

Health expenditure patterns among rural and urban people with Diabetes Mellitus- A prospective, comparative study.

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Abstract:

Background: Diabetes related expenditures are increasing as advancement in treatment strategies demand more resources to be utilized. The rise in the direct and indirect costs involved in diabetes management has impaired the ease in adherence to treatment. Urban-rural medical cost differences need to be taken into consideration while providing customized treatment plans.

Objectives: 1. To study the health expenditure pattern among people with diabetes. 2. To compare the health expenditure pattern among people with diabetes living in the urban and rural field practice areas of a tertiary care hospital at Puducherry.

Materials and Methods: A community based, prospective study was conducted among 300 individuals with type 2 diabetes in urban (n=150) and rural areas (n=150) of Puducherry selected by cluster sampling technique. Their average expenditure on diabetes was computed for a period of 6 months. Direct, indirect costs and catastrophic out-of pocket expenses incurred were compared between urban and rural communities.

Results: The mean duration of diabetes was 6.72 ± 1.1 and 5.9 ± 0.96 years in the rural and urban areas respectively. Oral hypoglycaemic drugs (93.3%) were the major treatment modality followed by majority of patients, followed by insulin (6.7%). The monthly direct cost involved in diabetes management was estimated as Rs. 542.17 ± 17.9 and Rs. 1516 ± 245.6 ($p < 0.001$) and indirect cost involved was estimated as Rs. 70.45 ± 28.1 and Rs. 242.5 ± 30.7 ($p < 0.001$) in the rural areas and urban areas respectively. Catastrophic expenditures were noted in 12% (n=36) of the study participants.

Conclusion: There is an increased burden of direct and indirect costs of diabetes on the family income. The financial burden of diabetes is more in urban compared to the rural area. Catastrophic expenditure due to diabetes is more prevalent in urban than the rural area.

Keywords: Diabetes, health expenditure, urban and rural, catastrophic, out of pocket cost

Introduction:

The global prevalence of diabetes among adults over 18 years of age has risen from 4.7% in 1980 to 8.5%. [1] More than 80% of expenditures for medical care for DM are made in the world's economically richest countries, not in the low- and middle-income countries where 80%

of persons with DM will soon live. [2] Estimates of the current and future economic burden of the disease on the health system can assist decision makers understand the magnitude of the problem, prioritize research efforts, and plan resource allocation to properly manage the condition. Expressed in International Dollars (ID), which correct for differences in purchasing power, the global expenditures on diabetes will be at least ID 561 billion in 2030. [3] The economic burden in India, where diabetes is almost an epidemic, is alarmingly on rise and estimation of the same shall give health policy makers a view towards intervening this enormous economic suffering of the people suffering from diabetes. The rise in the direct and indirect costs involved in diabetes management has impaired the ease in adherence to treatment. Urban-rural medical cost differences need to be taken into consideration while providing customized treatment plans. Hence this study aimed to compare the health expenditure pattern among people with diabetes living in the urban and rural field practice areas of a tertiary care hospital at Puducherry.

Methodology:

This Community-based, prospective comparative study was conducted from December 2019 to June 2020 (6 months) after approval from the Institutional Ethics Committee. Two groups of Diabetic patients (n=300) on treatment and follow-up residing in the rural (n=150) and urban (n=150) field practice areas were included by cluster sampling technique. Considering a prevalence of DM as 9% in the population (above 18 years of age as per the previous NCD survey pilot study at Chinnakanganangkuppam RHTC area), the prevalence of households with DM was estimated to be approximately 45%, assuming uniform distribution of DM patients in the households (every household on an average comprises of 5 members as seen in the pilot study). Using the prevalence of DM and the total population of the study area, a sample size of **122 households** was arrived at with a type II error of 0.2 and type I error of 0.05.

Cluster sampling will be used to select the households viz: each village under the RHTC area was considered as a cluster (5 villages) and each nagar (area) in UHTC area was considered as a cluster (10 nagars). From each cluster, 10 households were surveyed. Thus a total of 150 households were surveyed from 15 clusters.

House-to-house survey was conducted in the selected clusters to identify household lodging patients with diabetes mellitus. Households with Diabetes mellitus from the clusters consenting to the study were enrolled in the study to get the required sample size. Only families staying in the study area for at least 1 year were interviewed using a semi-structured proforma every month and followed-up till 6 months.

Health Expenditure pattern:

Direct costs: Direct cost includes hospital services, physician services, laboratory tests and the daily management of DM. Monthly expenditure on medicines, Number of visits and consultation fees for the month, cost for investigations during the month, cost of hospitalization for the month were estimated using a structured interview. Medical bill and records were checked.

