

Reasons for Hospitalisation among Patients with Diabetes in a Secondary Care Hospital in South India: A Retrospective Study

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Abstract

Background: Type 2 diabetes mellitus is a rapidly emerging non-communicable disease in India. It is associated with many life-long complications and higher rates of hospitalisations. The characteristics and reasons for hospitalisation among individuals with diabetes have not been documented in India. Such a study would direct policy makers in implementing prevention and education strategies and economic changes as needed. **Aim and Objectives:** The study aimed to study the characteristics and causes of admission of patients with diabetes admitted to a secondary care unit in South India. **Methods:** Aretrospective observation study of inpatient records of patients with diabetes aged 18 years and above admitted between January to December 2019 in a secondary care unit was done. The details of patient demographics, reason and outcome of admission were retrieved manually from paper-based patient records. Descriptive analysis was done using SPSS version 23. The study was approved by the Institutional Review Board of the institution. **Results:** Among the 479 admissions of patients with diabetes during 2019, the mean age of the admitted patients was 57.75 years. The majority of them had only one admission, 15% had re-admissions in the same time period. Approximately 78% of the admitted patients had one or more co-morbidities, 44.6% had hypertension as a co-morbidity. The principal cause of admission was infections (45%), followed by metabolic and endocrine causes (13.5%), cardiovascular disease (10.9%) and renal disease (7.96%). More than 80% of the admissions had a favourable outcome and were discharged. **Conclusion:** This retrospective study demonstrated that the most common reason for admission among patients with diabetes to a secondary care unit in South India was infection. Many infections are preventable with effective treatment for diabetes and health education. Patients bear the costs of routine treatment for diabetes which is a fraction of the direct cost of hospitalisation and can drive them to huge economic losses. Therefore, interventions to promote standard treatment by primary and secondary care health professionals and self-awareness among patients need to be done to prevent hospitalisations.

Keywords: Diabetes, family medicine, secondary health care

BACKGROUND

Diabetes mellitus is an ongoing epidemic in South-East Asia and India in particular. This metabolic disorder is characterised by impaired insulin secretion and variable degrees of peripheral insulin resistance. In 2021, the number of people with diabetes in the world has been estimated to be 536.6 million. India has 74.2 million people with diabetes estimated to rise to 124.9 million by 2045 second to China.^[1] The International Diabetes Federation has reported that one in seven adults with diabetes come from India.^[1]

Diabetes is associated with other chronic non-communicable diseases like cardiovascular disorders, peripheral vascular diseases, cerebrovascular diseases and chronic renal ailments.

Consequently, there is an increased use of health care services, unplanned hospital admissions and premature morbidity and mortality. Several studies have reported that the hospital admission rates of people with diabetes are two to six times higher than those without diabetes. They also have a longer

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length of stay.^[2-4] Additionally, people with diabetes are more at risk for developing infections.^[5]

As the projected incidence of diabetes in the Indian population is increasing, we can expect that the admissions rates of patients with diabetes-related complications will also increase. It throws importance in understanding the reason for admission of people with diabetes. This has not been documented in family practice or secondary care setting in India. We planned this study to report the most common reasons for admission among people with diabetes presenting to a family medicine-run secondary care hospital in South India.

METHODS

The inpatient records of patients with diabetes aged 18 and above admitted to the Low-cost effective care unit (LCECU), Department of Family Medicine were reviewed between January 2019 and December 2019. LCECU is a secondary care unit run by family physicians. It serves the urban economically challenged population in the South Indian town of Vellore. This unit is subsidised by the parent tertiary unit, which is the Christian Medical College, to enable economically disadvantaged patients to access high-quality care without the encumbrance of payment. The patients pay for their medications and a token amount for their investigations.

The inpatient unit consists of 40 general beds and six beds for postnatal patients. There are two beds for women in labour and a single cot operation room. There is a rotation for Bachelor of Medicine and Bachelor of Surgery (MBBS) graduates in their internship and post-graduate trainees in Family medicine. It is supported by laboratory and pharmacy services. It provides daily ambulatory care, antenatal care once a week and outreach clinics to the local urban areas daily. It caters to an approximate population of 1, 98,000.

