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Original Article

Study of Factors Affecting Glycemic Control among Patients with Type 2 Diabetes on Follow up Care At A Tertiary Care Hospital

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ABSTRACT

Background: Diabetes is a non communicable disease and today the world is experiencing a silent pandemic. Its complications negatively impact the patient's quality of life, caregivers and society. Evidence based medicine suggests good Glycaemic control is required to restrict the complications of diabetes. Many factors play a significant role in poor glycaemic control. This study aims to identify the factors affecting glycemic control in patients with type 2 diabetes.
Methods: A prospective observational study was conducted on 175 patients with diabetes mellitus having HbA1c more than 7g% from April 2022 to September 2022. A pre-tested, semi-structured questionnaire was used to collect the socio-demographic details, history and reasons for not taking insulin after obtaining informed consent.
Results: 56% were between 41-60 years. The mean Hba1c was 11.3% with no significant differences between genders, socio-economic status and place of residence. 82.9% did not take insulin due to a patient related factor. Fear of injection being the most important (37.7%) which was seen more in male (32%) than females (23%). 13.1 % were not advised by their doctor.
Conclusion: Proper adherence to treatment plays a pivotal role in preventing complications. Patient factors which are major cause of non adherence to insulin usage and doctors inertia to advice insulin therapy at appropriate time, need to be addressed. Patients and caregivers have to be counselled on the need for insulin therapy in management of the condition and preventing complications.

Key Words: *Glycemic control, Type 2 Diabetes, HbA1c, Insulin therapy, Fear of injection*

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INTRODUCTION

Diabetes mellitus refers to a grouping of metabolic diseases involving prolonged hyperglycemia caused by the inadequate secretion of insulin, poor insulin action, or a combination of the two [1]. A chronic condition impacting 366 million people worldwide, diabetes is expected to afflict 552 million people by 2030 [2]. It has a number of long-term consequences that have a poor impact on people's quality of life and may shorten their lives, which has detrimental implications on both people and societies [3]. Nephropathy, neuropathy, and retinopathy are examples of microvascular consequences of diabetes; macrovascular problems include (cardiovascular and cerebrovascular disease) [4].

By enhancing glucose control and reducing the risk of cardiovascular disease, diabetes treatment primarily tries to postpone the onset of disease consequences and to slow down the illness's progression [5, 6]. Previous studies have provided evidence of the power of good glycemic control to restrict the microvascular and macrovascular complications of diabetes [6-8]. Despite that, between 40% and 60% of patients worldwide still have poorly controlled diabetes [9-13].

Achieving optimal glycemic control may not be an easy task. It depends on the type of treatment, patients adherence to medication and comorbidities. Likewise, risk factors, obesity, biological and psychosocial factor are responsible for differences in glycemic control. Limited data are currently available that evaluate the relationship of glycemic control with lifestyle, clinical characteristics, and treatment pattern. Hence, the primary purpose of this study was to identify factors influencing glycemic control status in T2D patients.

Insulin is usually initiated in a single dose of long acting insulin (0.1-0.4U/kg per day) given in the evening or just before bed time has less nocturnal hypoglycaemia than NPH insulin. The insulin dose may then adjusted in 10-20% increments as dictated by SMBG results. Initially basal insulin may be sufficient, but often prandial insulin coverage with

multiple injections is needed as diabetes progresses. Other insulin formulations that have a combination of short acting and long acting insulin are sometimes used in patients with type2 DM because of convenience but do not allow independent adjustment of short acting and long acting insulin dose and often do not achieve the same degree of glycemic control as basal/bolus regimens.

MATERIALS AND METHODS

A prospective observational study was conducted on 175 patients with diabetes mellitus having HbA1c more than 7g% from april2022to sept 2022. Clearance was taken from the institutional ethical committee and written informed consent was taken from the study participants. Patients with diabetes mellitus were included in the study by purposive sampling technique. A pre-tested, semi-structured questionnaire was used to collect the socio-demographic details, history of diabetes and reasons for not taking insulin by interview method.

RESULTS

TABLE 1: SOCIO-DEMOGRAPHIC CHARACTERISTICS

SOCIO-DEMOGRAPHIC CHARACTERISTICS		FREQUENCY	PERCENTAGE
AGE	**30-40 YEARS**	4	2.3
	41-60 YEARS	98	56.0
	>60 YEARS	73	41.7
	MEAN±SD	57.64±7.401	
GENDER	**MALE**	104	59.4
	FEMALE	71	40.6
RESIDENCE	**RURAL**	50	28.6
	URBAN	125	71.4
SOCIO-ECONOMIC CLASS	**UPPER**	38	21.7
	MIDDLE	108	61.7
	POOR	29	16.6
EDUCATION	**ILLITERATE**	13	7.4
	10TH STD	95	54.3
	PROFESSIONAL	67	38.3
FOLLOW-UP SECTOR	**GOVT**	97	55.4
	PRIVATE	78	44.6

Majority of the study participants belonged to the age group 41-60 years (56%) of age. The mean age of the study participants was found to be 57.64±7.401.Majority of the study participants were males (59.4%) with females contributing to 40.6% of study population. 71.4% of the study participants were residing in urban areas. 61.7% of the study participants belonged to middle socio-economic class. 7.4% of the study participants were illiterates with 54.3% having completed 10^{th} standard. 55.4% of the study participants were taking treatment/follow-up from government sectors.

