

Factors Leading to Psychological Insulin Resistance Among Patients with Type 2 Diabetes Mellitus

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ABSTRACT

Background Diabetes mellitus has become a global epidemic and it is needed to timely prevent, diagnose and manage it with oral hypoglycemic drugs and start insulin at right time to prevent complications. Reluctance to initiate or intensify the insulin therapy both in patients and physicians is called psychological insulin resistance (PIR) which is present in significant number of patients.

Study design: Descriptive Cross-sectional Study

Place & duration: Aziz Bhatti Shaheed Teaching Hospital Gujrat from Jan 2017 to June 2017

Methodology: 400 diabetic patients were included in study and a study questionnaire was asked from patients and psychological insulin resistance and factors leading to it were evaluated. Data analysis was done by SPSS 20.0

Results: Out of 400 patients 50% were male and 50% were female. Mean age was 47.10 + 11.34 years, mean duration of DM 4.88 + 4.49 years mean HBA1C was 10.92 + 1.12%. Most of the patients were less education and belonged to rural areas. PIR was present in 51.25% patients and majors factors leading to it included loss of autonomy(95.25%), lack of clarity(64%), self-injection(47.75%), stigmatization(44%), fear of hypoglycemia(43.75%), misdirection from community(42%), cultural unacceptability(38%), social phobia(38%), lack of knowledge of benefits of glycemic control(40.5%), restriction in lifestyle(35.75%), pain of injection(35.5%), uncertainty about treatment benefit(32%), objection to lifelong treatment(28.25%), non-compliance(22%), restriction in diet(21.75%) and misdirection from media(20.25%)

Conclusion: Psychological insulin resistance is present in more than half of patients with type 2 diabetes mellitus due to multiple factors attributable to patients.

Keywords: PIR, Insulin resistance, Diabetes

Introduction

Diabetes mellitus has become a global epidemic. The worldwide prevalence of diabetes mellitus was 108 million in 1980 which has increased to 422 million in 2014. In adults over 18 years, the global prevalence of diabetes was 4.7% in 1980 which has increased to 8.5% in 2014 and it is rising more rapidly in middle and low-income countries. Diabetes is a major cause of microvascular and macrovascular complications such as diabetic retinopathy and blindness, chronic renal failure, myocardial infarction, stroke and lower limb amputation due to diabetic foot. In 2012, it was estimated that 1.5 million deaths were directly

caused by diabetes and almost other 2.2 million deaths were due to high blood glucose. Approximately half of the deaths due to high blood glucose occurred in patients less than 70 years of age.¹ World Health Organization estimates a project that diabetes will be the 7th leading cause of death till 2030.²

In patients with type 2 diabetes, intensive blood glucose control by insulin and oral hypoglycemic drugs significantly decrease the risk of microvascular complications as depicted by UKPDS trial.³ As type 2 diabetes mellitus is associated with a progressive decline in

pancreatic beta cell function which increases the demand for insulin as disease progress; insulin is required to achieve good control.⁴ Therefore it is needed to timely prevent, diagnose and manage type 2 diabetes. The recommended management of diabetes mellitus include a trial of diet and exercise but if normal glycemic control is not achieved; pharmacological intervention is required. Initiating basal insulin is most effective in lowering blood glucose after oral anti-diabetic agent failure.⁵

Resistance in initiating insulin therapy at the optimal time in type 2 diabetes patients have been subject to research and is considered as an important barrier to achieve recommended levels of blood glucose control.^{6,7} This reluctance to initiate or intensify the insulin therapy both inpatients and physicians has been termed as psychological insulin resistance (PIR).^[8] According to DAWN study, it was found that more than half of all type 2 diabetes not using insulin worry about having to start insulin therapy and considered that starting insulin meant they have not taken their medication properly.⁹