As the unit is managed by family physicians, the morbidity managed is not restricted to a particular specialty like surgery, general medicine or paediatrics. Children, adults and the elderly are managed by all the physicians and referred if tertiary care is needed. The inpatient records with the diagnosis of diabetes mellitus were reviewed and identified. The reason for admission was charted based on presenting complaints. The clinical diagnosis and outcome of admission were retrieved from the paper records and entered in Epidata version 3.1. Other factors like length of stay and diabetes-related complication were also noted. The Statistical analysis was done using SPSS version 23. The study was approved by the Institutional Review Board for the retrospective study. The study was approved by the Institutional Review Board, Christian Medical College, Vellore. IRB Min No. 13123: 24.06.2020.

RESULTS

There were 479 admissions related to diabetes over a period of 1 year from January to December 2019 at this centre. In the secondary care unit where this study was undertaken, patients

who needed consultation or management by specialists at the tertiary care level would be referred.

Figure 1 shows the age-sex distribution of all the patients with diabetes admitted during the study period. Nearly two thirds of the patients who were admitted were females. Only 74 (15.4%) of them were less than 45 years. There was equal distribution in the age group less than 45 years and a higher proportion of females in the age group of 45-60 and more than 60 years. The mean age (SD) was 57.75 (12.2) years, the median was 58 years and the range was 24 to 91 years.

Figure 2 shows the frequency of admissions. There were a total of 400 patients with diabetes who were admitted during this period. The majority (84.8%) had only one admission but 48 (12.0%) were admitted twice and 13 (3.2%) were admitted more than twice during this period. Three of them were admitted four times and one patient was admitted a maximum of five times during this period.

As many patients had one or more reasons for admission, the number of reasons does not co-relate to the number of patient admissions. The metabolic and endocrine causes mentioned in Table 1 include hypoglycaemia 26 (4.0%) and hyperglycaemia or ketosis 62 (9.5%). The other reasons included fractures, palliative care for cancers, vertigo, dizziness, deep vein thrombosis, herpes zoster and depression. Almost half of the reason for hospitalisation was for infections.

The most common infectious cause was skin and soft tissue infections which included necrotising fasciitis, cellulitis,

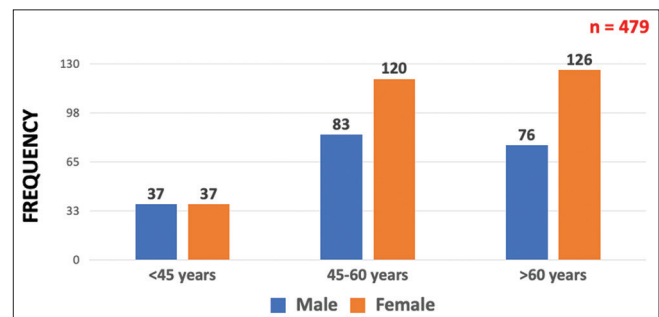


Figure 1: Age- gender distribution

Table 1: Reasons for hospital admissions

Cause of admission	Number (n=653)	Percentage
Admissions due to Diabetes and its Complications		
Infection	295	45%
Metabolic and Endocrine	88	13.5%
Cardiac	71	10.9%
Renal	52	8%
Neurological	9	1.4%
Admissions not due to Diabetes		
Surgical/Pre-operative	37	5.7%
Gastrointestinal	40	6.1%
Haematological	11	1.7%
Others	50	7.6%

abscess, ulcers and digit amputations followed by urinary tract infection as shown in Figure 3.

Figure 4 shows the distribution of co-morbidities among patients admitted for diabetes-related care. About 1/5th of the patients did not have any co-morbidity. About 2/3rd of them had either one or two co-morbid conditions. The commonest co-morbidity was hypertension (44.6%), others included dyslipidemia (14.7%), heart disease (8.6%), Chronic obstructive pulmonary disease (COPD - 6.3%) and others like obesity, hypothyroidism, mental illness, cancers and osteoporosis.

