SLEEP QUALITY IN INDIVIDUALS WITH AND WITHOUT DIABETES MELLITUS- A CASE CONTROL STUDY

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ABSTRACT

BACKGROUND

Diabetes Mellitus (DM) is one of the common chronic medical conditions affecting approximately 422 million people worldwide. Studies have shown that upto one-third of patients with DM suffer from concomitant sleep difficulties. Numerous studies have recognised diabetes as a novel risk factor for sleep disorders via peripheral neuropathy or endocrine-metabolic pathway.

Aim- The present study was undertaken to compare the sleep quality in type 2 diabetes patients and non-diabetic patients.

MATERIALS AND METHODS

100 cases of type II diabetes mellitus and 100 non-diabetic age matched controls including both males and females were assessed for sleep quality. Sleep quality was assessed by Pittsburgh Sleep Quality Index (PSQI).

RESULTS

Demographic data was not significantly different between cases and controls. Sleep quality was significantly lower in cases when compared to controls.

CONCLUSION

The seven components of PSQI scored less for diabetics, which indicates that the sleep quality in diabetics is significantly lower in comparison to non-diabetic patients.

KEY WORDS

Diabetes Mellitus, Diabetics, Non-Diabetics, PSQI.

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BACKGROUND

Diabetes mellitus is affecting people globally and is being increasingly recognised as a significant health burden. Diabetes is fast gaining the status of a potential epidemic in India with more than 62 million diabetic individuals currently diagnosed with the disease.^{1,2} In 2000, India (31.7 million) topped the world with the highest number of people with diabetes mellitus followed by China (20.8 million) and United States (17.7 million) in second and third place respectively. According to Wild et al,³ the prevalence of diabetes is predicted to double globally from 171 million in 2000 to 366 million in 2030 with a maximum increase in India. It is predicted that by 2030 diabetes mellitus may afflict upto 79.4 million individuals in India, while China (42.3 million) and the United States (30.3 million) will also see significant increase in those affected by the disease.^{3,4} According to the latest WHO estimates in 2016, globally there are about 422

million adults living with diabetes mellitus.⁵ Patients with DM, by virtue of its numerous clinical and associated implications, suffer a poor quality of sleep.^{6,7} It is not surprising that sleep quality among these patients are significantly impaired. Patients with DM can experience challenges to their sleep and wakefulness due to physiological imbalance and co-morbid sleep pathologies.⁸

People who have diabetes often have poor sleep habits including difficulty falling asleep or staying asleep. Some people with diabetes get too much sleep, while others have problems getting enough sleep. According to the National Sleep Foundation, 63% of American adults do not get enough sleep needed for good health, safety and optimum performance.

There are several causes of sleep problems for people with type 2 diabetes including obstructive sleep apnoea, pain or discomfort, restless legs syndrome, the need to go to the bathroom and other problems associated with type 2 diabetes.

Impaired sleep quality disrupts the adequate glycaemic control regarded as corner stone in diabetes mellitus management and also lead to many deleterious effects causing a profound impact on health-related quality of life.

Aims and Objectives

- To study the sleep quality in adults with type 2 diabetes.
- To compare the sleep quality between diabetic and non-diabetic adults.

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MATERIALS AND METHODS**Study Design**

A case-control study.

Study Site

The study was conducted at Vijaya Hospital, Madinaguda, Hyderabad, India.

Study Sample

100 diabetic patients as cases and 100 non-diabetic patients as controls.

Study Tools**Pittsburgh Sleep Quality Index (PSQI)⁹**

The Pittsburgh Sleep Quality Index (PSQI) is a self-report questionnaire that assesses sleep quality over 1 month's time interval. The measure consists of 19 individual items, creating 7 components that produce one global score and takes 5 - 10 minutes to complete. Developed by researchers at the University of Pittsburgh, the PSQI is intended to be a standardised sleep questionnaire for clinicians and researchers to use with ease and is used for multiple populations. The questionnaire has been used in many settings including research and clinical activities, and has been used in the diagnosis of sleep disorders.

Sampling Technique

The sample size was selected for convenience.

