Original Research Article

SOCIODEMOGRAPHIC PROFILE AND OUT-OF-POCKET EXPENDITURE AMONG TYPE 2 DIABETES MELLITUS PATIENTS IN A TERTIARY CARE HOSPITAL NEAR THE INDIA-PAKISTAN BORDER IN RAJASTHAN

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ABSTRACT

Background: Diabetes Mellitus, particularly Type 2, is rapidly increasing in India, presenting significant public health and economic challenges. This study evaluates the out-of-pocket expenditure incurred by patients with diabetes, highlighting the financial burden associated with managing this chronic condition.

Material & Methods: In this single-center observational study, we analyzed 75 cases of diabetes from January 2024 to June 2024. Patients aged 18 years and older were included, while those with gestational diabetes, severe complications, or other chronic diseases were excluded. Data on direct and indirect costs related to diabetes management were collected through structured interviews and questionnaires.

Results: Our findings revealed that the mean expenditure on diabetes treatment was ₹1730.67 (USD 20.77) per month, which constituted an average of 64.76% of the participants' per capita income. A significant proportion of patients reported treatment costs exceeding their monthly income, indicating a substantial economic burden.

Conclusions: The study underscores the pressing need for improved healthcare policies and financial support systems to mitigate the economic challenges faced by diabetes patients. Enhancing access to affordable treatment options and comprehensive health insurance can play a vital role in alleviating the financial strain, ultimately improving patient outcomes and quality of life.

Keywords: Diabetes Mellitus, Out-of-Pocket Expenditure, Economic Burden, Healthcare Policy.

INTRODUCTION

Type 2 Diabetes Mellitus (T2DM) has been increasing rapidly in India due to factors such as urbanization, lifestyle changes, and genetic predisposition to insulin resistance.[1]According to the International Diabetes Federation (IDF), an estimated 77 million people in India had diabetes in 2019, with projections indicating this number could rise to 134 million by 2045.[2] The ICMR-INDIAB study highlights regional variations in diabetes prevalence, with higher rates observed in southern

states like Tamil Nadu and Kerala compared to the northern regions.

Globally, the incidence of Type 2 diabetes in 2021 was 10.5%, with Southeast Asia at 8.8% and India at 9.6%. These numbers are projected to rise to 12.5%, 11.5%, and 10.9% respectively by 2045.[2] Additionally, younger age groups, particularly those aged 20–40 years, are increasingly affected by T2DM, posing long-term health challenges. Even rural areas are experiencing a surge in diabetes cases, driven by the transition from agrarian lifestyles to more sedentary occupations and shifts in dietary patterns.[3]

Complications and Health Burden

The health burden of diabetes in India is significant, as it is associated with a range of complications including cardiovascular diseases, neuropathy, nephropathy, retinopathy, and diabetic foot ulcers. These conditions severely impair the quality of life and increase mortality rates.[4]Cardiovascular disease, in particular, is the leading cause of morbidity and mortality among diabetic patients in India.

Managing these complications requires a strong healthcare infrastructure, which is often inadequate, especially in rural areas. The healthcare system in India faces the dual challenge of managing both communicable and non-communicable diseases, further complicating diabetes care and prevention efforts.[4]

Out-of-Pocket Expenditure for Diabetes

The financial burden of diabetes on individuals and families in India is substantial. The country's healthcare system is characterized by significant out-of-pocket (OOP) expenditures, which account for over 60% of total health expenditures.[5] This high OOP expenditure is particularly burdensome for chronic conditions like diabetes, which require long-term and continuous care.

High OOP costs, especially for medications and complications, often push households into poverty, particularly in rural areas with limited healthcare access. As a result, families are forced to reduce essential spending on education, nutrition, and other necessities. Despite government initiatives such as the Pradhan Mantri Jan Arogya Yojana (PMJAY), health insurance coverage for diabetes-related expenses remains insufficient, leaving many patients financially vulnerable.

To address this growing issue, improvements in public health initiatives, stronger rural healthcare infrastructure, and expanded health insurance coverage for diabetes care are essential. Additionally, policies that promote healthy lifestyles, such as taxing sugary beverages and encouraging physical activity, are necessary to mitigate the risk factors for diabetes.

Rationale for the study: Diabetes is a pressing public health concern in India with a rapidly increasing prevalence and profound socio-economic impact. The high OOP expenditures associated with diabetes exacerbate financial hardship for many families,

contributing to catastrophic health spending. Addressing this issue requires a comprehensive approach, including public health initiatives, healthcare system improvements, and expanded insurance coverage to manage the growing diabetes epidemic. So the present study was conducted to evaluate the out-of-pocket expenditure in diabetes cases and the health seeking behavior of diabetes patients.

MATERIALS AND METHODS

In this single-center, cross-sectional, descriptive observational study, we aimed to evaluate the out-of-pocket expenditure incurred by patients with diabetes visiting a tertiary care hospital. The study was conducted from January 2024 to June 2024, during which we meticulously selected 75 diabetic patients for analysis. Inclusion criteria required patients to be 18 years or older, without any other major chronic diseases. Both male and female patients were included to ensure a diverse representation of the diabetic population.

Formula for Sample Size Calculation.[6]

$$Z=4pq/d^2$$

The prevalence of diabetes was considered for sample size calculation (p = 11%), with an absolute error margin (d) of 10%. Based on these parameters, the calculated sample size was 60; however, we included 75 patients who satisfied the study criteria.

Exclusion Criteria

To refine the study cohort and focus solely on the financial implications of diabetes management, we established exclusion criteria. We excluded cases of gestational diabetes, patients with severe diabetes-related complications, and those with comorbidities such as hypertension, asthma, or other cardiovascular diseases. This approach was essential to isolate the costs directly associated with diabetes treatment.