The mean (SD) duration of stay in hospital was 5.1 (3.5) days, with a median of 4 days and a range of 1 to 27 days. The mean (SD) duration of diabetes among the admissions was 7.78 (6.4) years, the median of 7 years and a range of 0-35 years. This data was available only for 226 admissions. The mean (SD) of HBA1C levels was 8.9 (2.4), a median of 8.6 and ranging from 4.6 to 14.0 was recorded for 419 admissions.

A majority (88.9%) of the admissions had a favourable outcome and were discharged from the hospital as shown in Figure 5. About 10% were referred and less than 2% died.

Table 2 describes the factors influencing the outcome of diabetes-related admissions. Female patients had more favourable outcome than the males which was statistically significant ($P = 0.01$, OR (95% CI) = 0.53 (0.30-0.95)). Those admissions requiring longer duration of hospital stay also had significantly better outcome than those with shorter stay ($P = 0.13$, OR (95% CI) = 0.29 (0.15-0.56)). There was no significant association between age, presence of co-morbidities, HBA1C values, duration of diabetes and reason for admission with the outcome of the diabetic admissions.

After adjusting for other variables in multivariate analysis, women with diabetes were found to have a significantly favourable outcome (AOR (95% CI) = 0.26 (0.09 -0.76)). Duration of diabetes was not included in the multivariate analysis due to the missing values.

DISCUSSION

This study describes the reasons for hospitalisations among patients with diabetes in a family physician run secondary care unit in South India. The majority of the patients were above