Inclusion Criteria**Cases**

- Type 2 diabetes diagnosed by physician.
- Duration of diabetes, minimum 1 year.
- On oral or injectable medication.
- Given informed consent.
- Age > 25 yrs., both male and female.

Controls

- Age > 25 yrs., both male and female.
- HbA1c levels < 5.6

Exclusion Criteria

Presence of already existing psychiatric illness.

Statistical Analysis

- Statistics were done by using means and standard deviations.
- Tests of comparison for continuous variables: Independent student's T test.
- Software tools used were MS Excel and R programming language.

RESULTS

The mean age of diabetics is (47.7 ± 14.37) yrs. and in Dr. Faith et al study the mean age is 63.9 years, which is not comparable.¹⁰ In our study for non-diabetics, mean age is (37.72 ± 12.87) yrs. Out of 100 diabetic cases 24% of diabetic patients are in 25 to 34 years' age group, 20% in 35 to 44, 22% are in 45 to 54, 18% in 55 to 64 and 16% in 65 and above. Out of 100 controls, 26% of non-diabetic patients are in 25 to 34 years' age group, 6% are in 45 to 54, 44% in 35 to 44, 11% in 55 to 64 and 13% in 65 and above. In diabetic

patients 60% are females and 40% are males, whereas in control group 66% are females and 34% are males.

Socio-demographic Profile		
Age	Cases No. of Cases (%)	Controls No. of Controls (%)
25-34 yrs.	24	26
35-44 yrs.	20	44
45-54 yrs.	22	6
55-64 yrs.	18	11
>65 yrs.	16	13
Sex		
Male	60	66
Female	40	34
Religion		
Hindu	80	86
Muslim	19	12
Christian	1	2
Education		
Educated	88	92
Uneducated	12	8
Marriage		
Married	98	82
Unmarried	2	8
Employment		
Employed	40	56
Unemployed	60	54
Type of Family		
Joint	46	40
Nuclear	54	60

Sleep Quality

0- No Difficulty.

1- Difficulty.

2- Very Difficulty.

3- Severe Difficulty.

	Diabetics	Non-Diabetics
Component 1 Subjective Quality Sleep	Mean: 1.22 SD: 0.046 Mean ± SD=1 ± 0.046	Mean:0.88 SD:0.34 Mean ± SD=0.88±0.34
Component 2 Sleep Latency	Mean: 1.11 SD: 0.709 Mean ± SD=1.11 ± 0.709	Mean: 0.88 SD: 0.65 Mean ± SD=0.88±0.65
Component 3 Sleep Duration	Mean: 1.36 SD: 0.067 Mean ± SD=1.36± 0.067	Mean: 0.44 SD: 0.70 Mean ± SD=0.44 ± 0.70
Component 4 Habitual Sleep Efficiency	Mean: 0.22 SD: 0.056 Mean ± SD=0.22 ± 0.056	Mean: 0 SD: 0. Mean ± SD=0
Component 5 Sleep Disturbances	Mean: 1.76 SD: 0.0698 Mean ± SD=1.76 ± 0.06	Mean: 1.06 SD: 0.31 Mean ± SD=1.06 ±0.31
Component 6 Use of Sleeping Medication	Mean: 1.53 SD: 0.78 Mean ± SD=1.53 ± 0.78	Mean: 0.18 SD: 0.38 Mean ± SD=0.18±0.38
Component 7 Day Time Dysfunction	Mean: 1.16 SD: 0.88 Mean ± SD=1.16± 0.88	Mean: 0.14 SD: 0.34 Mean ± SD=0.14 ± 0.34

Subjective Quality Sleep

Sleep quality in diabetic cases is in the range between difficult to very difficult sleep quality, whereas non-diabetic cases have no difficulty in sleep quality.

Sleep Latency

Diabetics are having sleep latency between difficult and very difficult, whereas non-diabetic cases are not facing any problems.

Sleep Duration

Sleep duration in diabetic cases is in very difficult range, which is opposite in the case of non-diabetics.

