

Economic Burden of Type 2 Diabetes Mellitus among Patients in the Rural Field Practice Area of a Medical College in Davangere - A Cross Sectional Study

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Abstract

Background: Diabetes is rapidly emerging as a major health care problem, even in rural India. The earlier occurrence, delayed diagnosis and improper care leads to high complication rates, greater productivity loss and consequently higher costs. As the epidemiological burden of diabetes increases, the economic burden is expected to rise and the economically disadvantaged will be affected the most.

Objectives: To assess the economic burden of diabetes among type 2 diabetic patients and to explore the factors associated with the economic burden of diabetes.

Materials and Methods: Community based cross sectional study was carried out in rural field practice area of a medical college in Davangere for a period of six months during 2016-17 among 112 patients with type 2 diabetes mellitus. Information was collected using pretested predesigned questionnaire on socio-demographic details, health services utilization, expenditure incurred on diabetes care (both direct and indirect costs) in the past six months.

Results: The direct cost accounted for 94.2% of the total cost of treatment, of which hospitalization for diabetes related complications and medications were major components. Source of health care significantly influenced the direct cost. About 8.9% of study subjects skipped medications at least once due to lack of money.

Conclusions: Direct cost in the management of diabetes is major contributor to the expenditure. Availability of affordable essential quality diabetic medications and strengthening of public healthcare is crucial in reduction of these direct costs involved in diabetic management.

Keywords: Direct cost, Economic burden, Indirect cost, Type 2 diabetes mellitus

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Introduction

In the world, an estimated 422 million people were having diabetes in 2014. The prevalence of diabetes rose from 4.7% in 1980 to 8.5% in 2014. Diabetes contributed to 3.7 million deaths in 2012 directly and indirectly.¹ The prevalence and deaths due to diabetes are increasing in alarming pace in low and middle-income countries.² Around 77% of diabetes patients live in low and middle-income countries.³ Diabetes is rapidly emerging as a major health problem in India, even in rural areas. It is estimated that 67 million people live with diabetes in India,³ this is expected to rise to 101.2 million by 2030.⁴ The decade earlier onset of the disease, coupled with delayed diagnosis and lack of adequate management, results in high complication rates, loss of productivity and consequently higher costs of treatment. Diabetes caused 612 billion USD in health expenditure during 2014.³ The costs involved can be classified as direct costs, indirect costs and intangible costs. The medical costs incurred by a person with diabetes are reported to be two to fivefold higher than those incurred by those without diabetes.⁵

Diabetes is a societal catastrophe worldwide, which causes personal suffering and drives families into poverty due to its chronic nature. Globally the governments are struggling to meet the cost of diabetes management. The financial burden is expected to increase due to the growing number of people developing diabetes and the economically disadvantaged groups will be affected the most.⁶ As much as 25% of family income will be spent on healthcare if one adult in a low income family has diabetes.⁴ Estimation of cost of diabetes is crucial for better planning and implementation of health services, as health care resources in India are limited and diabetes because of its complication demands higher portion of resource allocation.^{5,7} Our study intends to shed light on the pattern of expenditure on diabetes management in rural area and also help policy makers in strengthening preventive and curative services for diabetic care at the primary health care level.

Objectives

The primary objective of the study is: to assess the economic burden of diabetes among type 2 diabetic patients and to explore the factors associated with the economic burden of diabetes.

Materials and Methods

A Community based cross sectional study was carried out in the rural field practice area of a Medical College in Davangere, over a period of six months from October 2016 to March 2017. The study subjects were patients who were diagnosed with Type 2 Diabetes Mellitus for six months or more and willing to participate in the study. Those who are critically ill were excluded from the study.

The list of all the patients with Type 2 Diabetes Mellitus was obtained from the Non-Communicable Disease (NCD) register maintained in the Rural Health Training Centre (RHTC) of Medical College. Out of 128 patients with Type 2 DM whose names were in the register, 112 patients gave their consent to participate in the study resulting in 87.5% response rate.

