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Assessment of Diabetes Mellitus Related Complications in Inpatients at a Tertiary Care Hospital, Baptist Hospital, Bangalore

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Abstract

The study was to assessment of diabetes mellitus related complications in inpatients at a tertiary care hospital, Baptist hospital, Bangalore. A prospective descriptive study was conducted over 6 months, after taking ethical committee approval. 150 In patients diagnosed with diabetes will be enrolled to the study. Demographic data, detailed medical history, medications for diabetes mellitus, concomitant medications for co morbid diseases, Pharmacoeconomics, questions regarding lifestyle, dietary pattern, and exercise program with laboratory investigations were recorded in the study preform. Also reporting any drug interactions, adverse drug reactions or contraindication related to diabetes medications. Diabetes complication includes all micro vascular and macro vascular complications. Diagnosis of diabetic complications was done by physician and complications and laboratory results were taken from patient cards. The Micromedex, Medscape and references books will be used as tools to review the prescription and case charts. Majority of the patients were male (64.4%). The average age of the study population was 60.34±12.04 years. Most of the patients had a diabetes history of more than 10 years and HbA1c > 8%. The average QoL score was 65.47±15.07. Majority of the diabetic patients had the QoL score between 70 and 50. Patients without complication had a better QoL. As the number of complications increased, there was a decrease in the QoL. The presence of comorbidity also decreased the QoL. There was a statistically significant correlation with various parameters such as age, duration of diabetes history, HbA1c, number of complications and type of complication verses QoL of diabetic patients ($p<0.05$). The overall QoL in diabetic patients is reduced. Thus, proper management and strict glycemic control is necessary to prevent progression and occurrence of complications to maintain a better QoL in diabetes patients. It was observed that tablet metformin and Inj. Actrapid (Insulin) is most frequent medication that prescribed among diabetic patients without complications.

Keywords: Diabetes mellitus, Diabetes complications, Quality of Life

Introduction

Diabetes mellitus is a chronic disease caused by inherited and/or acquired deficiency in production of insulin by the pancreas, or by the ineffectiveness of the insulin produced. Such a deficiency results in increased concentrations of glucose in the blood, which in turn damage many of the body's systems, in particular the blood vessels and nerves.

Certain genetic markers have been shown to increase the risk of developing Type 1 diabetes. Type 2 diabetes is strongly familial, but it is only recently that some genes have been consistently associated with increased risk for Type 2 diabetes in certain populations. Both types of diabetes are complex diseases caused by mutations in more than one gene, as well as by environmental factors. (World Health Organization, 1997)

Diabetes in pregnancy may give rise to several adverse outcomes, including congenital malformations, increased birth weight and an elevated risk of perinatal mortality. Strict metabolic control may reduce these risks to the level of those of non-diabetic expectant mothers. (World Health Organization, 1997)

Impaired glucose tolerance (IGT) and impaired fasting glycaemia (IFG) refer to levels of blood glucose concentration above the normal range, but below those which are diagnostic for diabetes. Subjects with IGT and/or IFG are at substantially higher risk of developing diabetes and cardiovascular disease than those with normal glucose tolerance. The benefits of clinical intervention in subjects with moderate glucose intolerance is a topic of much current interest. (World Health Organization, 1997)

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A chronic disorder of carbohydrate, fat, and protein metabolism, type 1 and type 2 diabetes mellitus affected 135 million people

worldwide in 1995. According to World Health Organization (WHO 1) experts, this number will increase to 300 million individuals in 2025 (King et al., 1998). In the United States, 3 to 8% of the Caucasian population suffers from the disease, but the prevalence is much higher among ethnic minorities living in industrialized countries such as the Indian Asians in Great Britain or the Pima Indians in the United States (Williams & Pickup,1999) A serious cause of morbidity and mortality with an annual financial cost exceeding $100 billion, the disease not only represents a burden to the affected individuals but also poses staggering economic costs. (Bjork, 2001; Ettaro et al., 2004)

With an increasing incidence worldwide, DM will be a leading cause of morbidity and mortality in the foreseeable future. The goal of treatment for DM is to prevent mortality and complications by normalizing blood glucose level. But blood glucose level might be increased despite appropriate therapy resulting in complications, such as disturbances in fat metabolism, nerve damage, and eye disease. Different studies, in fact, of different methodological quality have documented the complications of diabetes in different setups including hospitals and the community including its contributing factors like poor attitude and adherence. These all affect the treatment outcome and may lead to complications and thus to death. (Afkhami-Ardekani et al., 2009)