In a local study conducted in Pakistan, PIR was found to be present in 53.29% patients and fear of injection or needle phobia was found to be the commonest factor (24.62%) followed by fear of side effects of insulin (18.87%). Other factors that contributed to PIR included perceptions of fears, difficult and lifelong application, cost, storage issues, last resort of treatment, misdirection from quacks and patient's reluctance.¹⁰ In a study conducted in Malaysia, 51% of patients with type 2 diabetes were found to have PIR.¹¹

PIR is common in insulin-naive patients with type 2 diabetes and contributes to unnecessarily long delays for initiating insulin of insulin therapy as a result extending the duration of hyperglycemia.⁸ It is necessary to quantify the problem and address the patient worries and attitude towards insulin therapy as most of the patients in our country have poor knowledge regarding diabetes mellitus. Thus, the purpose of this study is to determine the frequency of PIR and factors contributing to its presence.

Methodology

This descriptive cross-sectional study was conducted at Liver and Diabetes Clinic, Aziz Bhatti Shaheed Teaching Hospital Gujrat from February 2017 to June 2017 and those patients who had type 2 diabetes mellitus who had poor glycemic control on two oral anti-diabetic drugs, had HbA1C > 9%, were insulin naive and having no disability in injection use were included in study. Patients were interviewed after the informed consent and approval of an ethical committee of the hospital. The sample size was calculated with 95% confidence interval and 5% margin of error using 53.29% as the prevalence of PIR.¹² 400 patients who met the inclusion criteria were included in the study.

The study instrument was a questionnaire which had closed-ended dichotomous questions and were asked from patient by the treating doctor. The age, gender, education, socioeconomic status, residence and duration of diabetes were enquired from patients and noted. Education was described from illiterate, primary, middle and onwards. Those patients having monthly income <PKR 15000 were considered poor, those between PKR 15000-50000 were considered satisfactory and those >PKR 50000 were considered to have the good socioeconomic background. The HbA1C levels were done for each patient and noted. The patients were advised for insulin therapy for glycemic control and their responses were noted according to the questionnaire. Patients views about the problems regarding the use of insulin therapy, their knowledge of diabetes and effect of social factors was asked.

Patients were divided into two groups; those having psychological insulin resistance were designated as group A and those without PIR were designated as Group B. All variables were compared in two groups. Statistical analysis was done using SPSS version 20.0. Means and standard deviations (SDs) were reported for continuous variables and proportions for categorical variables. Chi-square test was applied to evaluate the association of both groups with factors leading to PIR and a p-value of <0.05 was considered significant.

Results

Out of 400 patients included in the study, 200(50%) were male and 200(50%) were female in both groups. Mean Age of patients was 47.10 ± 11.34 years and mean duration of diabetes mellitus was 4.88 ± 4.49 years. 208(52%) never went to any school, 8(2%) had education till primary, 40(10%) till middle, 64(16%) till matriculation, 8(2%) till intermediate, 64(16%) had bachelors degree and 8(2%) had masters levels education. 152(38%) belonged to poor, 232(58%) to satisfactory and 16(4%) to good socioeconomic background. Mean HbA1C levels were $10.92 \pm 1.12\%$. 302(75.5%) patients belonged to rural background while 88(24.5%) patients were from urban areas.(Table I)

Gender Distribution	200(50%) Male 200(50%) Female
Group A (with PIR)	205
Group B (without PIR)	195
Mean Age (years)	47.10 ± 11.34
Mean Duration of Diabetes Mellitus (Years)	4.88 ± 4.49
Mean HbA1C (%)	10.92 ± 1.12
Area	Rural 302(75.5%) Urban 88(24.5%)
Education	Illiterate 208(52%)

	Primary (5 th Grade)	8(2%)
	Middle (8 th Grade)	40(10%)
	Matric (10 th Grade)	64(16%)
	Intermediate (12 th Grade)	8(2%)
	Bachelors	64(16%)
	Masters	8(2%)
Socioeconomic Status	Poor	152(38%)
	Satisfactory	232(58%)
	Good	16(4%)

Psychological insulin resistance was found to present in 205(51.25%) patients (Group A) out of which 115(28.75%) were male and 90(22.50%) were female while 195 (48.75%) were willing to start insulin when prescribed (Group B). 381(95.25%) patients reported that their autonomy will be affected by use of insulin injections which was present equally in both groups.