TABLE 2: CO-MORBIDITY PROFILE

CO-MORBIDITY PROFILE		FREQUENCY	PERCENTAGE
CO-MORBIDITIES	**YES**	88	50.3
	NO	87	49.7
HYPERTENSION	**YES**	83	47.4
	NO	92	52.6
THYROID DISORDER	**YES**	13	7.4
	NO	162	92.6

50.3% of the study participants had comorbidities. 47.4% of the study participants had hypertension and 7.4% of the study participants had thyroid disorders.

TABLE 3: DURATION OF DIABETES:

DIABETES MELLITUS DURATION	
Mean	**Std. Deviation**
8.27	2.386

The mean duration of diabetes of the study participants was found to be 8.27±2.386.

TABLE 4: GLYCAEMIC INDICES:

GLYCAEMIC INDICES	Mean	Std. Deviation
FBS	265.20	45.990
PPBS	360.63	49.089
HBA1C	11.317	1.5132

The mean FBS, PPBS and Hba1c of the study participants was found to be 265.20±45.990, 360.63±49.089 and 11.317±1.5132 respectively.

TABLE 5: DIABETIC COMPLICATIONS:

DIABETIC COMPLICATIONS		FREQUENCY	PERCENTAGE
DIABETIC NEUROPATHY	**YES**	80	45.7
	NO	95	54.3
DIABETIC RETINOPATHY	**YES**	27	15.4
	NO	148	84.6
DIABETIC NEPHROPATHY	**YES**	33	18.9
	NO	142	81.1
CAD	**YES**	22	12.6
	NO	153	87.4
PVD	**YES**	13	7.4
	NO	162	92.6
CVA	**YES**	13	7.4
	NO	162	92.6
OTHERS	**YES**	11	6.4
	NO	164	93.7

45.7% of the study participants had diabetic neuropathy, 15.4% of the study had diabetic retinopathy. 18.9% of the study had diabetic nephropathy. CAD, PVD, CVA were found in 12.6%, 7.4% and 7.4% of the study participants respectively.

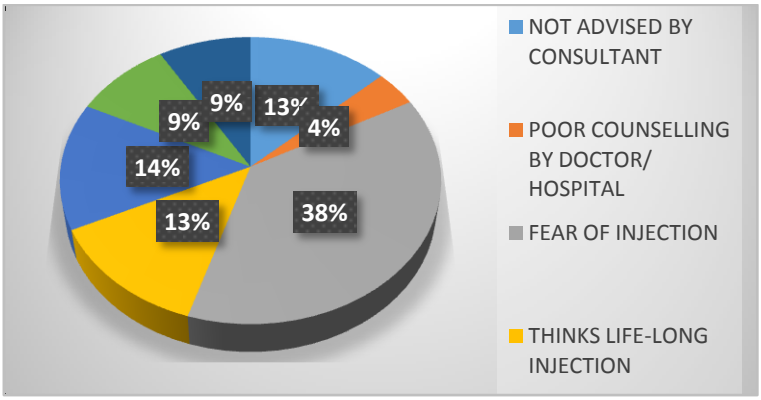

Figure1: REASON FOR NOT ON RX WITH INSULIN:

17.1% of the study participants did not take insulin because of doctor factor and 82.9% of the study participants did not take insulin because of patient factor. The most common reason for not taking insulin was found to be a patient factor pertaining to fear of injection in 37.7% followed by fear of weight gain in 14.3% of the study participants. 13.1% of the study participants were not advised by the consultant to take insulin.

DISCUSSION

Glycemic control is the major therapeutic goal for prevention of organ damage and related complication of diabetes. The American Diabetes Association recommends an HbA1c level of below 7% as a target for optimal blood glucose control [14]. Poor glycaemic control in Type 2 diabetes has been described as "a conspiracy of disease, suboptimal therapy and attitude" [15], whereby poor glycaemic control may be attributable to a number of factors, including disease progression, insulin avoidance and side effects of therapy (particularly hypoglycaemia and weight gain) and therapeutic inertia on the part of clinicians.

In the present study, Majority of the study participants belonged to the age group 41-60 years (56%) of age. The mean age of the study participants was found to be 57.64±7.401. In a study done by Demoz GT et al [16], The mean (± SD) age of the study participants was 56 ± 11 years. In a study done by Li J et al [17], 45.4% of the study participants belonged to the age group >60 years with a mean age of 54.1 years. In a study done by Alzaheb RA et al [18], 65.7% of the study participants were aged 30–49 years.