A predesigned semi-structured questionnaire was administered to the study subjects to collect information. The questionnaire consisted of two parts; the first part consisted of socio-economic details like gender, education, occupation and income etc. Second part of the questionnaire had for details about diabetes mellitus like, duration of diabetes, type of medication, presence of complications, associated co morbidities, hospitalisation and cost of treatment. Details regarding the cost of treatment of diabetes was collected for previous 6 months and classified as direct and indirect costs. Direct costs included the amount they spend for physician consultation, laboratory investigation, medications, hospitalisation, travel to health care facility, money spent on accommodation if the health care facility is situated in another place. Indirect costs included work-days lost due to diabetes and the loss of income due to restriction of activity.^{8,9}

The data collected is presented as percentages and medians wherever necessary and independent sample median test was used to explore factors associated with the cost of diabetes. Ethical clearance was taken for the study from the institutional ethical committee.

Results

The mean age of the study subjects was 59.4±11.2 years. As seen in Table 1, majority of the study subjects were females (58%). Most of the study subjects were illiterate (49.1%), 26.8% had primary schooling, 12.5% had secondary schooling while a few (3.6%) were graduates. About 54.5% of the study subjects belonged to lower socio-economic status (Class IV and Class V as per Modified B. G. Prasad Classification).

The mean duration of Type 2 DM was 7.6±6.3 years. Most of the study subjects were taking oral hypoglycaemic agents (84.8%), 2.7% were taking only insulin and 8% were taking both insulin as well as oral hypoglycaemic agents. Majority of the study subjects (56.3%) had no associated co-morbidities, while 41.1% had associated hypertension. About 42% of the study subjects had complications due to hyperglycaemia. As seen in Figure 1, the most common diabetes related complications found were Diabetic Neuropathy (13.4%) and Diabetic Retinopathy (13.4%). Majority of the study subjects were taking treatment from private health facilities (83.9%). The study subjects were enquired about the details of expenditure towards diabetes care and management of complications related

to Diabetes, both in terms of direct and indirect costs in the past six months. The direct cost accounted for 94.2% of the total cost of treatment. As seen in Figure 2, the items which consumed maximum expenditure in direct costs were hospitalisation for diabetes related complications (37.8%) and medications (36.2%). The indirect costs included mean work days lost due to restriction of activity due to illness or hospitalization and income lost due to absence from work.

The indirect costs account for 5.8% of the total expenditure for diabetes management. Majority of the study subjects (66.1%), met the expenses with their own money, about 26.8% said they borrow money from a family member, a very few relied upon social insurances schemes (2.7%) to meet the expenses. About 8.9% reported that they had skipped medications due to lack of money at-least once in the previous six months.

Table 1. Socio-demographic profile of the study subjects

Variable	Frequency (n=112)	Percentage (%)
Gender		
Male	47	42
Female	65	58
Education		
Illiterate	55	49.1
Primary	30	26.8
Secondary	14	12.5
Pre-university	09	8.0
Graduates	04	3.6
Occupation		
Unemployed	06	5.4
Farmer	39	34.8
Homemaker	44	39.3
Skilled workers	07	6.3
Unskilled workers	16	14.3
Socio-economic status as per Modified BG Prasad's classification		
Upper (Class I and II)	31	27.7
Middle (Class III)	20	17.8
Lower class (Class IV and V)	61	54.5
Type of Family		
Nuclear	36	32.1
Joint	51	45.5
Three generation	25	22.3

