Original Article

RETROSPECTIVE ANALYSIS OF DIABETIC ADMISSIONS: MOVING FORWARD BY LOOKING BACK

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ABSTRACT

Background: Diabetes Mellitus is an "iceberg" disease. Developing countries are experiencing a dramatic increase in prevalence of Diabetes Mellitus. Studying pattern and outcome of diabetic admissions can be helpful in determining the effectiveness of inpatient and outpatient care.

Objective: Diabetes related admissions to medical and surgical wards of a Tertiary Care Center at Jodhpur were retrospectively studied, with an aim to determine the burden that diabetes poses on the health care system. Changes and improvements in both inpatient and outpatient management of diabetes can be made by analyzing the data collected.

Methods: A one year retrospective, hospital based, clinical study was carried out at M.D.M. hospital, Jodhpur, Rajasthan, India. Medical records of the diabetic patients admitted to the medical and surgical wards, between April 2010 and March 2011 were studied and the data collected was analyzed.

Results: During the study period a total 9,320 patients were admitted to medical and surgical wards, out of which 411(4.41%) admissions were diabetes related. The mean age of the patients was 54.51+/-17.12 years (range, 10-90 years). Reasons for admissions were Infections/septicemia (24.57%), Hyperglycemic Emergencies (15.58%), cardiac disease (13.63%) and, renal disease (6.08%). The common associated medical conditions were Anemia (59.85%) and Hypertension (40.14%). Duration of hospital stay ranged from 1 to 34 days, with a mean duration of 5.36 days. Mean duration of hospital stay was the longest (11.36 days) for those admitted for diabetic foot ulcer.

Conclusion: Efforts should focus on establishing clinics having facilities for treatment of all aspects of diabetes, including complications.

Keywords: Diabetes Mellitus, Admissions, Pattern, Outcome, Diabetic Clinics

INTRODUCTION

Whole world is witnessing an increase in both the prevalence and incidence of diabetes; reasons being population growth, aging, urbanization and an increase of obesity and physical inactivity. But this increase has been especially dramatic in societies in economic transition, in newly industrialized countries and developing countries. Currently the number of cases of diabetes worldwide is estimated to be around 285 million, a prevalence rate of about 6.6%.[1] This number is predicted to almost double (438 million) by the year 2030 (a prevalence rate of about 7.8%), with the greatest number of cases being expected in China and India. In India, the prevalence of diabetes mellitus is roughly estimated to be 2.4% in rural and 4.0-11.6% in urban dwellers. And the frequency of impaired glucose tolerance ranges from 3.6-9.1%, indicating the potential for further rise in prevalence of diabetes mellitus in the coming decades.[2]

The Epidemic of Diabetes in India is in Epidemiological transition. Earlier most of the patients were hospitalized with acute metabolic complications of diabetes, but now the number of patients presenting with long-term complications like nephropathy, retinopathy, etc is on a rise. In addition to these specific complications, other nonspecific complications, [3] notably coronary artery and cerebral vascular disease are also increasing in frequency in diabetic patients. This is due to atherosclerotic vascular disease, the prevalence of which has increased worldwide. Few patients are admitted with classical triad of polydipsia, polyphagia and polyuria.

Hospitalization is both an adverse health event and a marker for serious health complications and is often predictive of disability[3]. Persons with diabetes are admitted to hospitals more frequently and experience longer hospital stays than non-diabetic individuals[4]. With the increase in long-term complications and atherosclerotic vascular diseases, the pattern of diabetic admissions is also changing. Diabetes is considered an ambulatory care-sensitive condition, and many hospitalizations are potentially preventable[5].

There is scarcity of published data, if any, regarding pattern of hospitalization of diabetic patients in Western Rajasthan. This study was aimed to examine the epidemiology, presenting features and outcome of diabetes-related admissions to the medical and surgical ward of a tertiary care center at Rajasthan, India. Such data would be useful to determine the burden on health care system and in planning of appropriate management strategies.