Indirect costs: Indirect cost included loss of productivity due to sickness, absenteeism, disability, premature retirement and premature mortality of the patients, monthly income lost due to disease related absenteeism (calculated by daily wages multiplied by number of absent days), monthly income loss of the accompanying household member (calculated by daily wages multiplied by number of absent days). Cost of transportation of the patient and accompanying

member to the physician and for investigations for the month were estimated. Ancillary costs like other specialist consultation, doctor assistant charges, snacks, etc. were also be taken into account.

Catastrophic expenditure: Health spending was taken to be catastrophic when household health expenditure is above 40% of the total household expenditure. [4]

Statistical analysis:

Data entry and analysis was done using SPSS version 20.0 (online version). Frequency and percentages for the qualitative data were calculated and expressed in tables and graphs.. Student unpaired t-test will be used to test the difference between means. A p-value <0.05 (alpha error<5%) was considered statistically significant.

Results: The study participants included in the study were analyzed for completion of follow up and after exclusion of 20% drop out (n=60), 300 diabetics were included in the study. The mean duration of diabetes was 6.72 ± 1.1 and 5.9 ± 0.96 years in the rural and urban areas respectively. The socio-demographic characteristics of the study participants are depicted in Table 1:

Table 1: socio-demographic characteristics of the study participants (n=300)

	Rural (n=150)	Urban (n=150)
Mean age (years)	45.6 \pm 3.4	41.8 \pm 2.9
Gender		
Male	89 (59.3)	94 (62.7)
Female	61 (40.7)	56 (32.3)
Socio-economic status		
Class I	6 (4)	10 (6.7)
Class II	20 (13.3)	27 (18)
Class III	109 (72.7)	98 (65.3)
Class IV	12 (8)	14 (9.3)
Class V	3 (2)	1 (0.7)
Mean Duration of diabetes (years)	6.72 \pm 1.1	5.9 \pm 0.96
Type of anti-Diabetic:		
Oral	140 (93.3)	127 (84.7)
Insulin	7 (4.7)	15 (10)
Oral + Insulin	3 (2)	8 (5.3)

Health facility approached		
Private	62 (41.4)	104 (69.8)
Government	50 (33.3)	35 (23.3)
Government + Private	38 (25.3)	11 (7.3)

Oral hypoglycaemic drugs (93.3%) were the major treatment modality followed by majority of patients, followed by insulin (6.7%). The monthly direct cost involved in diabetes management was estimated as Rs. 542.17 ± 17.9 and Rs. 1516 ± 245.6 (p<0.001) [Table 2] and indirect cost involved was estimated as Rs. 70.45 ± 28.1 and Rs. 242.5 ± 30.7 (p<0.001) in the rural areas and urban areas respectively. [Table 3]

Table 2: Urban-Rural differences in the Direct cost incurred for treating diabetes

	Rural (n=150)	Urban (n=150)	Total (n=300)
Direct Expenses	Rs. 542.17 ± 17.9	Rs. 1516 ± 245.6	Rs. 1342.47 ± 89.9
Drugs	Rs. 455.2 ± 30.8	Rs. 1356 ± 110.5	Rs. 1279.8 ± 122.6
Oral drugs	Rs. 412 ± 34.2	Rs. 969 ± 44.6	Rs. 463.65 ± 54.2
Injectable drugs	Rs. 529 ± 74.2	Rs. 1760 ± 252.1	Rs. 1113.25 ± 67.2
Consultation charges	Rs. 95.8 ± 30.2	Rs. 150.5 ± 55.5	Rs. 88.65 ± 9.5
Lab investigations	Rs. 107.2 ± 16.7	Rs. 250.8 ± 52.7	Rs. 108.25 ± 14.2

Student t test, p<0.001 (highly significant) for all rows comparing urban and rural costs

