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Clinical, Socio-demographic and Psychosocial Determinants of Glycemic Control among Patients with Type 2 Diabetes Mellitus: A Hospital Based Cross Sectional Study at Bagalkot

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Abstract	Original Research Article

Background: Diabetes mellitus (DM) is a rapidly growing public health crisis globally with a huge burden of disease. Despite of its global attention and efforts by the healthcare community, its incidence and prevalence continues to rise. Gycemic control in Type 2 diabetic patients is affected by multiple variables including the distress as its major predictor. *Aims:* To evaluate the clinical, socio-demographic and psychosocial determinants of Glycemic Control among patients with Type 2 Diabetes Mellitus. *Study Design and Settings:* This was a cross sectional study conducted included a sample of 150 patients with Type 2 Diabetes Mellitus attending Medical OPD of HagalshriKumarehswar Hospital and Research Centre, Bagalkote. *Materials and Methods:* Data were collected using self report method and Patient's Medical records. Tools used for data collection were; socio-demographic and clinical profile and diabetic distress scale. Multiple linear regression analysis was performed to find the significant predictors of glycemic control. *Results:* Findings revealed a significant regression equation [$F_{22,149} = 9.418$, $R^2 = 0.60$, $P < 0.023$] when all the variables are considered together for finding the significant predictors of the glycemic control. Diabetic Distress [$t = 1.747$, $P < 0.05$] has positively predicted the glycemic control while Duration of diabetes [$t = -2.286$, $P < 0.05$] has negatively predicted the glycemic control of patients with type 2 Diabetes mellitus. *Conclusions:* Distress is the major predictor of glycemic control among patients with Type 2 diabetic mellitus. Interventions as well as customized management strategies are required to ensure effective management of distress to achieve optimal glycemic control to prevent long-term complications of diabetes mellitus.
Keywords: Clinical, Socio-demographic and Psychosocial determinants, Glycemic Control, Patients with Type 2 Diabetes Mellitus.

INTRODUCTION

Diabetes mellitus (DM) is a rapidly growing public health crisis globally with a huge burden of disease [1]. It is a prevalent metabolic disorder characterized by a deficiency in the secretion of insulin or in its effect or both [2]. In 2019, it was estimated that 463 million individuals are suffering from diabetes, and it is expected to rise to 578 million patients by 2030 and 700 million by 2045 [3]. Type 2 diabetes mellitus (T2DM) is characterized by the failure of beta-pancreatic cells and peripheral insulin resistance [4]. T2DM represents 90%-95% of the overall diabetic cases and despite its global attention and efforts by the healthcare community, its incidence and prevalence continue to rise [5]. New methods of assessing glycemic control are under evaluation nowadays.

For the management of all diabetic patients, the key therapeutic goal is to maintain good glycemic control (GC) in order to prevent macro and microvascular complications [1]. GC is the optimal blood sugar level in a DM patient [6]. Glycemic control in T2DM patients can be evaluated using three parameters: glycosylated haemoglobin (HbA1c), fasting blood glucose (FBG), and

postprandial glucose (P PG). Among these, glycosylated haemoglobin is the gold standard for the estimation of glycemic control [7]. The American Diabetes Association (ADA) defines good diabetic control at a cutoff of glycated haemoglobin (Hb1Ac) 7%, whereas the American College of Endocrinologists set it at 6.5%. Regarding fasting blood glucose, the recommended range is 70-130mg/dL (3.9-7.2mmol/l) as set by ADA, whereas the American College of Endocrinologists and the International Diabetes Federation set it at less than 110 mg/dL (6.1 mmol/l) and 100 mg/dl (5.5 mmol/l), respectively [8].

Assessing diabetic distress and its predictors is useful for documenting the patients' perceived burden of chronic disease, tracking changes in health over time, assessing the effects of treatment. Considering the fact that many socio-demographic, clinical variables and psychosocial variables especially diabetic distress influence the glycemic control of patients with type 2 Diabetes mellitus, the present study aims at assessing the diabetic distress and other factors influencing the glycemic control among patients with type 2 Diabetes mellitus attending the Medical OPD of at HSK Hospital, Bagalkot.

MATERIAL AND METHODS

Study Design and Participants
Present study was a descriptive cross-sectional study conducted between July 2024 to Aug 2024. A convenient sample of 150 people living with type 2 diabetes mellitus coming for follow up counseling at Medical OPD of HSK Bagalkot were selected for the study. Patients with type 2 Diabetes mellitus who were above 18 years of age and willing to participate were included in the study.

