PREVALENCE OF SLEEP DISORDER IN SUBJECTS WITH TYPE 2 DIABETES MELLITUS: AN OBSERVATIONAL STUDY

PREVALENȚA TULBURĂRILOR DE SOMN LA SUBIECȚII CU DIABET MELLITUS TIP 2: STUDIU OBSERVAȚIONAL

Santosh Metgud[1], Chakradhar Reddy Bangaru [2]

Keywords: Sleep disorder, Obstructive Sleep apnea, Diabetes Mellitus (type 2).

Abstract

Background. Most of the evidences have shown that Sleep Disorder (SD) is an independent risk factor for hypertension, cardiovascular disease and impaired glucose metabolism.

Objectives. To determine the prevalence of Sleep disorder in subjects with type 2 Diabetes Mellitus (DM) by using Pittsburgh sleep quality index and intermountain modified Berlin sleep apnea scale.

Methods. Fifty participants with type 2 DM who attended department of diabetology KLE'S Dr.Prabhakar kore hospital and medical research centre at Belgaum. Fifty participants of both males and females between age group 40-60 years were included and allocated into two groups and given them a self-administered questionnaire. The Pittsburgh sleep quality index (group a) was used to evaluate sleep quality, and The Intermountain modified Berlin sleep apnea scale (group b) was used to evaluate risk of obstructive sleep apnea.

Results. Sleep quality index results revealed that poor sleep quality in 17(34.0%) of 50 diabetic patients and is negatively correlated with BMI ($p>0.05$) which is not significant and Obstructive sleep apnea revealed that 33(66.0 %) of 50 diabetic patients and is positively correlated to BMI ($p<0.05$) which is highly significant. Age is not correlated with BMI, PSQI scale and BERLIN scale.

Conclusion. The SD is prevalent among type 2 diabetic patients and that individuals at high risk of BMI are also at higher risk for OSA. Therefore, early detection and treatment of SD among type 2 diabetic is essential.

Cuvinte cheie: tulburări de somn, apnee obstructivă în somn, diabet mellitus tip 2.

Rezumat

Introducere. Majoritatea evidențelor științifice demonstrează că tulburările de somn reprezintă un risc independent pentru hipertensiune, boli cardiovasculare și tulburări ale metabolismului glucidic.

Obiectiv. Determinarea prevalenței tulburărilor de somn la pacienții cu diabet mellitus tip 2, folosind Pittsburgh Sleep Quality Index și Intermountain Berlin Sleep Apnea Scale modificată.

Metode. Cincizeci de participanți cu diabet mellitus tip 2 din cadrul Departametului de Diabetologie al Spitalului și Centrului de Cercetare KLE Dr.Prabhakar din Belgaum, bărbați și femei, cu vârste cuprinse între 40-60 ani, au fost incluși în studiu și împărțiți în două grupuri. Li s-a cerut să completeze un chestionar autoadministrat. Pittsburgh Sleep Quality Index (grup a) s-a folosit pentru evaluarea calității somnului, iar Intermountain Berlin Sleep Apnea Scale modificată (grup b) s-a folosit pentru a evalua riscul de apariție a pneei obstructive în somn.

Rezultate. Rezultatele Sleep Quality Index au indicat faptul că o calitate redusă a somnului a apărut la 17 (34.0%) dintre cei 50 de pacienți diabetici și este corelat negativ cu IMC ($p>0.05$), fiind nesemnificativă. Obstructive Sleep Apnea a indicat faptul că apnea este prezentă la 33 (66.0 %) dintre cei 50 de pacienți diabetici și este pozitiv corelată cu IMC ($p<0.05$), fiind foarte semnificativă. Vârsta nu se corelează cu IMC, scala PSQI și scala BERLIN.

Concluzii. Tulburările de somn sunt frecvente la pacienții cu diabet mellitus tip 2, prezentând un risc crescut pacienții cu IMC crescut, care prezintă, de asemenea, risc crescut pentru apnee în somn. De aceea, este esențială depistarea precoce și tratarea tulburărilor de somn la pacienții cu diabet mellitus tip.

