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SLEEP QUALITY, QUALITY OF LIFE AND GLYCEMIC CONTROL: COMPARISON BETWEEN RURAL AND URBAN TYPE 2 DIABETIC PATIENTS

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ABSTRACT Type 2 Diabetes Mellitus is a pandemic causing enormous burden in terms of morbidity and mortality. Life style modification is the first step in the management of Diabetes. Sleep quality and other Quality of life(QoL) indices are often neglected. There is a vast difference in the life style of urban and rural population and may influence the course of Diabetes Mellitus and its management.Aim of the study was to (1). Examine sleep quality, QoL and glycemic control among rural and urban diabetic individuals. (2). Compare sleep quality, QoL and glycemic control between rural and urban diabetic individuals. In this study, 110 diabetic patients were grouped as rural and urban categories. Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI). WHOQOL-Bref was used to assessQoL. HbA1c was estimated using turbidimetry kit method. The mean HbA1c levels were 8.1± 2.6 in urban and 7.7 ± 1.7 among rural diabetics. Mean sleep score of the urban diabetics was 12.3 ± 6.7 and was 11.4 ± 4.8 in rural diabetics. QOL good scores were 68.3%, 76.7%, 86.7% and 76.7% among urban diabetics and 88%, 70%, 90% and 98% correspondingly in rural diabetics. This study concluded that the rural diabetic patients had better glycemic control. They had better sleep scores and QoL scores in all domains except social domain. The better glycemic control seen may be due to life style and environmental differences.

KEYWORDS : Sleep Quality, Quality Of Life, Glycemic Control

INTRODUCTION

Type 2 diabetes mellitus (T2DM) is an expanding pandemic causing morbidity, mortality and health system costs.[1,2] It is an escalating public health problem in India, associated with genetic susceptibility, dietary shift, and rapid lifestyle changes. There are about 336 million people with diabetes living in low- and middle-income countries.[3]These numbers are projected to increase to 101.2 million by 2030[4].

Aetiopathogenesis of T2DM is multifactorial involving both genetic and environmental factors. Life style and physical environment play a significant role in the development and course of T2DM. The impact of the disease on an individual is multidimensional. It imposes a significant burden in terms of physical and mental health as well as socioeconomic burden causing impaired quality of life (QoL).[5,6]The QoL is largely decreased in diabetic patients irrespective of the gender. Diabetic complications like nephropathy, vision loss, heart problems, erectile dysfunction, and peripheral neuropathies affect the QoL. In a cohort study, it was found that there was an improvement in the QoLespecially mentalQoL when there was a tight glycemic control.[7]Mere presence of diabetes can curtail the quantity and quality of any relationship, family life, and hindrance in traveling and increase in economic burden.[8]

Sleep is an important aspect, often neglected in routine evaluation of a diabetic patient in busy clinical practice. The duration of sleep was reported to show an association with glycemic control in T2DM.[9]Accumulating epidemiological studies have disclosed that difficulty with initiating or maintaining sleep is associated with significant increase in risk of T2DM.[10-12] This relationship formulates a catastrophic loop wherein those with diabetes experience decreased sleep quality, which may in turn lead to obesity and glucose intolerance, thus affecting the QoL significantly. The sleep disorder plays a prime role in the incidence and development of diabetes via neuro – endocrine metabolic pathway.[13]People suffering from a sleep disorder such as altered sleep quality or sleep duration, experience diminished insulin sensitivity and consequently, elevated blood glucose, exacerbating the progress of diabetes. On the flip side, sleep disorder can stimulate the hypothalamic–pituitary–adrenocortical system to release additional glucocorticoids. As an outcome, the glucose production increases, while the consumption decreases, affecting the glycemic control.[14]Further sleep problems leads to increase in circulating levels of leptin and ghrelin[15,16]which would increase appetite and caloric intake, facilitating the development of obesity[15]and hyperglycemia.In addition to these pathways, a decrease in brain glucose utilization after sleep deprivation might lead to an increase in the glycemic level.[17]Altered growth hormone metabolism have also been implicated in impaired glycemic control due to altered sleep quality.[18]Hence, good sleep quality is essential for maintaining an effective glycemic control and improving quality of life of patients with diabetes.

There has always been difference in the prevalence of T2DM between rural and urban areas.[19,20]A recent data shows that the age-standardized prevalence of total diabetes (diagnosed and formerly undiagnosed diabetes) ranges from 8-18% in urban India and 2.4-8% in rural India.[21]There are vast differences in various aspects like food availability, consumption, work life balance, social media exposure, physical work, stress and pollution levels between urban and rural population. With these differences in lifestyle and environment between the rural and urban areas, we would expect to have difference in Quality of life indices and sleep quality and consequently even in glycemic control between diabetic patients from rural and urban areas. Studies have been carried to determine the relationship between sleep quality and QoL in general population, but there is no comparative study done to assess impact of sleep quality and QoL on glycemic control between rural and urban diabetic subjects. In developing country like India, with majority being rural population, cost incurred by the diabetic patients for the treatment is increasing constantly; hence a holistic approach is required by including sleep and QoL as a part of awareness and management for achieving desirable glycemic control. With this background, this current study is to examine and compare the sleep quality, quality of life and glycemic control among urban and rural diabetic patients with type 2 diabetes.