Instruments
Socio-demographic and Clinical Profile
Socio - demographic Determinants: Age, Gender, Religion, Occupation, Educational status, Monthly income of family, Current Marital Status, Type of family, Area of Residence.

Clinical variables: Duration of Diabetes Mellitus, BMI, Fasting blood sugar, Post Prandial blood sugar, smoking,

alcohol, medication adherence, physical activity, regular monitoring of blood glucose, diet control, other co-morbidity, treatment pattern.

Diabetes Distress Scale: It is a 17 item scale and responses were recorded on 6 point Likert Scale. The score ranges between 17 to 102.

Glycemic Control: Glycemic Control has been considered in terms of Glycated Hemoglobin (HbA1c). i.e. Non Diabetic Less than 6%, Good Control: 6 – 7 %, Fair Control: 7 – 8 % and Poor Control: more than 8%. Glycated Hemoglobin (HbA1c) was obtained from patient's medical records.

Data Collection Procedures
Prior permissions were taken from relevant institutions before the beginning of data collection procedure. The study participants were indentified during the study period at Medical OPD of Hanagal Shri Kumareshwar Hospital and Research Centre, Bagalkote. Every Type 2 diabetic patient who fulfilled the inclusion criteria was approached for data collection. Consent was obtained by the interviewers before participants underwent the structured interview which lasted approximately for 15 to 20 minutes. All the information collected was based on patient's self report, but the information related to HbA1c, FBS, PPBS, treatment pattern were obtained from the medical records. Patients height and weight were also recorded for calculating the BMI.

Data Analysis
Data analyses were performed using SPSS v25.Descriptive univariate statistics such as frequencies and percentages were used for categorical variables and means (M) and standard deviations (SD) were used for continuous variables. Multiple regression model was used to find the significant predictors of glycemic control in terms of HbA1c. All significance levels reported are two-sided.

Descriptive analyses of sample characteristics
Table 1 shows the characteristics of patients with type2 diabetic mellitus. The mean total HbA1c score was 7.640(SD = 5.47).

Table 1: Mean and SD of continuous socio-demographic, clinical and psychosocial determinant (Diabetes Distress)

Sl. No.	Variables	Mean	SD
1	Age (Years)	43.56	13.007
2	Family monthly income	16480.00	19319.89
3	Duration of diabetes mellitus	2.73	1.375
4	BMI	23.35	5.97
5	Fasting blood sugar	146.03	146.03
6	Post prandial blood sugar	194.23	57.46
7	HbA1c	7.640	5.47
8	Diabetic distress	34.83	6.765

Table 2: Description of Categorical Sample Characteristics

Sl. No.	Variables	Percentage (%)
1.	**Sex**	
	Male	56.7
	Female	43.3
2	**Religion**	
	Hindu	87
	Muslim	13
3	**Education**	
	Illiterate	54.7
	Upto 10th std	19.3
	PUC	19.3
	Degree and above	19.3
4	**Occupation**	
	Unemployed	14.0
	Employed	7.3
	Self employed	18.0
	Agriculture	20.0
	Coolie	40.7
5	**Type of family**	
	Joint	28.0
	Nuclear	72.0
6	**Smoking**	
	Yes	14%
	No	86%
7	**Area of residence**	
	Rural	62.0
	Urban	38.0
8	**Medication Adherence**	
	Highly adherent	22.0
	Partially adherent	44.7
	No adherence	33.3
9	**Diet control**	
	Poor	21.3
	Moderate	57.3
	Good	21.3
10	**Treatment pattern**	
	Monotherapy	25.3
	Combination of oral hypoglycemics	38.7
	Combination of oral hypoglycemics and insulin	36.0
11	**Alcohol**	
	Yes	13.4
	No	86.6
12	**Physical activity**	
	Yes	14%
	No	86%
13	**Regular monitoring of blood glucose level**	
	Yes	25.3
	No	74.7
14	**Other co - morbidity**	
	Yes	25.3
	No	74.7

Multiple linear regression analysis

The Multiple Linear Regression carried out to find the determinants of glycemic control among patient with type 2 diabetes mellitus revealed a significant regression equation [$F_{22,149} = 9.418$, $R^2 = 0.60$, $P < 0.023$].