Introduction

Sleep Disorder is commonly seen in age groups around 35-50 years with a chronic illness presented by partial or complete cessation of breathing [1]. Sleep disorder is mainly associated

[1] Assistant Professor, Institute of Physiotherapy, KLE University, Belgaum.
Address-KLEU Institute Of Physiotherapy,JNMC Campus,Nehru nagar,Belgaum
Phone number-9880088400, Email-santosh metgud@gmail.com
[2] MPT 1ST year, OMT PG, Institute of Physiotherapy, KLE University, Belgaum.
Address- room no-85,sangam hostel,Nehru nagar,belgaum.
Phone number-8197856684, Email-bangaruchakradhar@gmail.com

with sleep disordered breathing, insomnia; sleep apnea, restless leg syndrome and nocturnal hypoxemia. It may also lead to some cardiovascular complications, altered glucose metabolism and metabolic dysfunctions [2,3]. However, the causative factor and mechanism that stimulate sleep disorder in diabetic individuals is not known or less understood. Most of the studies shown, that sleep disorder develops indirectly the risk for hypertension, cardiovascular disease [4-8] and for glucose metabolism. [9] Many of self reported studies shown that inappropriate glucose metabolism and individuals with diabetes mellitus are independently associated with snoring, which is a common symptom for sleep disorder [10,11]. People with diabetes may also be at higher risk for sleep problems relative to the general population because of common risk factors for diabetes and sleep problems, including advanced age, obesity, and treatments for complications of common co-morbid diseases (egg. epression, cardiovascular disease). Additionally, diabetes-specific complications, such as neuropathy, could directly interfere with sleep. However, most people with diabetes who have sleep problems are likely to go untreated. Diabetes was the sixth leading cause of death listed on U.S death certificates in 2003 with a higher incidence of cardiovascular, cerebrovascular, and renal disease [12].

Aim

The aim of this study is to find out the prevalence of sleep disorder (SD) in subjects with type2 Diabetes Mellitus (DM). To determine the prevalence of Sleep disorder in subjects with type 2 DM by using Pittsburgh sleep quality index and modified Berlin scale.

Methods

Subjects

Fifty participants with type 2 DM who attended department of diabetology KLE'S Dr.Prabhakar Kore Hospital and Medical Research Centre, Belgaum. . Fifty participants of both males and females between age group 40-60 years were included and allocated into two groups and given them a self-administered questionnaire. The Pittsburgh sleep quality index (group a) was used to evaluate sleep quality, and the Intermountain modified Berlin sleep apnea scale (group b) was used to evaluate risk of obstructive sleep apnea. The subjects included are age group between 40 to 60 years, both males and females, Subjects with type 2 Diabetes Mellitus, Subjects who are willing to participate in study.Excluded are Subjects with psychological disorder, Subjects who are consuming alcohol before sleep.

Outcome measures

Pittsburgh sleep quality index: The SQI assesses sleep quality over the preceding month and differentiates 'good' sleepers from 'poor' sleepers. Questionnaire responses involve seven components; each component is scored from 0 to 3, where a score of 3 represents the negative extreme. Component scores are summed to provide the SQI global score (range, 0 to 21); scores > 5 identify 'poor' sleepers. [13]

Intermountain modified Berlin questionnaire: The BQ includes five items on snoring (category 1, items 1-5), three items on daytime somnolence (category 2, items 6-8), and one item on the history of hypertension (category 3, item 9). The questionnaire also includes information about age, gender, height, and weight. The overall score is based on the patient's responses to each of the three categories. [14]

Procedure

Ethical committee-Ethical clearance was done prior to the study. Detail explanation about the scale was explained to the participant. All participants were screened for their inclusion and exclusion criteria before their recruitment in the study. A written informed consent was obtained from the study participants and they were allocated into two groups A and B respectively. After dividing the groups the questionnaire issued to participant on requesting to give the information truly up to their knowledge. Outcome measures viz. Pittsburgh sleep quality index and

intermountain modified sleep apnea Berlin questionnaire were taken from all the 50 participants' only single time.

Statistical analysis

Statistical analysis was conducted using SPSS software (version 19.0) and significance was set at 0.05. Male and Female comparison done by using mann-whitney U test which is a non-parametric test. Spearman's rank correlation coefficient done between Age, BMI, PSQI and BERLIN scales for males and females separately.

Results

The results of the present study shows males are more involved in suffering from sleep disorder rather than females. The mean age for females 49.1 years (±6.17) and males was 51.1 years (±5.61) and comparable value of it was 50.4 years (±5.82). The mean BMI for females was 25.2 kg/m^2 (±1.42) and for males 25.6 kg/m^2 (±1.99) and combined value for males and females was 25.4kg/m^2 (±1.81).

Table one also shows mean values of PSQI scale which assessed about quality of sleep for females was 6.7(±2.61) and males was 5.8(±3.24). The combined value for both males and females was 6.1(±3.05), with P-value (0.153) which statistically not significant. The mean value for Berlin scale that asses the obstruction of sleep for females was 11.3(±5.87) and males 15.1(±6.73) and combined mean value for both was 13.8(±6.63) with P-value (0.043), which shows statistically significant.

