancreatic β-cell dysfunction, as discussed above, explain the epidemiological observations that the prevalence of prediabetes and type 2 diabetes are increased in OSA. Most studies have used quantitative and

validated measures for diabetes and OSA, such as fasting glucose or GTT and polysomnography, respectively. Interestingly, there is evidence to suggest that type 2 diabetes independently increases the likelihood of sleep-disordered breathing, possibly through the effects of diabetes on the autonomic and central nervous system [6]. The prevalence of OSA in people with type 2 diabetes is variable, and estimates range from 18% in primary care, to 58% in an older cohort, and as high as 86% in obese populations with type 2 diabetes [7, 8].

However, there is heterogeneity in the findings of these longitudinal studies when adjusted for confounders, including age, sex, and BMI. This suggests that shared risk factors are important moderators of the association between OSA and type 2 diabetes and should be considered in the clinical evaluation and management decisions pertaining to individual patients. In this regard, emerging data suggest that OSA expression in rapid eye movement (REM) sleep (in which more frequent respiratory events and more severe oxygen desaturation may be observed) has significant effects on insulin resistance and glycemic control [9, 10].

The most typical clinical signs for OSA are daytime sleepiness, memory and concentration dysfunction, sexual dysfunction, gastroesophageal reflux, headaches, snoring, the presence of hypertension [11-13]. Hypopnea is a condition when there is no stopping the breathing of snoring, and apnea - when the breath stops for 5 seconds. Currently, the standard for assessing the severity of respiratory disturbances during sleep is the so-called apnea / hypopnea index (AHI), which provides a quantitative assessment of episodes of apnea and hypopnea per 1 hour of sleep during a polysomnographic study. About the syndrome speak in the case when AHI> 5 [14]. However, the polysomnography requires serious material costs, and for the preliminary assessment of the risks of OSA, it is possible to use the methods of questioning. The diagnostic significance of the STOP-Bang questionnaire was evaluated in the Sleep Heart Health Study. The STOP-BANG is a shorter and more straight-forward instrument. It includes a subjective 4-item questionnaire (STOP) and a 4-item portion informed by demographics and measures (BANG) [15]. The sensitivities of the STOP-BANG for detection of OSA at an apnea/hypopnea index (AHI, number of events per hour sleep) >5, >15, and >30 were 83.6, 92.9, and 100% respectively. Previous investigators did evaluate the STOP-BANG in a sleep laboratory setting retrospectively, by deriving the equivalent of STOP responses from other questionnaires patients completed, and adding BANG information from medical records [16]. They found that the STOP-BANG had a sensitivity of 81.5% for detecting AHI ≥5.

STOP-BANG Questionnaire

The STOP-BANG questionnaire used in this study included four yes/no questions: S- “Do you Snore loudly (louder than talking or loud enough to be heard through closed doors)”, T-“Do you often feel Tired, fatigued, or sleepy during daytime?” O- “Has anyone Observed you stop breathing during your sleep?” P- “Do you have or are you being treated for high blood Pressure?” [15] The BANG portion of the questionnaire asked patients to report their height and weight (from which BMI was calculated), Age, Neck circumference or collar size, and Gender [15].

Patients received an additional point toward their STOP-BANG scores for the presence of each of the following clinical characteristics: BMI >35, age > 50, neck circumference > 40cm, and male gender. Patients were classified as having high risk for OSA if they had a total STOP-BANG score ≥3 points, out of a possible 8 points [15]. As both self-reported and measured or observed values for BMI, age, neck circumference, and gender were collected, two sets of scores were calculated-bang questionnaire in patients with type 2 diabetes mellitus.

Material and methods

We examined 300 patients with type 2 diabetes (mean age was 59.4 ± 6.66 years). All examined were divided into 2 groups: Men-150 patients and women 150 patients with type 2 diabetes. All the examinees signed informed consent to participate in the study, were questioned: "Questionnaire for the screening of sleep apnea -Stop-Bang" Patients gave answers to questions about snoring in sleep, stopping breathing in sleep, and blood pressure (BP). When assessing the completed questionnaire, the total score was calculated.

When more than 3 positive responses were recruited, it was regarded as a possible breathing disorder in a dream. Also, all patients underwent general clinical examination, calculated BMI, and measured the circumference of the neck. Statistical processing was carried out using the Microsoft Excel program. The results are presented as the mean (Mean) and the mean error (SEM). Groups were checked using by Statistica 6.0.

Results and Discussions

It was found that in the first group of patients from 150 women with diabetes 2, the mean age was 57.4 ± 7.6 years; the average body mass index (BMI) was 31.2 ± 5.0 kg / m2, the neck circumference - 38.04 ± 2 cm. In the second group of patients from 150 men with type 2 diabetes, the mean age was 54 ± 8.3 years, the average BMI was 28.9 ± 7.2 kg / m2, the neck circumference was 41.8 cm ± 3 cm. Recorded hereditary predisposition of T2DM was aggravated in 59% of patients with diabetes, men patients with obesity was 57.8%, and women patients - 60.6%. Physical activity in both groups did not differ significantly. In the group of patients with T2DM, the presence of autonomic neuropathy was taken into account, which was diagnosed in 164 patients (78 women, 86 men), which corresponds to 48.4%. The presence of arterial hypertension (AH) was found in men with T2DM in 19.6%, in obese people in 12.8% of cases.

According to the results of the questionnaire (see Table 1), it was noted that snoring occurred in 45.4% of men, in women it was 75.7% among patients suffering from T2DM. In each group, complaints of weakness during the day were reported in 87 % of patients, 25.7% of women and 10.6% of men had periodic respiratory arrest in sleep.

Clinical characteristics of the patients examined in the group

	All examined patients (n = 300)	Male (n = 150)	Female (n = 150)
Snore	181 (60,6 %)	68 (45,4 %)	113 (75,7 %)
Observed	54 (36,3%)	16 (10,6%)	38 (25,7%)
Tired	129 (65,9 %)	76 (51,5 %)	53 (80%)
Blood pressure	251 (81%)	97 (65,1%)	145 (96,9%)
BMI 35kg/m	181 (60%)	86 (57.8 %)	95 (63,6 %)
Age up to 50	240 (80,3 %)	111 (74,2 %)	129 (86,3 %)
Neck circumference M>40 F>37	333 (84 %)	204 (81,8%)	129 (86,3%)

High blood pressure, mainly in the morning, was observed in patients with T2DM, women 96.9% more often than men 65.1%, men's BMI was 57.8%, women's' 63.6%. A high risk of developing sleep apnea was 37.5% of men with T2DM and 40.9% of a woman with T2DM. The results of the screening of sleep apnea syndrome showed that a direct correlation between T2DM, BMI and sleep apnea ($p < 0.01$).

Conclusion

According to the results of Stop-bang questionnaire, the risk of OSA development among men and women in the Uzbek nationality. Men contingent was 37.5% and 40.9% of women with T2DM who had a high risk of developing sleep apnea. Given that the quality of life indicator is an indicator of the state of health, any violation of them dictates the need for timely detection and correction of OSA. The Stop Bang questionnaire can be used for primary screening in patients with type 2 diabetes with the aim of identifying OSA. Patients at high risk for development of apnea are encouraged to study with the aid of a polysomnography for further tactics of reference.

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