ORIGINAL RESEARCH

Assessment of sleep quality in patients with type 2 diabetes mellitus

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ABSTRACT

Background: The aim of the present study was to assess sleep quality in patients with type 2 diabetes mellitus. **Materials and methods:** The present case control design was conducted among 100 diabetic patients and 100 non diabetic age matched controls presenting to internal medicine OPD. Pittsburgh sleep quality index was used to assess the sleep quality and disorder of the patient. Biochemical indices included HbA1c levels. There after the data was collected and analyzed statistically to determine any co-relation between sleep quality and glycemic status. **Results**: BMI was found more in case group as compared to control group with statistically significant difference as $p<0.05$. FBS, PPBS (mg/dl) was found more in case group as compared to control group with statistically significant difference as $p<0.05$. Mean HbA1c among the case and control group was 9.51±1.35 and 4.97±0.76 respectively. According to Pearson correlation analysis, statistically significant correlation was found between sleep quality and age, BMI as well as HbA1c i.e. with increase in age, BMI, HbA1c, poor sleep quality also increases. **Conclusion**: The study concludes, that sleep quality was poor in diabetic patients and there is a significant association between diabetics and sleep quality. Majority of patients with type 2 diabetes mellitus were suffering from poor sleep quality.

Keywords: Sleep quality, type 2 diabetes mellitus.

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INTRODUCTION

Diabetes is the 7th leading cause of death in the world and in combination with obesity and hypertension (HTN), leads to cardiovascular diseases (CVDs) which are the first leading cause of death globally.[1] The prevalence of diabetes mellitus (DM) and obesity are worldwide increasing in parallel.[2] A recent study reported that with population growth, aging, and the rise in overweight and obesity, the number of adults with diabetes in the world increased from 108 million in 1980 to 422 million in 2014. Globally, the prevalence of diabetes has increased in both gender equally, in men from 43% in 1980 to 90% in 2014 and in women from 50% to 79%.[3]With one million deaths attributable to diabetes India is the second largest contributor to regional mortality. In 2015, India had 69.2 million people with diabetes and 36.5 million impaired glucose tolerance (IGT) people (20–79 years) which are expected to rise to 123.5 million and 63.6 million by 2040, respectively. The prevalence of diabetes is high in urban than in rural India (14.2% vs. 8.3%) while prediabetes prevalence was found to be nearly same (urban 14.5%; rural 14.7%)[4]. The majority of people with diabetes (>90%) have Type 2 DM (T2DM). Unfortunately, more than 50% of people with T2DM still remained undiagnosed.Presently, more than three-quarters of the estimated 179 million people with diabetes are in the 40-59 years of age. Hence it is important to screen individuals early to increase the quality of life and delay complications. The role of sleep in balancing the mental and physical wellbeing of the individual is just beginning to gain importance as an area of research. Sleep is under the control of circadian rhythm. But the normal day-night cycle of human sleep is not seen nowadays. This has lead to the development of sleep medicine as a separate speciality.[5]Sleep cycle begins with NREM sleep, passes through four stages and ends with REM sleep. NREM sleep is otherwise called slow wave sleep and occurs in four stages 1 to 4. This cycle gets repeated every 70 to 90 minutes. The proportion of time taken for each stage varies according to age. The pattern of sleep is also characteristic for each individual. There also occurs brief periods of awakening of which the person is not aware (called stage W).[6]

India has a large population of diabetic patients but there are limited studies and lack of data on sleep

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problems in this group of patients with poor diabetic control which may lead to poor quality of life and development of complication, therefore this case control study will be done to bridge the gap between the same. This study may help to estimate the burden of sleep related morbidity in type 2 diabetes mellitus and its implications of the health status of diabetic patients also to diagnose and manage sleep related issues early, in turn can help maintain blood sugar levels within target ranges and may impede the development of complications.