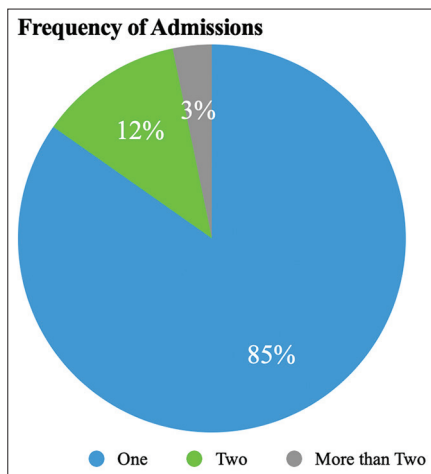


Figure 2: Frequency of Admissions

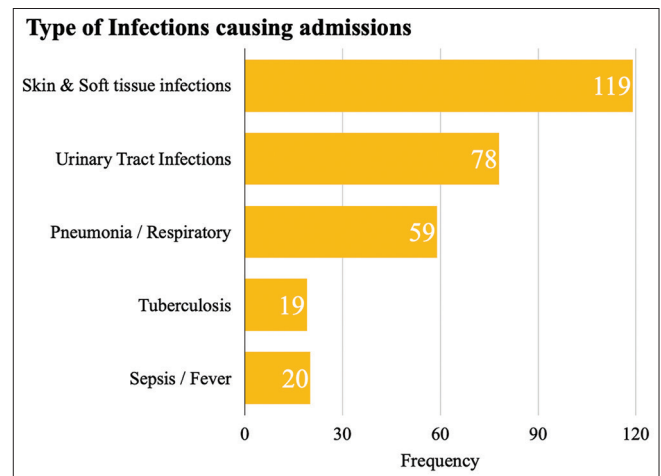


Figure 3: Type of Infections causing Admissions

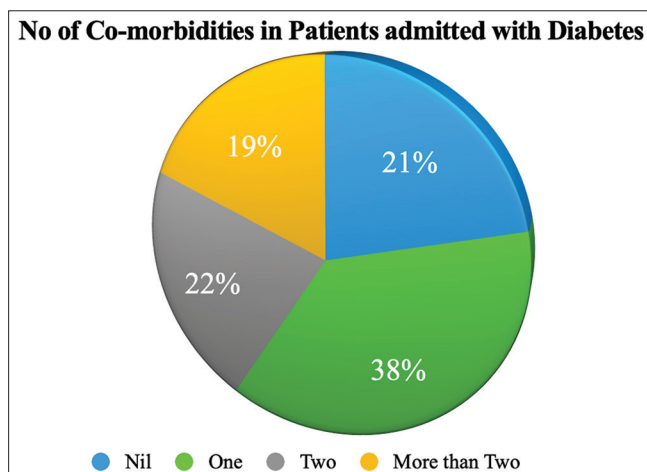


Figure 4: No of Co-morbidities in Patients Admitted with Diabetes

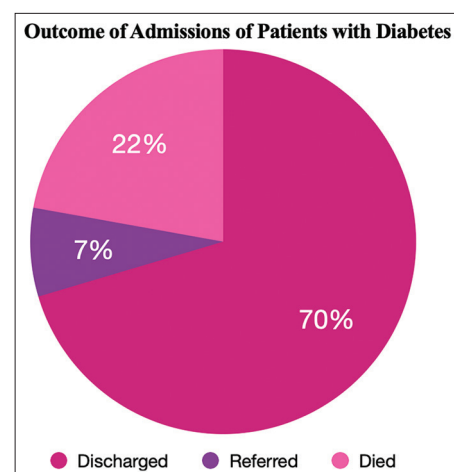


Figure 5: Outcome of Admission of Patients with Diabetes

Table 2: Factors influencing the outcome of diabetes related admissions

Variable	Outcome		Odds Ratio (95% CI)	AOR	P
	Discharged No (%)	Referred/Died No (%)			
Age in Years (n=479)					
≤58	225 (90.0)	25 (10.0)	1.25 (0.71-2.22)	1.39 (0.46-4.22)	0.57
>58	201 (87.8)	28 (12.2)			
Gender (n=479)					
Male	167 (85.2)	29 (14.8)	0.53 (0.30-0.95)	0.26 (0.09-0.76)	0.01
Female	259 (91.5)	24 (8.5)			
Co- Morbidities (n=479)					
No	91 (90.1)	10 (9.9)	1.17 (0.57-2.41)	0.74 (0.25-2.22)	0.59
Yes	335 (88.6)	43 (11.4)			
Duration of admission in days (n=479)					
≤4	202 (83.5)	40 (16.5)	0.29 (0.15-0.56)	0.44 (0.16-1.25)	0.13
>4	224 (94.5)	13 (5.5)			
HBA1C (n=419)					
≤7	117 (92.1)	10 (7.9)	1.49 (0.71-3.13)	1.07 (0.35-3.32)	0.91
>7	259 (88.7)	33 (11.3)			
Duration of Diabetes in years (n=226)					
≤7	113 (89.7)	13 (10.3)	1.18 (0.52-2.73)		
>7	88 (88.0)	12 (12.0)			
Reason for admission (n=403)					
Diabetic	142 (91.6)	13 (8.4)	1.28 (0.64-2.57)	1.77 (0.62-5.01)	0.29
Non-Diabetic	222 (89.5)	26 (10.5)			

45 years of age. Studies conducted in Libya and Canada report that diabetic patients more than 65 years of age were more frequently admitted.^[6,7] The younger age group among our patients reflect the earlier age of onset of Type 2 Diabetes in the Indian population.^[8] There was a preponderance of women among the older patients. The equal sex distribution among the younger patients can be attributed to the health-seeking behaviour of men in the younger age group compared to the older men. Our study found favourable outcomes among female patients, in contrast to the literature from Western countries. A US-based study has documented increased re-hospitalisation rates for cardiovascular disease among women with poorly controlled diabetes.^[9] A European study reports a lower number of medications and fewer visits to general practitioners with long rehabilitation stays among men.^[10]

Al-Adsani *et al.*^[11] have reported that the mean length of stay of hospitalised patients with diabetes in Kuwait was 8.6 ± 10 days. Our study analysis reports a mean duration of inpatient stay of 5.1 days. Studies conducted in the United Kingdom and Taiwan have noted that patients with diabetes have a longer length of stay than those without diabetes.^[12,13] Approximately 15% of the admitted patients had re-admission during the period of our study. Reportedly, in the United States patients with diabetes had a higher likelihood of getting re-admitted.^[14] This significantly contributed to increased health care expenditure. Regassa *et al.*^[15] report a re-admission rate of 52% among those with diabetes in Ethiopia. Readmission rates can be decreased by inpatient education about diabetes, medication reconciliation prior to discharge so that the patient is sent home with appropriate medications. Some other suggested

interventions are a telephonic consultation after discharge and an ambulatory visit to adjust the dosage of medications for diabetes.^[14]