OBJECTIVES

1. To examine sleep quality, quality of life and glycemic control among rural and urban diabetic individuals
2. To compare sleep quality, quality of life and glycemic control between rural and urban diabetic individuals.

MATERIALS AND METHODS

Study design and participants

This was a cross-sectional comparative study that was conducted over a period of two months (January to February 2020).The urban study participants were selected from urban the Tertiary care hospital and rural study participants were chosen from rural Primary healthcare

centers. The study was approved by the Institute Ethics and Research Committee before its implementation. Consent was taken. Subjects were between the age 35 – 65 years, and having type 2 diabetes mellitus for more than two years duration were included in our study. We excluded pregnant females, and patients suffering from any acute illness or any known psychiatric problem, patients on drugs affecting sleep or causing mood disturbances.

Sample collection

Universal safety precautions were taken while collecting the blood samples. Sterile disposable needle and vaccutainer was used for sample collection. Correct procedure was followed at every step such as site for venepuncture and pressure used to transfer into vaccutainer; to prevent occurrence of hemolysis. After obtaining written informed consent about 3ml of venous blood was drawn under aseptic precautions in EDTA container and processed accordingly.

Data collection procedure and instrument

a) Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI).[22]
b) Details regarding sociodemographics such as age, BMI, clinical profile, family history, and duration of diabetes were obtained from a self-predesigned patient's proforma and a questionnaire was administered to collect demographic details and WHOQOL-Bref with 26 questions in 4 domains to collect details on QOL.[23]

Determination of HbA1c by turbidimetry

HbA1c was estimated using a commercially available turbidimetry kit method, analysed in vitros 5600 OCD diagnostics auto analyzer. Whole blood, EDTA sample was collected

Statistical Analysis

The data was collected and entered in MS Excel. Statistical analysis was carried out using SPSS v.20. Descriptive statistics including frequency, percentage, mean and standard deviation were used to understand the sleep quality, Qol and diabetes control. If $p<0.05$, it is said to be statistically significant. QOL was calculated in four domains—physical, psychological, social relationships and environmental domain based on the WHO scoring system. Chi-square test was used to determine the factors associated with sleep and Qol.

TABLE – 1 Sociodemographic characteristics of Urban and Rural diabetic patients

Variable	Urban (n= 60)	%	Rural (n=50)	%
Age in years	50.5 ± 11.9		55.6 ± 9.5	
Males	25	41.7%	23	46%
Females	35	58.3%	27	54%
Married	38	63.3%	41	82%
Not married	22	36.7	9	18%

RESULTS

As per study criteria, 110 diabetic patients were included of which 50 belonged to rural, and 60 to urban population. The proportion of male population under study was 41.7% urban and 46% rural. The female population consisted of 58.3% urban and 54% rural subjects. A majority of the population under study was within the age group of 40-65 yrs (mean age urban: 50.52 ± 11.96 years, rural: 55.62 ± 9.59 yrs) [Table no.1].

The mean HbA1c levels in urban diabetics was 8.1± 2.6 and among rural diabetics, it was 7.7 ± 1.7. Amidst total diabetic participants of 110, 87 were found to have poor glycemic control and 23 had good glycemic control.

Mean sleep score of the urban population was 12.3 ± 6.7and correspondingly of rural population was found to be 11.4 ± 4.8. Amongst the urban population, 78% had bad sleep scores and 22% had good scores. Similarly, in the rural population, 56% had bad sleep scores and 44% had good sleep scores.A chi-square test of independence was performed to examine the relation between sleep quality among urban and rural population. The relation between these variables was significant, $X^2(1, N=110) = 6.7$, $p = 0.012$. [Table - 2]

Scores for quality of life were categorized under good scores and poor scores. The physical domain scores for the urban population were, 68.3% had good scores and 31.7% had poor scores. Similarly, among rural population, 88% had good scores and 12% had poor scores. In social domain, 76.7% of urban population had good scores whereas the remaining 23.3% had poor scores. The corresponding scores in the rural population were 70% and 30% respectively. Psychological domain scores for urban population were, 86.7% had good scores and 13.3% had poor scores and the corresponding scores for the rural population were 90% and 10% respectively. Urban population for environmental domain had 76.7% good scores and 23.3% poor scores, whereas, 98% good scores and 2% poor scores in the rural population. [Table - 3]

TABLE - 2 Comparison of sleep quality among urban and rural diabetic patients

population	PSQI sleep score Poor (%)	PSQI sleep score Not Poor (%)	X2, P value
URBAN (n=60)	47(78)	13(22)	6.7, 0.012*
RURAL(n=50)	28(56)	22(44)	

*Two-tailed $P<0.05$ was considered statistically significant.
Perceived sleep quality: Poor=global score for PSQI ≥5.
Perceived sleep quality: Not poor=global score for PSQI <5.
PSQI: Pittsburgh Sleep Quality Index

TABLE - 3 Quality of life scores among Urban Diabetic patients and Rural Diabetic patients

	URBAN DIABETIC PATIENTS		RURAL DIABETIC PATIENTS	
Variables	Good QoL	Poor QoL	Good QoL	Poor QoL
Physical domain	41(68.3%)	19(31.7%)	44(88%)	6(12%)
Social domain	46(76.7%)	14(23.3%)	35(70%)	15(30%)
Psychological relationship domain	52(86.7%)	8(13.3%)	45(90%)	5(10%)
Environmental domain	46(76.7%)	14(23.3%)	49(98%)	1(2%)

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