Habitual Sleep Efficiency

Non-diabetics have very good habitual sleep efficiency, whereas diabetic cases are facing problem (Based on the overall average).

Sleep Disturbances

Sleep disturbance is in mild-to-moderate difficulty in diabetics and non-diabetics.

Use of Sleeping Medication

Average, clearly shows that very few cases in both diabetics and non-diabetics use sleep medications.

Day Time Dysfunction

The average of daytime dysfunction is very high in diabetics in comparison to non-diabetics. With the average more than 1 (Difficult) compared to Non-Diabetics 0.14 (No difficulty).

PSQI Score	Count	Percentage
≤ 5	57	57.00%
> 5	43	43.00%
Grand Total	100	100.00%
<i>PSQI Global Scores among Cases</i>		

57% of diabetics scored < 5 which indicates good sleep and 43% scored > 5 which indicates poor sleep which is comparable to Maria et al study.¹¹

The range of Diabetics PSQI is from (1 - 10), whereas the range of Non-Diabetics PSQI is from (1 - 7).

The Sleep quality of Diabetics is poor compared to Non-diabetic patients.

P value is 0.000287 after performing the test. P value is less than 0.05 (p value < 0.05). Therefore, the study of sleep quality between Diabetics and Non-Diabetics is significant.

Diabetics Global PSQI Score		Non-Diabetic Global PSQI Score	
Mean	5.47	Mean	3.58
Standard Deviation	2.672172	Standard Deviation	1.334696
Range	12	Range	6
Minimum	1	Minimum	1
Maximum	13	Maximum	7

DISCUSSION

In diabetic patients 80% Hindus, 19% Christians and 1% Muslims, whereas in control group 86% Hindus, 12% Christians and 2% Muslims.

In diabetic patients 98% were married and 2% were unmarried, whereas in control group 82% were married and 8% were unmarried.

In diabetic patients 88% were educated and 12% were uneducated, whereas in control group 92% were educated and 8% were uneducated.

In diabetic patients 58% were unemployed, 40% were employed and 2% were retired, whereas in control group 56% were employed and 44% were unemployed.

72% of diabetic patients are residing in urban areas and 28% in rural areas, whereas 76% of control are residing in urban area and 24% in rural area.

54% of the diabetic patients hail from nuclear family and 46% from joint family, whereas 60% of controls hail from nuclear family and 40% from joint families. All the diabetic and non-diabetic patients belong to middle class. 74% of the diabetic patients are using oral medication and 26% of the cases are using injectables. 96% of the diabetic cases have diabetes under control and 4% are uncontrolled cases. In 4% of uncontrolled diabetic patients 96% of the cases are uncomplicated, 6% are cardiac complicated and 54% of diabetic patients had less than five years' duration of diabetes. 36% had 5 to 10 years of duration of diabetes. 4% had 10 to 15 years and 6% cases had above 15 years' duration of diabetes.

The mean global PSQI score for diabetics is 5.47 ± 2.67 , whereas for non-diabetics is 3.58 ± 1.33 .

The correlation between age and PSQI scores in diabetics is 0.3211, which indicates a positive correlation.

The correlation between age and PSQI scores in non-diabetics is 0.1989, which indicates a positive correlation.

Limitations

One limitation of this study was that sleep was subjectively assessed and no objective measures of sleep were obtained. Consequently, we are unable to ascertain the underlying causes of insomnia and sleep disturbances in this population. Another limitation is the cross-sectional design, which precludes us from establishing cause and effect in the associations examined.

CONCLUSION

The seven components of PSQI scored less for diabetics, which indicates that the sleep quality in diabetics is significantly lower in comparison to non-diabetic patients.

Age and PSQI scores in diabetic patients are positively correlated, which indicates that higher the age, lower the sleep quality.

Poor sleep quality in diabetics could be attributed to many factors including obstructive sleep apnoea, pain or discomfort, restless legs syndrome, the need to go to the bathroom and other problems associated with type 2 diabetes. It is necessary for primary health-care workers to include sleep related knowledge in diabetes self-management programs to improve sleep quality in diabetes patients.

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