We found that infections contributed to approximately half of the reasons for admission among our patients. This extends with the previous finding as infections being the principal cause of hospitalisation in diabetic patients in Canada, Nepal and Tripoli.^[6,7,16] While in our study, skin and soft tissue infections predominated, in Canada and Nepal the main cause was urinary tract infections and chest infections in Tripoli. The skin and soft tissue infections included cellulitis, necrotising fasciitis and abscess. Like in Nepal, we had patients admitted with pulmonary tuberculosis. The prevalence of diabetes among tuberculosis patients has been noted to be 21% in South Asian countries and increasingly the recommendation is to screen all tuberculosis patients for diabetes mellitus.^[17] In contrast, the most frequent cause for admissions among patients with diabetes in Kuwait was acute coronary syndrome and pneumonia.^[17]

The second most frequent reason for admission in our study was metabolic complications namely hyperglycaemia and hypoglycaemia. Haifa Elhadi *et al.*^[6] report that one-tenth of the admissions among people with diabetes was due to metabolic reasons. Inpatient studies done in Egypt demonstrated that hyperglycaemia and hypoglycaemia accounted for only 7.7% and 1.9% of the admissions.^[18] The increased number of admissions in our study for this cause could probably reflect the poor self-care, compliance to treatment and self-awareness of diabetes mellitus among our patients. The cardiac causes for hospitalisation included heart failure, acute coronary events,

hypertension and rheumatic heart disease. Choi *et al.*^[7] report heart failure as the second most common reason for admissions among patients with diabetes in Canada. Published studies report that an individual with diabetes has a significantly higher baseline of a cardiovascular risk factor than the general population which would make them more susceptible for all cardiac events.^[19]

Approximately two-thirds of our study patients had one or two co-morbidities. The most common co-morbidity noted was hypertension similar to studies done in Tripoli and Canada.^[6,7] The risk for hospitalisation in patients with diabetes increases with multiple co-morbidities despite glycemic control. Most of our patients had a favourable outcome and were discharged. The mortality noted was less than 2%. Notably, mortality was recorded by Elsayed *et al.*^[18] in Egypt was 26.9%. However, we are a secondary care unit without intensive care facilities whereas the other study had patients admitted to critical care. The patients with a longer duration of hospitalisation had more favourable outcomes in our study. This could be explained by the fact that patients who were referred to tertiary care had a shorter hospital stay than they would be referred earlier.

As mentioned earlier infections were the predominant cause for hospitalisation among individuals suffering from this non-communicable disease. In India, where most individuals have limited financial resources the additional costs of hospitalisation need to be prevented. The patient bears the economic loss due to lost working days and mostly pays from his or her pocket towards hospitalisation, drugs and laboratory services. Hospitalization accounts for 35% of direct costs in patients with diabetes in India.^[20] Foot ulcers and skin and soft tissue infections can be prevented by patient education on hygiene, self-foot examination and recognition of early signs of infection in each visit to the health care facility. Primary and secondary level health care professionals who manage diabetes commonly need to be updated on guidelines for glycemic control, disease monitoring and techniques for debridement and mechanic offloading in foot ulcers. During hospitalisation, targeted patient education on the disease and self-care strategies will go a long way to prevent re-admission.

CONCLUSION

In conclusion, this is a retrospective descriptive study reporting the characteristics and reasons for admissions of patients with diabetes in a secondary care centre. The main causes of hospitalisation demonstrated in this study are infectious causes, metabolic causes related to diabetes and cardiovascular causes. This sheds light on the imminent need to implement strategies to prevent hospitalisations that incur huge economic burdens and increase morbidities among those with diabetes.

Limitations

Our study is based in a secondary care centre in South India run by family physicians. The findings of our study cannot be

therefore generalised to other contexts and geographic areas. We have included the analysis of patients who had multiple admissions and had more than one reason for hospitalisation. However, we have counted each cause separately. The inpatient records had deficient information on HBA1C levels, duration of diabetes, lifestyle and habits of patients such as smoking and exercise.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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