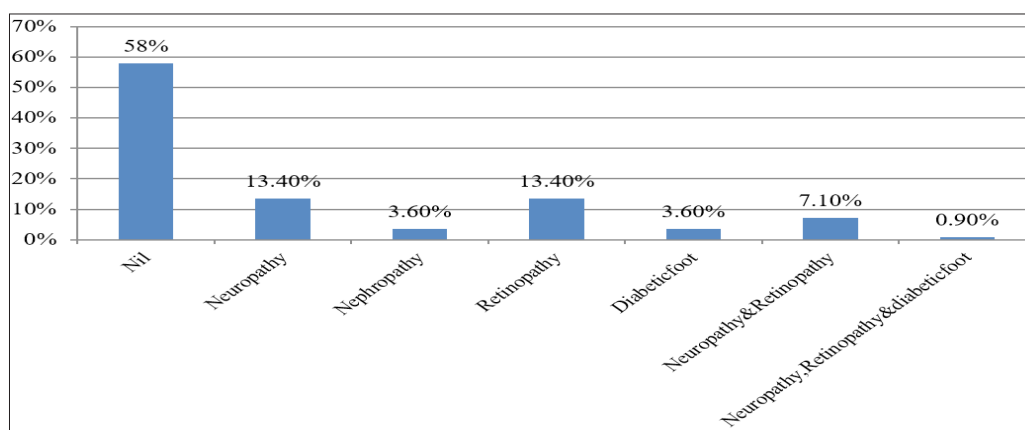


Figure 1. Complications due to hyperglycaemia

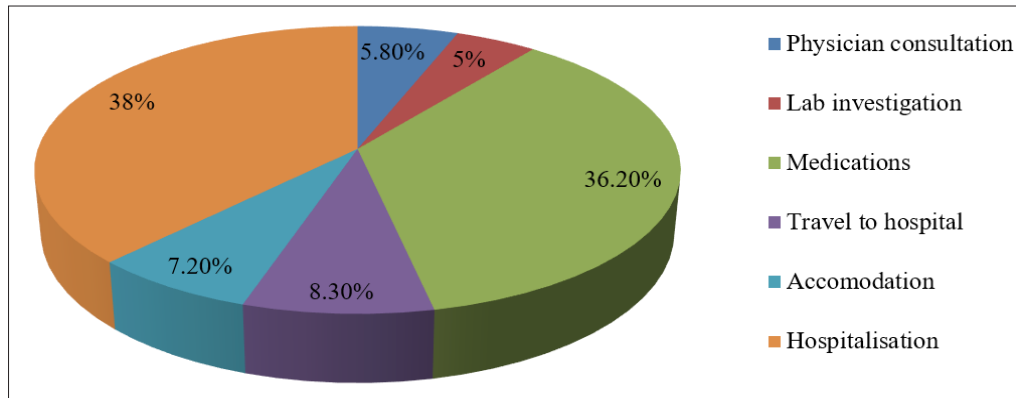


Figure 2. Distribution of direct cost of diabetes management

Table 2 shows the cost incurred by patients seeking health care at private facilities, which is obviously higher when compared to expenses incurred by those attending Government Facility (Table 3). Data cleaning was performed to decrease the missing data and outliers to assess the cost of diabetes. Only two people visiting the government

sector reported loss of income due to absence from work.

Table 4 shows the factors considered to explore their influence on cost of the diabetes treatment. Only source of health care was statistically influencing the direct cost spent on treatment of diabetes.

Table 2. Cost of diabetes treatment in private sector (INR) (N=93)

Variable	Median	Inter-quartile range	Minimum-Maximum
Direct cost	2600	1100-4845	200-50,450
Physician consultation (n=93)	200	150-350	50-1200
Laboratory investigation (n=85)	100	100-300	10-1700
Diabetes medications (n=82)	1900	600-3000	60-10000
Travel (n=78)	200	75-600	20-5000
Accommodation (n=18)	500	500-1000	100-25000
Hospitalization (n=14)	7500	3875-16250	100-50000
Indirect cost			
Work days lost due to restriction of activity (n=23)	7	3-15	1-60
Income lost due to absence from work (n=4)	2000	1500-18625	1500-24000

Table 3. Cost of diabetes treatment in government sector (INR) (N=18)

Variable	Median	Inter-Quartile range	Minimum-Maximum
Direct cost (n=18)	100	0-200	0-4150
Laboratory investigation (n=7)	50	40-120	10-120
Diabetes medications (n=5)	2000	200-3000	200-4000
Travel (n=8)	100	100-1525	60-2000
Indirect cost			
Income lost due to absence from work	0.00	0-0	0-700