Fear of hypoglycemia was reported by 177(43.75%) patients out of which 102 were from group A and 75 from group B while self-injection was cumbersome for 191(47.75%) patients (80 in Group A while 111 in Group B). Fear due to the pain of injection was reported by 142(35.50%) patients (Group A 80, Group B 62). Fear of hypoglycemia was more in Group A, self-injection more in Group B while the pain of injections and loss of autonomy was reported in both groups equally.

Factors related to patients' routine life included restrictions in diet with therapy was present in 87(21.75%) patients (Group A 40, Group B 47), restriction in normal lifestyle in 143(35.75%) patients (64 Group A, 79 Group B) while 113(28.25%) patients had objections to lifelong insulin treatment (40 Group A, 73 Group B). These factors were present predominantly in Group B patients.

Patients lacked the knowledge of benefits of good glycemic control, method of insulin use, benefits of insulin and compliance to insulin therapy. 162(40.5%) patients had good knowledge regarding benefits of good glycemic control (64 Group A, 96 Group B), 256(64%) patients had lack of clarity regarding method use insulin injections (equal in both groups), 128(32%) patient were uncertain regarding benefits of insulin in managing diabetes mellitus (72 Group A, 56 Group B) and 88(22%) reported that they would be unable to cope with treatment (56 Group A, 32 Group B). Patients without PIR had a better knowledge of benefits of good glycemic control, patients with PIR showed more uncertainty of treatment and non-compliance while both groups had similar knowledge regarding the method of insulin injection use.

Social factors reported were stigmatization in 176(44%) patients (91 Group A, 85 Group B) 168(42%) rejected treatment due to misdirection from their family and other patients regarding insulin use (88 Group A, 80 Group B) insulin injections were culturally unacceptable in 152(38%) patients as they were worried to use it in social gatherings (80 Group A, 72 Group B) and 81(20.25%) patients did believe that other treatment modalities portrayed in media were useful (53 Group A, 28 Group B). Depicted in Table II.

FACTORS OF PIR	TOTAL	Group A	p-value	Group B	p-value
Autonomy	381 (95.25%)	192	0.001 *	189	0.000 *
Fear Of Hypoglycemia	177 (43.75%)	102	0.321	75	0.401
Self Injection	191 (47.75%)	80	0.236	111	0.353
Pain of Injection	142 (35.50%)	80	0.236	62	0.504
Restrictions In Diet	87 (21.75%)	40	0.051	47	0.067
Restriction In Lifestyle	143 (35.75%)	64	0.156	79	0.205
Objections To Lifelong Insulin Treatment	113 (28.25%)	40	0.051	73	0.169
Benefits of Good Glycemic Control	162 (40.5%)	64	0.478	96	0.279
Lack Of Clarity	256 (64%)	128	0.478	128	0.428
Uncertainty	128 (32%)	72	0.168	56	0.520
Non-Compliance	88 (22%)	56	0.099	32	0.025 *
Stigmatization	176 (44%)	91	0.377	85	0.382
Negative Input From Their Family And Other Patients	168 (42%)	88	0.356	80	0.428
Cultural Unacceptability	152 (38%)	80	0.428	72	0.196
Media	81 (20.25%)	53	0.091	28	0.022 *

Discussion

This study determines that psychological insulin resistance is present in a significant number of patients with type 2 diabetes mellitus and a variety of risk factors lead to it. Psychological insulin resistance was highlighted by DAWN study which showed that more than half of all type 2 diabetes not using insulin worry about having to start insulin therapy and also highlighted the role of health care providers in PIR.⁹ Results of this study are comparable to a local

study as 53.29% (Vs 51.25%) insisted on not using insulin therapy¹⁰ and another study from Malaysia (51%)¹¹ reported similar prevalence. Indian¹³ and American¹⁴ studies also depicted a significant PIR in patients with type 2 diabetes mellitus.