Diabetic Distress [$t = 1.747$, $P < 0.05$] has positively predicted glycemic control and duration of diabetes [$t = -2.286$, $P < 0.05$] has negatively predicted the glycemic control of patients with type 2 Diabetes mellitus (table.

Table 3: Multiple Linear Regression analysis to find the determinants (Predictors) of Glycemic Control. N=150

Sl no	Determinants (Predictors)	Standardized Coefficients (β)	t value	P value
1	Age	0.023	0.221	0.826
2	Sex	0.060	0.610	0.543
3	Religion	-0.066	-0.727	0.468
4	Education	0.136	1.345	0.181
5	Occupation	-0.063	-0.642	0.522
6	Family Monthly Income	0.011	0.123	0.902
7	Marital Status	-0.073	-0.778	0.438
8	Type of Family	0.058	0.605	0.546
9	Area of Residence	-0.013	-0.142	0.887
10	**Duration of Diabetes**	**-0.210**	**-2.286**	**0.024**[*]
11	BMI	-0.051	-0.561	0.576
12	Fasting Blood Sugar	0.021	0.153	0.878
13	Post Prandial Blood Sugar	-0.060	-0.448	0.655
14	Smoking	-0.266	-1.906	0.059
15	Alcohol	-0.037	-0.289	0.773
16	Medication Adherence	-0.027	-0.253	0.801
17	Physical Activity	0.034	0.373	0.710
18	Regular Monitoring of Blood Glucose	0.060	0.615	0.540
19	Diet Control	-0.061	-0.636	0.526
20	Other Co Morbidity	0.174	1.581	0.116
21	Treatment Pattern	0.002	0.026	0.979
22	**Diabetic Distress**	**0.199**	**1.747**	**0.033**[*]
Regression Equation: $F_{22, 149}=9.418$, $R^2=0.60$, $P=0.023$				

*P<0.05

DISCUSSION

This hospital based cross sectional study included a sample of 150 type 2 diabetic patients attending the Medical OPD of Hanagal Shri Kumareshwar Hospital and Research Centre, Bagalkot to assess their glycemic control and its predictors.

In this present study, the mean age of diabetic patients was 40.42 ±11.228, the mean family monthly income was 16480.00±19319.89, the mean duration of diabetes mellitus was 2.731±375, the mean BMI of diabetic patients was 23.53±5.97, the mean fasting blood sugar of diabetic patients was 146.03 ±146.03, the mean Post prandial blood sugar of diabetic patients was 194.234±57.46, the mean HBA1c of diabetic patients was 7.640±5.47.

Findings of present study are consistent and supported with the study conducted by **Kassahun T et al.,** (2016) at Ethiopia where the mean age of type 2 diabetic patients was 48.9±5.6 [9].

In this current study, mean of diabetic distress score of diabetic patients was 34.83±6.765.

Findings of present study are consistent and supported with the study conducted by **Aljuaid MO et al.,** (2018) at Saudi Arabia, where the mean of diabetes distress score was 38.25±5.78 [10].

It was found that patients with uncontrolled HbA1c had a higher diabetes distress scores [11]. This study is consistent with a previous systematic review which showed high prevalence of diabetes distress among type 2 diabetic patients and positive predicted glycemic control [t= 1.747, P<0.05].

A study conducted by **Ghouse J et al., (2020)** [12] found that the effect of mean HbA1c on all-cause mortality depended on the duration of diabetes (P for interaction <.001). For individuals with short diabetes duration (<5 years), the risk of death increased with poorer glycaemic control (increasing HbA1c), whereas for individuals with longstanding diabetes (≥5 years), we found a J-shaped association, where a mean HbA1c level between 6.5% and 7.9% [48 and 63 mmol/mol] was associated with the lowest risk of death. In the present study also, we found the negative correlation between HbA1c and Duration of Diabetes i.e longer the duration of diabetes more optimal will be the glycemic control [t= -2.286, P<0.05].

CONCLUSIONS

In conclusion, proper interventions for controlling glycemic level behaviors are necessary to improve proper self-care behaviors in patients who have a low knowledge level of T2DM. Efforts should be made for comprehensive management of diabetes distress. Interventions can be developed and tested for their effectiveness in reducing the diabetes distress among the

type 2 diabetes mellitus patients to the optimal glycemic control.

Ethical Consideration

Ethical clearance certificate was obtained from Institutional Ethical Clearance Committee of B.V.V.S Sajjalashree Institute of Nursing Sciences, Bagalkot.

Conflict of Interest: Nil

Source of Funding: Nil

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