Studies have reported that diabetes and its complications are among the common reasons for inpatient admissions, accounting for about 4.4% of total admissions leading to about 3.4% to 32.5% total deaths. The prevalence of chronic complications varies from 52.0% to 74.2%. The most common chronic complications were erectile dysfunction (64%), visual disturbance (33.8%) and cardiovascular disorders (30.1%), though hypertension alone was (68%), neuropathy (29.5%), and nephropathy (15.7%). Likewise, acute complications had similar trend which ranges 30.5% among which diabetic ketoacidosis (DKA) was 71%, followed by hypoglycemia (19.4%) but hyperosmolar hyperglycemic state (HHS) was insignificant. The common risk factors for occurrence of complications were gender, long duration with diabetes poor and inadequate glycemic control, negative attitude towards diabetes, poor treatment adherence and poor knowledge about the disease and its management. Thus, better understanding of perceptions and attitudes among both patients and providers is needed to guide initiatives to improve the management of diabetes. Hence, the common causes of diabetic complications are poor control of diabetes either due to no adherence, poor attitude towards the disease and its complications, unhealthy diet, and insufficient physical activity, and due to poor management by the health care professionals. On top of these complications diabetes can predispose the patient for different infections. The final outcome of diabetes is a disability, and/or death, and of course has great economic impact which is direct (medical and treatment costs) and indirect (costs of hospitalizations, loss of vision, lower extremity amputations, kidney failure, and cardiovascular events). Thus, prevention is most cost effective than treatment and management of diabetic complications. (Bertoldi et al., 2013)

the studies on QoL help in the evaluation of the psychological functioning of a patient, identification of specific shortcomings, and the needs of patients at different stages of the disease. They also help in comparing the impact of different treatment regimens on a patient's well-being and satisfaction. (Snoek, 2000) These results from the study of QoL can help a clinicians' ability to predict, treatment response, and survival time in certain contexts. (Acharya et al.,. 2014) Such comparative studies have equipped the clinicians with important information to support clinical decision-making, taking both biomedical and psychosocial aspects into consideration. (Snoek, 2000)

Most health care providers focus on medically related outcomes only when assessing the efficacy of their intervention, thus for a better outcome it is important to extend the assessment of the effect on physical, emotional, social and economic wellbeing that is, the quality of life.

Diabetes is a chronic illness therefore there is a need for assessing the QoL of patients at regular intervals. The complications of diabetes affect the organ system and are responsible for the majority of morbidity and mortality associated with the disease. (Power, 2008)

This study intended to study is for being a prevalent and acquired disease in India, preventive measures can be taken against diabetes if proper awareness is given. Medication therapy and surveillance of the current therapeutic approaches for diabetes mellitus in India are warranted for the better assessment of this prevalent disease.

Materials and Methods

150 In patients diagnosed with diabetes will be enrolled to the study. Demographic data, detailed medical history, medications for diabetes mellitus, concomitant medications for co morbid diseases, Pharmacoeconomics, questions regarding lifestyle, dietary pattern, and exercise program with laboratory investigations were recorded in the study preform.

Table 1: Demographics of Diabetes patient

	Category	Number of patients (%)
Gender N=150	Male	96(65%)
	Female	54 (35%)
Fating Blood Sugar (mg/dl) N= 142	Less than 110	36 (25.4%)
	110-126	8 (5.6%)
	More than 126	98 (69%)
HbA1c (%) N=138	7-Apr	31 (22.6%)
	8-Jul	23 (14.3%)
	More than 8	84 (63.1%)
BMI (Kg/m^2) N=130	≤18.4	9 (6.9%)
	18.5-22.9	32 (24.6%)
	23-24.9	18 (13.8%)
	≥25	71 (54.6%)
Comorbidity	HTN	124 (49.6%)
	Kidney Disease	46 (18.4%)
	Liver Disease	12 (4.8%)
DM with and without Complication	DM Without Complication	98 (65.2%)
	DM+1 complication	39 (26%)
	DM+2 complication	8 (5.2%)
	DM+3 complication	4(2.8%)
	DM+4 complication	1 (0.8%)
Types of Diabetic Complication	Retinopathy	22 (25.3%)
	Nephropathy	24 (27.6%)
	Neuropathy	14 (16.1%)
	Diabetic foot	17 (19.5%)
	IHD	39 (44.8%)
	Ketoacidosis	5 (5.7%)
Number of diabetic drugs prescribed N=150	One	85 (53.6%)
	Two	39 (24.4%)
	Three	23 (15.2%)
	Four	3 (1.2%)

We observed that out of 150 patients, (14.2%) had the history of diabetes less than 1year, (15.8%) had a history of 1-5 years, (30%) of 6-10 years, and (40%) of more than 10 years. The mean age of diabetic patients was found to be 60.34±12.04 years. In our study, majority of diabetic patients had a history more than 10 years, their QoL score was poor compared to those with a history of less than 10 years.