Table 4. Factors influencing the cost of treatment

Variable	Test used	P value	Significance
Direct cost			
Source of health care	Independent sample median test	0.005	Significant
Gender	Independent sample median test	0.217	Not significant
Socio-economic status	Independent sample median test	0.345	Not significant
Education	Independent sample median test	0.848	Not significant
Complications	Independent sample median test	0.217	Not significant
Indirect Cost			
Source of health care	Independent sample median test	0.548	Not significant
Gender	Independent sample median test	0.415	Not significant
Socio-economic status	Independent sample median test	0.519	Not significant
Education	Independent sample median test	0.509	Not significant
Complications	Independent sample median test	0.096	Not significant

Discussion

The present study is a community based cross-sectional study carried out in rural field practice area of a medical college, Davangere over a period of six months. About 112 study subjects with Type 2 DM participated in the study. The mean age of the study subjects was 59.4 ± 11.2 years and majority of the study subjects were females (58%). Most of the study subjects were illiterate (49.1%), 26.8% had primary schooling, while a few (3.6%) were graduates. Majority (54.5%) of the study subjects belonged to lower socio-economic status i.e. Class IV and Class V.

The direct cost accounted for 94.2% of the total expenditure incurred on diabetes care. Hospitalization for diabetes related complications and medications accounted for a major portion of direct cost. The indirect costs included mean work days lost due to restriction of activity due to illness or hospitalization and income lost due to absence from work. A community based longitudinal study carried out by Thakur A et al in East Delhi showed that, more than three fourth of the annual expenditure was direct cost and was met through out of pocket expenditure. Out of pocket expenditure to such high extent can worsen the financial burden of poor diabetics. Their study showed inpatient treatment and medicines were the major components in direct cost. Though basic anti-diabetic medications are available free of cost in Government settings, lack of supply of medicines and delay in getting medicines due to long queue, cause the patients to buy medicine from outside.^{7, 10} Persons with diabetes use higher health care resources when compared to a non-diabetic patient. The excess cost is attributed to higher cost of treating diabetes related complications, need for surgery, hospitalization and the economic loss due to lost economic opportunity.^{8, 11} Contrary to the findings of our study, Bommer et al in their systematic Review showed that Indirect costs are

the major source of economic burden due to Diabetes in South Asian Countries.¹²

In our study majority of the study subjects (66.1%), met the expenses with their own money, about 26.8% said they borrow money from a family member, a very few relied upon social insurance schemes (2.7%) to meet the expenses. About 8.9% reported that they had skipped medications due to lack of money at-least once in the previous six months. In the absence of a credible social security system to rely upon, most patients depend upon self-earned resources or seek financial support from family members. Hence an illness affecting the earning member of the family has significant effect on others as well, forcing the non-working members to start working, often prematurely at lower wages, affecting the children's education and often driving the family into poverty.^{8, 11}

In our study majority of the study subjects were taking treatment from private health facilities (83.9%). This may be due to non-availability of the facilities continuously. The intermittent availability of medications, lab investigations etc. may de-motivate the patients in accessing the government run health institutions.¹³ In our study source of health care significantly influenced the direct cost. The expenditure in terms of direct cost was more among study subjects seeking diabetes care at private facilities. Our study did not find any significant association with cost incurred and presence of diabetes related complications. A study carried out in South India by Akari S et al showed a greater financial burden among patients with macrovascular complications.¹⁴ This may be due to difference in the study setting and difference in the demographics of the study subjects involved. Patient education on self-care and provision of better care to ensure optimum glycaemic control are the better strategies to prevent diabetic related complications and subsequent hospitalizations.¹

Conclusion

Our study shows that majority of the study subjects were seeking health care from private health facilities (83.9%). The direct costs accounted for a major portion of the expenditure incurred, with hospitalization and medications accounting for most of it. The expenditure in terms of direct cost was significantly higher among study subjects seeking diabetes care at private facilities.

Limitations

We recorded the expenditure pattern on diabetic treatment based on self-report by the patients; this may limit the exact estimation of cost of diabetes. There can also be the possibility of recall bias as we asked the expenditure pattern in the previous six months because not many patients tend to retain the bills spend on medical care.

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