In the present study, Majority of the study participants were males (59.4%) with females contributing to 40.6% of study population. In a study done by Demoz GT et al [16], 52.9% of the participants were females. In a study done by Li J et al [17], 55% of the study participants with poor glycaemic control were found to be males. In a study done by Alzaheb RA et al [18], 52.7% of the participants were male.

In the present study, 71.4% of the study participants were residing in urban areas. In a study done by Li J et al [17], 59.0% of the study participants were residing in urban areas. In a study done by Alzaheb RA et al [18], 73.0% lived in an urban area.

In the present study, 61.7% of the study participants belonged to middle socio-economic class. 7.4% of the study participants were illiterates with 54.3% having completed 10^{th} standard; 55.4% of the study participants were taking treatment/follow-up from government sectors. In a study done by Li J et al [17], 44.4% of the study participants had studied between class 7^{th} to 12^{th}. In a study done by Alzaheb RA et al [18], 395 (93.4%) had completed at least primary or higher education; In a study done by Alzaheb RA et al [18], 189 (44.7%) earned a middle-level income;

In the present study, 50.3% of the study participants had comorbidities. 47.4% of the study participants had hypertension and 7.4% of the study participants had thyroid disorders. In a study done by Demoz GT et al [16], Comorbidities were present in 77.9% of the study participants. The most common comorbidity was hypertension in 65.5% of the study participants. In a study done by Li J et al [17], 60.9% of the study participants had hypertension. In a study done by Alzaheb RA et al [18], 77.4% of the study participants had comorbidities.

In the present study, the mean duration of diabetes of the study participants was found to be 8.27±2.386. In a study done by Demoz GT et al [16], The mean duration of the diabetes disease since diagnosis was 11.64 ± 6.95 years. In a study done by Li J et al [17], 69.8% of the study participants had duration of diabetes more than 4 years. In a study done by Alzaheb RA et al [18], 85.0% of the study participants had duration of diabetes more than 10 years.

In the present study, the mean FBS, PPBS and Hba1c of the study participants was found to be 265.20±45.990, 360.63±49.089 and 11.317±1.5132 respectively. In a study done by Demoz GT et al [16], The mean of FBG level for the last three consecutive visits was 174.1 ± 48.9 mg/dL.

In the present study, 45.7% of the study participants had diabetic neuropathy, 15.4% of the study had diabetic retinopathy. 18.9% of the study had diabetic nephropathy. CAD, PVD, CVA were found in 12.6%, 7.4% and 7.4% of the study participants respectively. In a study done by Demoz GT et al [16], 60.2% of the study participants had developed at least one chronic diabetes complications. diabetic neuropathy was the most (46.8%) commonly reported diabetes complications [16].

In the present study, 17.1% of the study participants did not take insulin because of doctor factor and 82.9% of the study participants did not take insulin because of patient factor. The most common reason for not taking insulin was found to be a patient factor pertaining to fear of injection in 37.7% followed by fear of weight gain in 14.3% of the study participants. 13.1% of the study participants were not advised by the consultant to take insulin.

A study done by Khan H et al [19] described poor patient engagement and lack of knowledge as being important in poor glycaemic control. This has been described as “neglect of self-care” in a study of 213 Finnish patients on insulin [20]. The authors describe the fifth of patients who neglected self-care (as determined by questionnaire), had much poorer metabolic control. Similar results were seen in a study of 917 Jordanian patients with Type 2 diabetes, showing that longer duration of diabetes, poor diet, negative attitudes towards diabetes and increased barriers to adherence scale scores were significantly associated with poor control [21]. Lack of engagement may also be demonstrated by frequent non-attendance. This has been previously shown to contribute to poor glycaemic control amongst 84,040 members of the Kaiser Permanente Northern California Diabetes Registry [22]. Patients who missed >30% of diabetic review appointments had HbA1c 0.7–0.79% (15–16 mmol/mol) higher than those who missed less than 30%.

CONCLUSION

Our study demonstrates that the patient factors are more when it comes to the reason of not taking insulin. The causes of poor glycaemic control are typically complicated and multifactorial. Focusing on these causes and collaborating with patients can result in appreciable improvements in glycaemic control. Although care planning

theoretically focuses more on the patient, there are currently no randomised studies that indicate it has an effect on enhancing glycemic control. It is impossible to determine whether similar improvements in control would have been observed with a standard strategy because our study was not intended to examine the approach in comparison to a conventional approach.

It has been noted that the non adherence to insulin treatment and refusal to insulin have plenty of reasons. Patients are often inadequately educated regarding the disease process and need for insulin therapy. Doctors are also at fault in not educating the patients/relatives and not informing them regarding insulin in the beginning of patients treatment.

Hence its better to see these diabetic patients in a separate atmosphere like diabetic clinics with diabetic educators/counsellors. Education coupled with demonstration go a long way for good adherence to insulin treatment.

Glucose monitoring and dose adjustments should be informed to all patients. Patients E-diary and communication with the family physicians/diabetic educator during emergency will help boost patients confidence. Finally early insulinization and good adherence will help the individual patient to have normal or near normal glycemic control.

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