Patients 95(62%) were hospitalized for less than 10 days, 41 (26.8%) for 10-20 days, and 14(8.8%) for more than 20 days. The mean duration of hospitalization in the diabetic patients was found 10.07±.7.55 days.

Out of 150 patients, 69(46.4%) had health insurance and 81 (53.6%) did not have any health insurance. Patients were prescribed with 1 to 4 medications for diabetes treatment; the majority of the patients were on monotherapy (Table 1). The subjects with Health insurance had a better Quality of life than those without insurance, these can be attributed to regular checkup, and the insurance company covers medication adherence as the cost.

There were 60 (37.6%) patients being treated with insulin monotherapy, 51 (32%) were on oral hypoglycemic agents, and 39 (24.8%) were taking a combination of insulin and oral hypoglycemic agents.

Among the diabetic patients, many had other comorbidities present, such as hypertension (HTN), kidney disease, liver disease, and other diseases as shown in Table III. Various tests were performed to determine the glycemic control, fasting blood sugar (FBS), glycosylated hemoglobin (HbA1c), and the body mass index (BMI) at the time of admission. Details are shown in Table 1.

The correlation between the QoL score and the number of diabetic complications is described in Table 2. Eighty-seven patients had various types of complications; retinopathy, nephropathy, neuropathy, diabetic foot, Ischemic Heart Disease (IHD) and ketoacidosis. The patients with diabetic neuropathy had the least QoL score (53.99±16.39) and the patient with diabetic retinopathy had a better QoL score (65.20±18.16) compared to other complications (Table 2).

Table 2: Correlation of QoL with various demographics characteristics of diabetic patients

Covariate factors		QOL scores (Mean ± S.D)	p values
Gender	Male	65.71±16.08	0.713
	Female	65.02±13.15	
Age (years)	Less than 40	71.47±14.16	0.024
	40-65	66.83±14.86	
	More than 65	62.38±15.16	
Comorbidity	Present	64.37±14.75	0.179
	Absent	67.09±15.55	
Type of Comorbidity	HTN	64.39±14.56	>0.05
	Kidney disease	62.12±15.03	
	Liver disease	63.24±16.81	
Duration of Illness (years)	<1	75.93±10.93	0.004
	1-5	68.15±16.34	
	6-10	65.56±15.33	
	>10	63.88±14.18	
Length of stay in hospital (days)	<10	66.49±15.53	0.370
	10-20	64.40±14.79	
	>20	62.27±13.73	
Patients diabetic Medication	Insulin	63.95±15.97	0.279
	OHA	65.92±14.92	
	Insulin+ OHA	67.89±14.08	
Health insurance status	Present	66.69±15.28	0.238
	Absent	64.42±14.88	
Diabetes with and without Complication	DM without complications	66.80±14.51	>0.05
	DM+1 complications	64.87±14.66	>0.05
	DM+2 complications	60.59±20.16	>0.05
	DM+3 complications	50.04±14.29	0.031
	DM+4 complications	62.94±16.63	>0.05
Type of Diabetic Copmlication	Retinopathy	65.20±18.16	0.931
	Nephropathy	58.24±16.94	0.013
	Neuropathy	53.99±16.39	0.003
	Diabetic foot	63.34±15.94	0.547
	IHD	63.88±15.10	0.476
	Ketoacidosis	58.65±10.24	0.308
BMI (kg/M^2)	≤18.4	70.46±11.76	0.572
	18.5-22.9	65.73±14.52	
	23-24.9	66.08±12.28	
	≥25	69.29±14.68	
HbA1c (%)	4-7	59.05±18.06	0.025
	7-8	67.59±13.81	
	>8	66.49±13.89	

P< 0.05, was considered statistical significant

The QoL in comparison to the demographic characteristics of the patient showed that there was no significant difference in the QoL scores between male and female. As the age increased the QoL decreased, patients less than 40 years had a better QoL while those more than 65 years had comparatively a poor QoL.