MATERIAL AND METHODS

Overall 400 subjects had been evaluated out of which 200 were the cases of type 2 diabetes mellitus as well as the other 200 subjects had been chosen as healthy controls. The study included the subjects who met the diagnostic criteria for type 2 DM, subjects showing manifestations of diabetes as well as showing 2hours post prandial plasma glucose more than 200mg/dl and random plasma glucose more than 200mg/dl. Subjects having type 1 DM, gestational DM, heart disease, lung disease as well as cerebral disease were excluded from the study. Also, the subjects with earlier treatment of obstructive sleep apnea were not included in the trial. Information such as age, BMI, level of education, occupation, residence, habit of smoking, history of ischemic heart disease, congestive heart failure, nocturnal hypoglycemia, duration of DM, type of treatment, history of hypertension and if the patient is continued on medication for the treatment of hypertension, history of renal disease and ophthalmological history was gathered.

STATISTICAL ANALYSIS

The data gathered had been analyzed using SPSS software. Difference among the 2categories had been evaluated using t test and chi square test.

RESULTS

In case group, men were relativelymorethanwomen, whileincontrolgroup,women were more in number as compared to men.In case group, 60% of the patients had over fifty years of age, whereas in control group, 52% of the patients belonged to the age group of 30-50 years.Mean BMI (Body Mass Index) in the case as well as control cohort was discovered to be 29.81±3.56 and 26.54±4.33, accordingly. Therefore, BMI was evident more in case cohort than the control cohort with numerically considerable difference as p value less than 0.05.Mean HbA1c in the case as well as control group was 8.61±1.81 as well as 5.74±1.12 respectively. Hence HbA1c was more evident in case cohort than the control cohort with numerically noteworthy difference as p value less than 0.05. The quality of sleep was discovered to be good in 37% whereas poor in 63% of patients in case group while, in control group, good sleep quality was observed in 40% and poor sleep quality in 60% of patients. Therefore, poor sleep quality was documented more in case cohort than the control cohort. When sleep quality had been evaluated in the 2 groups using chi square test, considerable variation was observed.Amongst the cases, raised BMI was discovered in those having poorsleepquality(31.12) asopposedtothose havinggoodsleep(27.68)with numerically considerable difference as p value less than 0.05.As per Pearson correlation analysis, numerically considerable association had been observed among sleep quality and age, BMI as well as HbA1c. it was discovered that with increasing age, BMI as well as HbA1c increases as well the quality of sleep becomes poor.

Table 1: Sleep quality

Sleep quality	Case		Control		p value
	Number of subjects	Percentage (%)	Number of subjects	Percentage (%)	
Good	24	24	48	48	0.008*
Poor	76	76	52	52	
Total	100	100	200	100	

*: Significant

Table 2: Correlation of FBS with sleep quality

Sleep quality	FBS (mg/dL)		p-value
	Mean	SD	
Good	130.2	28.4	0.001*
Poor	166.7	30.1	

*: Significant

DISCUSSION

Sleep health is a one of the novel and imperative modifiable risk factors for better glycemic control in patients with T2DM[7].Worldwide sleep disturbances and deprivation has become more prevalent over the recent years, and associated with the significant burden of T2DMandobesity. In our present case control study gender distribution in case group were men more than women i.e. 52.5%:47.5% while in healthy controls, women were more than men i.e. 57.5%:42.5%. Signifying men were comparatively more in case group while, women were comparatively

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more in control group. In contrary, Şemsinnur Göçer et al[8] in their study reported contrasting gender distribution where 40 diabetics (cases) and 42 non diabetics (controls) where subjected to the studythere were 21 women 52.5% ; 19men 47.5% ,with non diabetics controls studied 26 women (61.9%) which were more than 16 men (38.1%). In our study, case group had 60% of the subjects with age more than 50 years while in control group, 48% of the subjects were having age more than 50 years and 40%of cases had age between 30-50 years,52% of controls had age between 30-50 years. Signifying advancing age is associated with poor sleep quality. In a study by Dagmawit Zewdu et al[9], the mean age of individuals with type 2 DM was 53.24years (SD±10.68years) and that of non-DM individuals was 43.8years (SD±9.12years). This is in accordance to the present study.In our study mean BMI among the case and control group was29.81±3.56 and 26.54±4.33 respectively. Hence BMI was found more in case group as compared to control group with statistically significant difference as $p<0.05$.ŞemsinnurGöçer et al[8] in their study too reported that mean BMI was higher in diabetic 32.34 kg/m^2 as compared to non-diabetic subjects. In the current study, sleep quality was assessed by using Pittsburg Sleep Quality Index wherein, sleep quality was found good in 37% and poor in 63% of diabetic cases respectively. In the control group 40% enjoyed good quality of sleep in contrast poor quality sleep was noted in 60%. Hence poor equality was reported more in case group as compared to control group.