MATERIALS AND METHODS

Medical records of patients admitted to the medical and surgical wards of M.D.M. hospital, Jodhpur, Rajasthan, India, between April 2010 and March 2011 for diabetes mellitus and/or Complication of diabetes were retrieved from the Medical Information and Records Department of the hospital and analyzed. Patients admitted to other departments of the hospital (e.g. cardiology, pulmonology, nephrology, dermatology and ophthalmology) were not included in the study. Data extracted from the case records included personal and epidemiological data, diagnosis, laboratory values, duration of stay in the hospital and outcome. Data were expressed as mean standard deviation (SD), and frequency was expressed as a percentage. Computation of *P* values was done by *t* test and chi-squared analysis. $P<0.05$ was considered statistically significant.

RESULTS

A total of 9,320 patients were admitted to the medical and surgical wards over the 1-year period. The results indicate that Diabetes Mellitus was a major health problem, accounting for 4.41% of admissions. Out of diabetic admissions, 228 (55.47%) patients were males and 183 (44.53%) were females, showing statistically significant preponderance of males. Rural dwellers were 213 (51.82%) patients and urban residents were 198 (48.18%) patients. Out of total patients thirty Six (8.76%) patients were Economically Below Poverty Line (BPL). Most of the patients, 323 (78.59%) had Type II Diabetes. The epidemiological details and characteristics of patients are shown in Table 1.

The mean age of the patients was 54.51+/-17.12 years (range, 10-90 years). Duration of hospital stay ranged from 1 to 34 days, and the mean duration of stay was 5.36 days. The outcome of these admissions was; 362 (88.08%) treated and Discharge, 47 (11.43%) patients Left Against Medical advice and there were 2 (0.49%) Deaths, both of these were due to Stroke.

Table 1: Characteristics of study participants

Characteristics	Study participants (%)
Age group	
1-10 yrs.	1 (0.24%)
11-20 yrs.	21 (5.11%)
21-30 yrs.	17 (4.14%)
31-40 yrs.	37 (9.00%)
41-50 yrs.	68 (16.54%)
51-60 yrs.	102 (24.82%)
61-70 yrs.	84 (20.44%)
71-80 yrs.	67 (16.30%)
81-90 yrs.	14 (3.41%)
91-100 yrs.	0 (0.00%)
Mean Age (SD)	54.51 yrs (17.12)
Type of Admission	
Emergency	216 (52.55%)
Regular	195 (47.45%)
Sex	
Male	228 (55.47%)
Female	183 (44.53%)
Residence	
Rural	213 (51.82%)
Urban	198 (48.18%)
Economic status	
BPL	36 (8.76%)
Others	375 (91.24%)
Type of Diabetes	
I	53 (12.89%)
II	323 (78.59%)
Not Known	35 (8.52%)
Duration of Hospital stay	
1-5 days	260(63.26%)
6-10 days	109(26.52%)
11-15 days	18(4.38%)
16-20 days	15(3.65%)
21-25 days	4(0.97%)
26-30 days	1(0.25%)
31-35 days	4(0.97%)
Mean Stay	5.36 days
Outcome	
Discharge	362 (88.08%)
LAMA	47 (11.43%)
Death	2 (0.49%)

Diabetes mellitus and associated diseases

Although, Hypertension was found to coexist with diabetes mellitus in 165 (40.14%) patients, but the most common associated disease was Anemia (59.85%) in this study. Cardiac diseases, smoking, chronic renal failure were the other major associated diseases.

Indications for Admission in Diabetic patients

The diabetes mellitus-related indications for admission are shown in table 2. Few patients were admitted with the classical symptoms of polydipsia, polyphagia and polyuria. More patients were admitted with infec-

tions, hyperglycemic emergencies, macrovascular disease (cardiovascular and cerebrovascular) and renal disease. It was observed that major indications for admission were infections/septicemia (24.57%), hyperglycemic emergencies (15.58%), and cardiac disease (13.63%).