Most of our patients attributed several reasons for rejecting insulin therapy. Factors related to patients leading to delay or refusing insulin therapy in this study included patient autonomy (95.25%), self-injection (47.75%), fear of hypoglycemia (43.75%) and pain of injection (35.50%). Factors related to routine life included restrictions in diet (21.75%), restriction in normal lifestyle (35.75%) and objections to lifelong insulin treatment (28.25%). Social factors reported were stigmatization (44%), misdirection from their family, other patients and quacks regarding insulin use (42%), cultural unacceptability (38%) and misdirection from media (20.25%).

Patients lacked basic knowledge regarding diabetes mellitus and insulin therapy. Patients had poor knowledge regarding good glycemic control; only 40.5% had good knowledge, lack of clarity regarding the method of insulin use (64%), the uncertainty of benefit from insulin use (32%) and inability to cope with treatment (22%).

Khan et al. in their study in Rawalpindi found out fears and pain of injection, fear of hypoglycemia, difficult and lifelong application, cost, storage problems, last resort of treatment, misdirection from quacks and patients reluctance as the factors leading to delay in starting insulin in type 2 diabetic patients¹⁰ but frequency was much less than our study although sample size is same in both studies. This higher frequency may be attributed to lack of patient education, misbelieves regarding diabetes mellitus, misdirection from other people as most of our patients belonged to rural areas as compared to an urban area in their study with low education levels. They also showed that females are more prone to develop psychological insulin resistance which is contradictory to our results.

Jha et al. in their study conducted in India¹³ concluded that major factors leading to psychological insulin resistance were fear of injection, fear of pain during injection, fear of hypoglycemia, social stigma and lack of education of patients regarding diabetes mellitus. Similar factors were found out by Zainuddin et al. in their study in Malaysia.¹¹ The difference in frequencies may be attributed to different geographical and ethnic background of patients included in studies.

One study conducted in America found plans to improve their behaviors regarding health instead of starting insulin, negative impact on daily routine life, fear of injection and concerns about side effects of insulin or hypoglycemia as major factors leading to PIR.¹⁴ This shows that factors associated with PIR are almost similar but with different frequencies globally. The DAWN study.⁹ which was

conducted in 13 countries in Europe, Asia, and North America, concluded that there is the difference in magnitude of psychological insulin resistance to insulin which was related to culture and health care systems of different countries.

Patient education regarding diabetes mellitus and insulin therapy remains the best modality in reducing psychological insulin resistance.⁸ The compliance for insulin may be improved through better communication between healthcare provider and patient regarding risks, shared decision making, and training in self-management.

We recommend that patients should be educated regarding benefits of good glycemic control and complication of diabetes mellitus and their personal concerns should be identified and addressed properly. Treating physician is best person to educate in our country but help can be taken from nurses trained in diabetes management and insulin use and from diabetes educators who can play an important role.

Specific diabetes clinics can be established for this purpose. Public seminars and awareness campaigns can be organized by hospitals or physicians regarding diabetes mellitus and benefits of effective control. The patient follows up on the telephone can be done to check the adherence to therapy and motivation of patients by diabetes educators. Using 'expert patient' who had positive experiences of insulin initiation may augment the likely chances of patients starting insulin therapy.¹⁵

The limitation to this study includes that patient was given closed-ended dichotomous questions based on clinical experience of physicians, not the actual patient's perspectives. Questions were limited and patients were not provided with open options. Barriers in treating physicians were not accessed which play an important role in reducing psychological insulin resistance. Further studies are required to access the severity of problem and measures to eradicate the issue.

Conclusion

Psychological insulin resistance is present in more than half of patients with type 2 diabetes mellitus due to multiple factors attributable to patients. They should be identified and patient-centered approach should be made to reduce this.

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