The finding of the study is approximately similar to the studies conducted in India[10], Neenu Merin*et al*. Studied 37 diabetics and non diabetic patients comparing their quality of sleep using PSQI score. The study findings revealed that, majority of the subjects with diabetes had poor sleep quality 78.4%, whereas among non-diabetic subjects only 51.4% and this is comparable to the findings of present study where in sleep quality was found to be poor in 76% with diabetics and 52% with non diabetics.

Among the cases, higher BMI (obesity) was found in subjects with poor sleep quality (29.01kg/m^2) as compared to subjects with good sleep (25.57 kg/m^2) with statistically significant difference as $p<0.05$.According to Pearson correlation analysis, statistically significant correlation was found between sleep quality and age, BMI as well as HbA1c i.e. with increase in age, BMI, HbA1c, poor sleep quality also increases. Poor Glycaemic control was also significantly associated with poor sleep quality among individuals with type 2 DM.[11]ŞemsinnurGöçeretal[8] their study reported that there was a positive correlation between PSQI scores and age, BMI and HbA1c levels, indicating an increase in PSQI scores by increasing age, BMI and HbA1c.

CONCLUSION

The study concludes, that sleep quality was poor in diabetic patients and there is a significant association between diabetics and sleep quality. Majority of patients with type 2 diabetes mellitus were suffering from poor sleep quality. Individuals with type 2 DM need to control their blood glucose to improve their sleep quality. Additionally, regular physical exercise is needed to prevent poor sleep quality.

REFERENCES

1. World Health Day: WHO Calls for Global Action to Halt Risein and Improve Care for People with Diabetes. World HealthOrganization; 2016.
2. International Diabetes Federation. IDF Diabetes Atlas. 6th ed.Brussels, Belgium: International Diabetes Federation; 2013.
3. Ezzati M, NCD Risk Factor Collaboration (NCD-RisC)Members. Worldwide trends in diabetes since 1980:A pooled analysis of 751 population-based studies with4·4 million participants. Lancet 2016;387:1513–30.
4. Anjana RM, Pradeepa R, Deepa M, Datta M, SudhaV,Unnikrishnan R, et al. Prevalence of diabetes andprediabetes (impaired fasting glucose and/or impairedglucose tolerance) in urban and rural India: Phase Iresults of the Indian council of medical research-Indiadiabetes (ICMR-INDIAB) study. Diabetologia 2011;54:3022-7.
5. Chinese individuals in Shandong Province, China. Sleep Breath. = Schlaf Atm. 2019, 23, 349–354.
6. Zoto, E.; Cenko, F.; Doci, P.; Rizza, S. Effect of night shift work on risk of diabetes in healthy nurses in Albania. ActaDiabetol. 2019;56, 811– 813.
7. Haffner SM. Coronary heart disease in patients with diabetes. N Engl J Med.2000;342:1040–1042.
8. Göçer S, Yildirim T. Assessment of Sleep Quality in Patients with Type 2 Diabetes Mellitus: A Case-control Study. Eastern Journal of Medicine. 2021 Apr 1;26(2):273-9.
9. Zewdu D, Gedamu H, Beyene Y, Tadesse M, Tamirat M, Muluken S. Sleep quality and associated factors among type 2 Dm patients and non- Dm individuals in Bahir Dar governmental hospitals: comparative cross-sectional study. Sleep Science and Practice. 2022 Oct 14;6(1):10.
10. Merin N, Antony R. Quality of sleep among diabetes and non diabetes – pilot study. Indian Journal of public Health Research & Development.2020;11
11. Liu Y, Wheaton AG, Chapman DP, Cunningham TJ, Lu H, Croft JB. Prevalence of healthy sleep duration among adults—United States, 2014. Morbidity and Mortality Weekly Report. 2016;65(6):137-41.

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