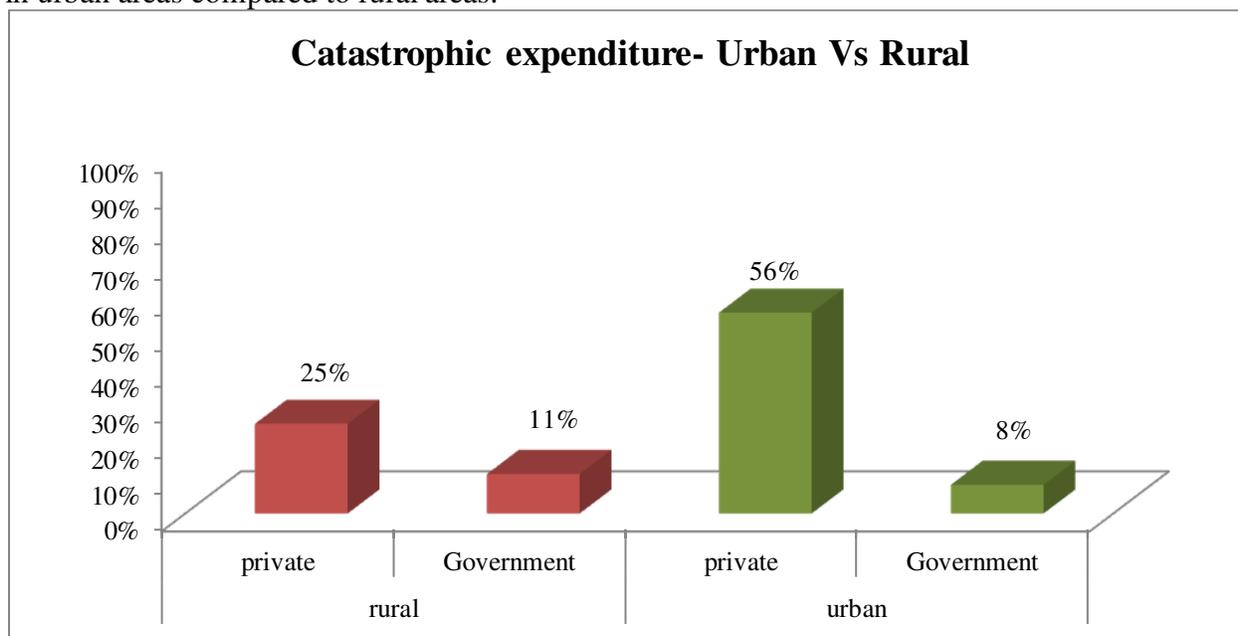
Table 3: Urban-Rural differences in the indirect cost incurred for treating diabetes

	Rural (n=150)	Urban (n=150)	Total (n=300)
Indirect Expenses	Rs. 70.45 ± 28.1	Rs. 242.5 ± 30.7	Rs. 99.35 ± 6.7

Transportation charges	Rs. 24.8 ± 10.2	Rs. 151 ± 45.1	Rs. 81.63 ± 4.8
Loss of pay/income	Rs.30.6 ± 4.5	Rs. 194 ± 61.4	Rs. 114. 83 ± 54.9
Total expense on Diabetes	Rs. 645 ± 36.8	Rs. 1860 ± 264.9	564.63 ± 86.7

Student t test, p<0.001 (highly significant) for all rows comparing urban and rural costs

Catastrophic expenditures were noted in 12% (n=36) of the study participants and it was higher in urban areas compared to rural areas.



Discussion:

Diabetes is a chronic non-communicable disease which has its own sequence of complications if left untreated. As the prevalence of diabetes increases in India, the cost incurred in its treatment also increased in high proportions. The medical cost involved in treating diabetes varies according to the geographical area, availability of facilities, awareness level of the patients and many other social factors. The present study highlighted the urban rural differences in expenditures met while managing diabetes dividing them into direct and indirect costs taking average of a 6 month follow up of incurred expenditures of each family. The monthly direct cost involved in diabetes management was estimated as Rs. 542.17 ± 17.9 and Rs. 1516 ± 245.6 (p<0.001) in the rural and urban areas. In the study by Fernandes et al., [4] the direct cost was estimated to be Rs.687.5 which included purchase of medicines and consultation charges. The study was done in 2016 in urban Delhi and over a period of 5 years, the cost has increased by three times as evident in our study. Similarly in a study done by Pablo Chandra et al. [5], the direct and indirect costs were Rs.735 and Rs.329 respectively. This was comparatively low in our study which showed a higher indirect cost in the urban areas Rs. 242.5 ± 30.7 in comparison to Rs. 70.45 ± 28.1 in rural areas (p<0.001). Grover et al. [6] in their study showed a higher

indirect cost which involved loss of income and transportation expenses which was comparatively lower in our studies. This clearly revealed that even though the expenditures on diabetes had higher direct costs related to consultation fees and investigation charges in the urban areas on the contrary showed lower indirect costs as availability of health facilities nearby and evening consultations by general physicians at the evenings saving loss of income due to absenteeism to work. Rural areas depended majority on the government health facilities which were open only in morning working hours and sparsely distributed. The importance of government urban health evening NCD clinics and free dispensing of essential diabetic drugs shall ease the economic burden in urban diabetic management which needs further evaluation.

Conclusion:

There is an increased burden of direct and indirect costs of diabetes in both rural and urban areas. The financial burden of diabetes is comparatively more in urban compared to the rural areas. The families facing Catastrophic out of pocket expenditure due to diabetes is more prevalent in urban than the rural areas. There is an urgent need to relook into the availability of health resources and probably a well revamped health insurance system to address the economic needs of the diabetics living in the urban as well as rural areas by respective appropriate technology.

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