

IMPACT OF INSOMNIA ON GLYCEMIC CONTROL OF DIABETES MELLITUS TYPE 2 PATIENTS IN ALEXANDRIA, EGYPT

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Introduction

Type 2 diabetes (T2DM) constitutes 90% of global diabetes cases, determined by hereditary and environmental factors. Accelerated urbanization and socioeconomic transformations have raised its prevalence, with forecasts of over 500 million cases by 2030. In areas such as Africa and the Middle East, many cases remain undiagnosed owing to restricted healthcare access, inadequate screening, and low health awareness. Achieving effective glycemic control through diet, exercise, medication adherence, and management of comorbidities is essential for reducing complications and enhancing quality of life. Emerging evidence indicates that sleep disturbances, including insomnia and obstructive sleep apnoea (OSA), substantially affect glycemic management in people with T2DM. These disorders may impair glucose regulation by elevating insulin resistance, inflammation, and hormone imbalances. Comprehending the impact of sleep, especially insomnia, on glycemic control may reveal overlooked mechanisms and improve therapeutic approaches for diabetes management.

Aim of the work

This study aimed to identify the sleep disorders in type 2 diabetes mellitus patients and to assess the impact of insomnia in glycemic control amongst diabetes mellitus type 2 patients in Alexandria, Egypt.

Patients and Methods

This cross-sectional study was conducted at the outpatient clinics of Alexandria Main University hospital from September 2023 to September 2024. Data collected included demographic details, diabetes duration, lifestyle factors, comorbidities, complications and medications. Major sleep disorders were evaluated using standardized tools, including the Insomnia Severity Index (ISI), STOP-BANG questionnaire, Restless Legs Syndrome Rating Scale (RLSS) and the Pittsburgh Sleep Quality Index (PSQI). Univariate and multivariate statistical analyses were conducted to determine the relationship between insomnia and glycemic control (HbA1c $\geq 7\%$).

Results

Among 250 patients, 53% (134 patients) had mixed sleep disorders, 42% (105 patients) had Insomnia, 32% (80 patients) had Obstructive sleep apnea and 5.2% (13 patients) Restless leg syndrome.

Logistic regression analysis shows insomnia as a strong predictor of elevated HbA1c ($\geq 7\%$), with an odds ratio (OR) of 3.334 in multivariate analysis. While exercise and diet initially appeared protective, only diet remained significant in adjusted models. Obstructive sleep apnea (STOP-BANG) and poor sleep quality (PSQI) were significant in univariate but not multivariate

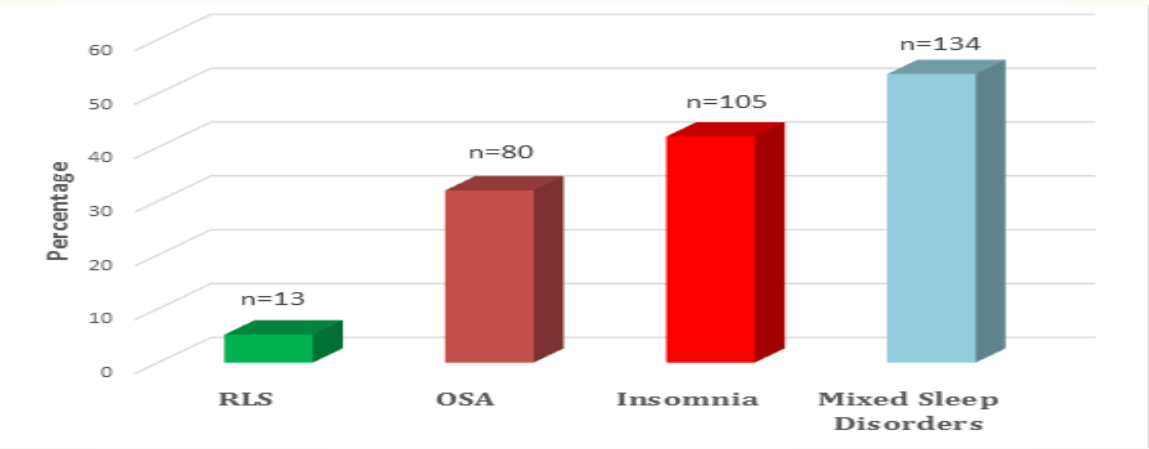


Figure (1): Distribution of sleep disorders among T2DM patients.