Table 2: Indications for Admission with Epidemiological Details

Indications for Admission	No. (%)	Residence		Type of Admission		Hospital	Outcome		
		Rural	Urban	Emergency	Normal	stay(days)	Discharge	LAMA	Death
Infection/ Septicemia	101(24.57)	51	50	50	51	6.31	93	8	0
Hyperglycemic Emergencies	64(15.58)	45	19	39	25	5.08	58	6	0
Cardiac Diseases	56(13.63)	21	35	30	26	4.28	49	7	0
Diabetic Nephropathy	25(6.08)	14	11	17	8	5.50	21	4	0
Diabetic Foot	22(5.35)	14	8	7	15	11.36	19	3	0
Stroke	21(5.11)	10	11	14	7	4.64	15	4	2
Hypoglycemia	15(3.65)	8	7	9	6	3.50	12	3	0
Uncontrolled Diabetes	13(3.16)	11	2	5	8	4.42	13	0	0
Accelerated Hypertension	11(2.68)	2	9	8	3	3.41	8	3	0
Miscellaneous	83(20.19)	37	46	37	46	4.43	74	9	0
Total	411	213	198	216	195	5.36 (5.02)*	362	47	2

*Mean duration in days

Though only 6.08% of the patients were admitted for nephropathy, 40.88% had serum Creatinine greater than 120mol/L. Same was the case with hypertension, although 2.68% patients presented with Accelerated Hypertension but 227 (55.23%) patients had high blood pressure on admissions. Other indications for admission were diabetic foot (5.35%), Stroke (5.11%), Uncontrolled Diabetes (3.16%), and other miscellaneous conditions accounted for 20.1% of the admissions. Table No. 2 shows the indications for admission with epidemiological details.

Complications of Diabetes Mellitus

The complications of Diabetes Mellitus can be broadly divided into Microvascular and Macrovascular complications. More than one of these may be present in a patient. Microvascular complications present in the patients were; Diabetic Nephropathy (15.57%), Diabetic Retinopathy (3.65%) and Diabetic Neuropathy (2.68%). Coronary Artery Disease (13.63%), Diabetic Foot (6.33%) and Stroke (5.11%), were the major Macrovascular complications seen in the patients. The prevalence of these complications in the study is shown in Table No. 3.

Table 3: Complications of Diabetes in study participants

Complications	Patients (%)
Micro vascular Complications	
Diabetic Nephropathy	64 (15.57%)
Diabetic Retinopathy	15 (3.65%)
Diabetic Neuropathy	11 (2.68%)
Macro vascular Complications	
Coronary Artery Disease	56 (13.63%)
Diabetic Foot	26 (6.33%)
Stroke	21 (5.11%)

Table 4: Common Infections in study participants

Infections	Patients (%)
Urinary Tract Infection	38 (31.93%)
Respiratory Infection	31 (26.05%)
Soft Tissue and Skin Infection	21 (17.65%)
Others	29 (24.37%)

Table 5: Laboratory Findings in study participants

Laboratory Findings	Study participants (%)
Blood Sugar	
Normal*	41 (9.97)
Hypoglycemia	26 (6.33)
Hyperglycemia	301 (73.24)
NA	43 (10.46)
Serum Creatinine	
Normal#	134 (32.60)
High	168 (40.88)
NA	109 (26.52)
Hemoglobin	
Normal	91 (22.14)
Anemia$	246 (59.85)
NA	74 (18.01)
Blood Pressure	
Normal	163 (39.66)
High@	227 (55.23)
Low	15 (3.65)
NA	6 (1.46)

*Normal Range, 70-110 mg/dl; #Normal Range, 0.6-1.2 mg/dl; $Anemia, Male <13 g/dl, Female <12 g/dl; @High, SBP >140 mm Hg or DPB >90 mm Hg

DISCUSSION

Diabetes is a chronic disease that requires long-term medical attention. The complications of diabetes mellitus also constitute an enormous and costly burden on limited resources available in the developing countries. Diabetes is major cause of disability through its

complications and the complications are also the major cause of hospital admissions in these patients[4]. Not many reports have been published regarding this aspect of diabetes and also the data available from different counties is not totally comparable. In this study, we have described the epidemiological characteristics, indications for admissions, and outcomes of diabetic patients admitted in a tertiary care center at Jodhpur, Rajasthan, India.

It was observed in the study that 4.41% of the total admissions to the medical and surgical wards were related to diabetes and/or its complications. This proportion of diabetes-related admissions is higher than that reported from Tanzania (1%), South Africa (1.5%) and from Nigeria (3.5%)[6]. However, this admission rate is lower as compared to the studies conducted in Jeddah (17%) and Libya (22%)[7,8]. This reflects the mixed urban and rural population which is served by the hospital and is supported by the epidemiological characteristics of the patients in this study [Rural 213 (51.82 %) and Urban 198 (48.18 %)].