The patients without comorbid condition had a better QoL than the patients with comorbidity. The QoL in different types of comorbidity is described in Table2. QoL in patients with a diabetes history of less than 1 year was better and as the duration increased the QoL decreased, those with more than 10-year diabetic history had a lower QoL. QoL score for a patient hospitalized less than 10days was better than for patient hospitalized for more than 20day, as the duration of hospitalization increased the QoL decreased.

Patients prescribed with a combination of insulin and OHA had a better QoL than patients on monotherapy of only insulin or OHA. These may be attributed to the fact that using combination therapy of insulin and OHA gives a better glycemic control. Patients on OHA monotherapy had a slightly Better QoL than those on insulin monotherapy. Diabetic patients without Complications had a better QoL in comparison to those with complications, and the minimum QoL score was in patients having diabetes with three complications.

The QoL for patients with health insurance was slightly better compared to those without health insurance. The patients with a BMI of less than or equal to 18.4kg/m2 had higher QoL score than the others and those with BMI of 18.5-22.9 had the lowest QoL score. The patients with HbA1c between 4% - 7% had a lower QoL in contrast to those with an HbA1c of more than 8% who had a better QoL score. The details of correlation of QoL score with various demographics characteristics of diabetic patients are represented in Table 2.

Diabetes complication includes all micro vascular and macro vascular complications. Patients who visited the hospital for the second time were excluded from study and the first visit's data was taken. In addition, adherence was assessed based on the patients report. Diagnosis of diabetic complications was done by physician and complications and laboratory results were taken from patient cards. The collected data were cleared and checked every day for completeness and consistency before processing. The Micromedex, Medscape and references books will be used as tools to review the prescription and case charts. The data will be stored confidentially and will be subjected to further analysis using appropriate software. table 3 The study revealed that rising prevalence of overweight/ obesity, consumption of saturated fats and trans fatty acids among patients with diabetes are triggers of risk factors for cardiovascular complications

Table 3: Drug interaction of DM related to complication in study

Type Of Drug Interaction	Complication	Effect Of Interactions	Male	(%)	Female	(%)	Total	(%)
Major								
T.Diltiazem+T.Carvedilol	Cardiomyopathy	Increase Risk Of Hypotension & Bradycardia	2	1.3	0	0	2	1.3
T. Aspirin + T.Clopidogrel	Cardiomyopathy Encephalopathy	Result Increase Risk Of Bleeding	12	8	2	1.3	14	9.3
T.Torsemide + T.Metolazone	Nephropathy	Increase Risk Of Electrolyte And Fluid Imbalance	2	1.3	0	0	2	1.3
T.Torsemide + T.Fluconazole	Nephropathy	Increase Torsemide Exposure And Increased Risk Of Toxicity	4	2.7	1	0.6	5	3.3
Moderate								
T.Ramipril+T.Glimepiride	Cardiomyopathy	Increase Risk Of Hypoglycemia	0	0	1	0.6	1	0.6
T.Ramipril+T.Pioglitazone	Cardiomyopathy	Increase Risk Of Hypoglycemia	0	0	1	0.6	1	0.6
T.Aspirin+ T.Carvedilol	Cardiomyopathy	Decrease Antihypertensive Effect	1	0.6	1	0.67	2	1.3
T.Metoprolol + T.Metformin	Cardiomyopathy	Hypoglycemia Or Hyperglycemia-Decrease Symptoms Of Hypoglycemia	2	1.3	0	0	2	1.3

Conclusion

in conclusion, the study was carried out to assessment of diabetes mellitus related complications in inpatients at a tertiary care hospital, Baptist hospital, Bangalore. Among the 150 Diabetic patients enrolled, the majority of them were male, the mean age of diabetic patients was 60.34±12.04 years, and majority had a history of diabetes for more than 10 years. Most of the patients [64(42.4%)] had a moderate QoL score between 50 and 70. There are various factors such as age of the patient, duration of history of diabetes, and HbA1c significantly reduce the QoL of diabetic patients ($p<0.05$). The present result need pharmacist intervention aimed to control and appropriate use of treatment based on the type of related complication due to Diabetes mellitus. The present result demonstrates that the complications of DM such as Retinopathy, Nephropathy, Neuropathy, Cardiovascular disease which are life threatening. The presence of complication and comorbidity had an adverse effect on the QoL of diabetic patients, as the number of complications increased the QoL decreased and hypertension was the predominant comorbid condition.

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