Table (1): Univariate and multivariate Logistic regression analysis for the parameters affecting HBA1C (≥ 7) (%) (n = 250)

	Univariate		#Multivariate	
	P	OR (LL – UL 95%C.I)	p	OR (LL – UL 95%C.I)
Age (years)	0.148	0.978 (0.949 – 1.008)		
DM (years)	0.250	1.021 (0.986 – 1.058)		
Insomnia	<0.001*	4.936 (2.523 – 9.656)	0.003*	3.334 (1.523 – 7.299)
Smoker	0.201	1.673 (0.760 – 3.682)		
Exercise	<0.001*	0.288 (0.146 – 0.565)	0.090	0.516 (0.240 – 1.110)
Diet	<0.001*	0.222 (0.123 – 0.400)	0.002*	0.348 (0.179 – 0.676)
BMI (kg/m ²) ≥ 30	0.776	1.084 (0.621 – 1.893)		
Stop bang risk ≥ 5	0.020*	2.195 (1.133 – 4.250)	0.882	1.064 (0.470 – 2.411)
PSQI ≥ 5	<0.001*	3.237 (1.762 – 5.946)	0.903	1.104 (0.224 – 5.435)
RLS ≥ 0	0.767	0.832 (0.248 – 2.797)		
Sleep disorders (combined)	<0.001*	3.554 (1.879 – 6.722)	0.708	1.384 (0.253 – 7.572)
Hypertension	0.631	1.153 (0.645 – 2.062)		
Dyslipidemia	0.769	1.089 (0.617 – 1.922)		
Ischemic Heart Disease	0.059	3.291 (0.958 – 11.310)		

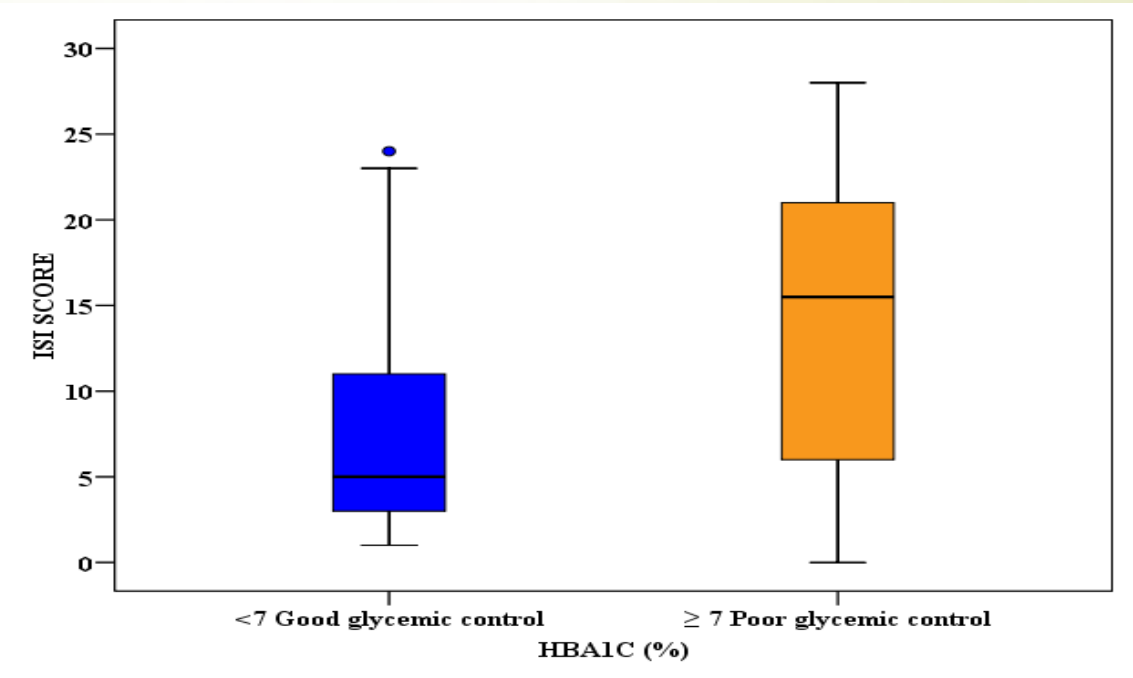


Figure (2): ISI scores according to HbA1c category of poor versus good glycemic control

Conclusion

Insomnia significantly impacts glycemic control in T2DM patients, with higher insomnia severity associated with elevated HbA1c levels, even after adjusting for confounders. This suggests that addressing insomnia could be an essential part of glycemic control strategies for T2DM patients. Moreover, lifestyle factors like diet and exercise showed protective effects, although other sleep disturbances showed limited influence on glycemic outcomes.