Hypertension and diabetes are Deadly Duo; major cardiovascular risk factors. It has been reported that, 40% to 50% of diabetic patients are hypertensive as compared with nondiabetic population[9]. In this study also, Hypertension was present as associated disease in 40.14% of the patients. But Anemia present in 59.85% of these patients, stood out as major health concern which needs immediate and effective management.

Anemia, especially Iron deficiency anemia has been a major health concern in India[10]. The incidence of anemia is highest among women and young children, varying between 60 to 70%. Recent surveys indicate that in rural India anemia is much more widespread than hitherto believed, even among men[11].

The mean duration of hospital stay was found to be 5.36 days. In a study from Riyadh[12], the mean duration of diabetes-related hospital stay was 10 days. In studies from Denmark[13], Tanzania[14] and from Nigeria[6], the mean duration of hospital stay was 8.4, 21 and 23.6 days, respectively. This variation might be related to differences in hospital facilities, severity of illness and availability of outpatient supportive care. But scarcity of facilities and huge patient load on the Government hospitals also contributes to this. Many patients are discharged early, on finding satisfactory improvement in their health. Diabetic foot ulcer required the most prolonged duration of hospital stay in this study. This is similar to what was reported in studies from Nigeria[15].

Infections accounted for the majority of admissions (24.57%), which is similar to what has been reported in other studies[16]. This could be a reflection of inadequate care and lack of education in patients. Physicians have an important role in the prevention, early diagnosis and management of infectious complications of diabetes. The common infections seen in diabetic patients in this study are shown in Table No. 4.

Hyperglycemic emergencies accounted for 15.58% of the admissions, while Cardiac Diseases and Diabetic Nephropathy were the reason for admission in 13.63% and 6.08% of cases respectively. The blood sugar level on admission was high in 73.24% of patients, but the frequency of admissions due to uncontrolled diabetes only was also less (3.16%) in the current study, which is Similar to other studies[17]. Although more patients are being admitted with acute complications, but the number of patients presenting with long-term complications is also on a rise. This indicates the changing pattern of diabetes-related admissions to the hospital.

Uncontrolled diabetes was the commonest reason for admission as reported in studies from northeastern Libya[8], where 58% of admissions were due to this reason alone. And Diabetic foot was most prevalent 937%) in a study from Nigeria[17].

Although only 6.08% of the patients were admitted for nephropathy, yet compromised renal function was present in 40.88% of the patients. Laboratory findings obtained in the admitted patients is shown in Table No. 5.

In-hospital mortality of 0.49% among diabetic patients was lower than that reported by Roaeid[8] (18%). Other studies have described in-hospital mortality rates ranging from 8 to 9% among diabetic patients. Transferring of patients in critical conditions to ICU and the high frequency of patients leaving the hospital against medical advice (11.43%) may account for this seemingly low mortality.

CONCLUSION

Through this study we were able to analyze the pattern of hospitalization in diabetic patients. The limitation of the study was that admissions to the medical and surgical ward only were included, which is an underestimation of the diabetes-related admissions to the hospital, as patients with diabetes are also routinely admitted to other departments of the hospital.

With the increasing prevalence of diabetes and its complications there is pressing need for Secondary Prevention i.e. to halt the progress of diabetes at its incipient stage and prevent complications, and Tertiary prevention i.e. to reduce or limit impairments and minimize sufferings caused by existing departure from good health and to promote the patient's adjustment to irremediable conditions.

Efforts should focus on identification of risk factors in order to prevent lengthy, recurrent and avoidable hospitalizations of patients with diabetes mellitus. Routine checking of blood sugar, of urines for proteins and ketones, of blood pressure, visual acuity and weight should be done periodically. The feet should be examined for any defective blood circulation (Doppler ultrasound probes are advised), loss of sensation and health of skin. Primary health care is of great importance to diabetic patients since most care is obtained at this level.

Diabetes is major cause of disability through its complications, e.g., blindness, kidney failure, coronary thrombosis, gangrene of lower extremities, etc. There is a great need to establish specialized clinics (Diabetic clinics) and units capable of providing diagnostic and management skills of a high order in large towns and cities[19]. The tertiary level should also be involved in basic, clinical and epidemiological research. It has been recommended that local and national registries for diabetics should be established[20].

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