Table 1. Mean Values of Demographic Data

GROUPS	AGE	BMI	PSQI	BERLIN
FEMALE (17)	49.1±6.17 (40-60)	25.2±1.42 (22.3-27.3)	6.7±2.61 (2-10)	11.3±5.87 (0-24)
MALE (33)	51.1±5.61 (40-60)	25.6±1.99 (19.4-30)	5.8±3.24 (2-14)	15.1±6.73 (0-25)
COMBINE	50.4±5.82 (40-60)	25.4±1.81 (19.4-30)	6.1±3.05 (2-14)	13.8±6.63 (0-25)
t 48	1.157	0.609	1.073	1.939
P-VALUE	0.253	0.546	0.153	0.043

The table 2 and 3 shows correlation coefficient for both the scales in males and females. In this no significant differences were observed by sex. Age is not correlated with BMI, PSQI and Berlin scales in both male and female groups. BMI is positively correlated with Berlin score (r =0.392) in female group which is statistically significant (P=0.005) and negatively associated with PSQI (r =0.277) which is statistically not significant. In contrast, correlation between PSQI and Berlin scales for males, Berlin scale showed positively correlated than PSQI (0.029).

Table 2. Correlation coefficient for women

	BMI	PSQI	BERLIN
AGE	-0.057(0.696)	0.004(0.979)	0.023(0.876)
BMI		-0.277(0.052)	0.392(0.005)
PSQI			-0.329(0.20)

Table 3. Correlation coefficient for men

	BMI	PSQI	BERLIN
AGE	-0.023(0.873)	0.035(0.810)	0.015(0.919)
BMI		-0.269(0.059)	0.238(0.096)
PSQI			-0.309(0.029)

Discussion

The results concluded by International Diabetes Federation (IDF) taskforce was that patients with type 2 diabetes mellitus had high prevalence of sleep disorder that is around 58% whereas the same study concluded that prevalence of Obstructive sleep apnea is around 23% [15].The results from Cross-sectional study done by Cunha MC et al. reported that

Cardiovascular diseases such as stroke, heart failure, cardiac arrest and ischemic heart disease was mainly associated with a series of Obstructive sleep apnea [16]. The results of this study revealed that obese diabetic patients are at higher risk for OSA, and that BMI is a dependent predictor of risk for OSA. Previous research examining potential causal links between diabetes and sleep problems has been inconclusive. A study done by Spiegel K et al concluded that forced sleep deprivation in healthy young men led to decreased leptin levels and increased appetite [17]; other cross-sectional study done by Gottlieb DJ, Punjabi NM et al depicts that subjects participated in the Sleep Heart Health Study showed that people with reduction in habitual sleep may have glucose intolerance, [18] suggests that sleep problems may lead to diabetes via physiologic mechanisms. However, the prevalence of sleep problems faced by type 2 Diabetic patients was found to be similar to that seen in type 1 diabetes [19]. Given the difference in etiology, these results suggest that diabetes may also lead to sleep problems.

Biological mechanisms proposed that reasons for developing obesity which cause sleep disorder that lead to type 2 Diabetes Mellitus. One is the abnormal regulation of Sympathetic nervous system may affect the leptin on fat and glucose metabolism and also disturbance in signaling from leptin and beta-3 adrenergic receptors lead to obesity and glucose intolerance [20]. Repeated arousal from sleep after each obstructive breath exacerbates this effect. [17]

Elevated cortisol levels, [21] pro-inflammatory cytokines, and ghrelin levels may predispose an individual to insulin resistance, and decreased leptin levels may be the mechanism for increased prevalence of Type2 DM in SD. [22] The results of this study also indicate that individuals at higher risk for OSA were more obese.

The previous studies showed that patients with obstructive sleep apnea had a significant recent weight gain of 7.4 +/- 1.5 kg compared with a weight loss of 0.5 +/- 1.7 kg ($P = 0.001$) in similarly obese controls. Male patients with obstructive sleep apnea had a history of significant weight gain compared to female. [23] The present study also inversely depicts that individuals with high BMI were more prone to obstructive sleep apnea in both males and females. We also found a higher prevalence of risk for OSA among men than women could be because of android fat distribution.

The study had certain limitations. First, it is relatively small sample size that limits the generalization of results. Large scale research will be needed in the future for Indian population. Second, we did not consider the medications or insulin injections that, might affect sleep, taken by patient. Third, the duration of the study was short term and long term research should be conducted in future.

Conclusion

The study concludes that prevalence among patients with type 2 diabetes are at high risk for Obstructive sleep apnea among which men are more involved than women.

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