Data Collection

Written informed consent was obtained from all participants, ensuring they understood the study's purpose and their role. Data collection included a comprehensive assessment of various components related to diabetes treatment costs. Information on medication expenses, including oral hypoglycemics and insulin, was gathered, along with costs related to blood glucose monitoring supplies, such as glucose meters and test strips. Additionally, we documented healthcare visit costs, covering consultations with endocrinologists, dietitians, and diabetes educators.

We also collected patient-reported data on indirect costs, such as transportation expenses to the hospital and lost wages due to medical appointments, through structured interviews. A standardized questionnaire was used to maintain consistency across all participants. This comprehensive approach allowed us to capture an overall view of the financial burden faced by diabetes patients,

enabling us to analyze out-of-pocket expenditure trends effectively.

Data Analysis

The study adhered to ethical standards and received approval from the institutional review board, ensuring the validity and integrity of the findings. Data were collected using a structured proforma, entered into an MS Excel sheet, and analyzed using Epi Info version 7.2.1. Descriptive statistics for each variable were presented as frequencies, proportions, and means with standard deviations.

RESULTS

A total of 75 diabetes cases were included in the study. The mean age of participants was 53.6 years (± 13.34), with ages ranging from 18 to 81 years. Among the participants, 39 were male (52%) and 36 were female (48%).

Family size varied from 1 to 14 members, with an average family size of 5.4 members (SD = 2.38). Monthly family income showed considerable variability, ranging from ₹4,500 (USD 54.00) to ₹140,000 (USD 1,680.00), yielding a mean income of ₹21,286.67 (USD 255.44) and a high standard deviation of ₹22,419.85 (USD 268.38). This significant standard deviation indicates a broad income disparity among participants.

Per capita income ranged from ₹642.86 (USD 7.71) to ₹33,333.33 (USD 400.00), with a mean of ₹4,560.67 (USD 54.86) and a standard deviation of ₹5,379.61 (USD 64.73).

Regarding diabetes treatment costs, expenditures varied from ₹100 (USD 1.20) to ₹4,000 (USD 48.00) per month, with a mean expenditure of ₹1,730.67 (USD 20.77) and a standard deviation of ₹1,240.09 (USD 14.90). The expenditure as a percentage of per capita income ranged dramatically from 5.00% to 392.00%, averaging 64.76% (SD = 71.74%), underscoring the economic burden of diabetes on the families in our study. [Table 1]

In our study, 54 patients (72%) were from rural areas, while 21 patients (28%) were from urban areas. In our study, 42.7% of patients reported checking their blood sugars weekly, while 22.7% did so monthly. Daily blood sugar monitoring was reported by 17.3% of patients. Other frequencies included once in two months (8.0%), once in six months (4.0%), once in three months (2.7%), once in a year (1.3%). Mean fasting blood sugar was 163.11, mean Post prandial blood sugar was 264, mean HbA1c was 7.21 gm%.

In our study, 47 patients (62.7%) were on a combination of insulin and oral hypoglycemic agents (OHA), while 28 patients (37.3%) were on oral hypoglycemic agents (OHA) alone. [Figure 1]
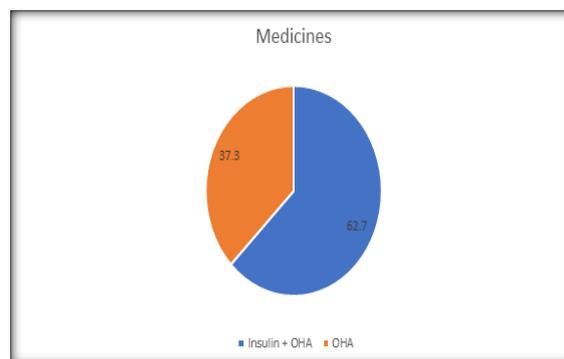
Figure 1: Distribution of study participants based on type of medication

Cost of treatment per month- Including traveling expenses, lab tests, doctor consultation fees and medicines etc.

In our study, the cost of treatment per month, including traveling expenses, lab tests, doctor consultation fees, and medicines, varied among patients. The most common expenditure range was ₹501 to ₹1000 (USD 6.01 to USD 12.00), reported by 18 patients (24.0%). This was followed by 15 patients (20.0%) who spent between ₹100 to ₹500 (USD 1.20 to USD 6.00), and 14 patients (18.7%) who reported spending ₹2001 to ₹3000 (USD 24.01 to USD 36.00) per month. Additionally, 11 patients (14.7%) spent more than ₹3000 (USD 36.01), while 8 patients (10.7%) each fell into the ₹1001 to ₹1500 (USD 12.01 to USD 18.00) and ₹1501 to ₹2000 (USD 18.01 to USD 24.00) categories. Only 1 patient (1.3%) reported spending ₹100 or less (USD 1.20) per month. [Approximate exchange rate used is 1 USD = ₹83.33.]. [Table 2]

In our study, when comparing treatment costs to per capita income (PCI), 26 patients (34.7%) reported that their treatment cost was between 21% and 50% of their PCI. This was followed by 19 patients (25.3%) whose treatment cost was between 5% and 20% of their PCI. Additionally, 12 patients (16.0%) reported that their treatment cost was between 100% and 200% of their PCI, while 10 patients (13.3%) had treatment costs between 51% and 75% of PCI. A smaller proportion, 4 patients (5.3%), reported treatment costs between both 200% and 400% of PCI, and 76% to 100% of PCI. [Table 3]

Table 1: Distribution of the socio-demographic and economic variables

Variable	Minimum	Maximum	Mean	SD
Age of the patient	18	81	53.60	13.34
Number of family members	2	14	5.40	2.38
Total Family Income per month in Rupees	4500	140000	21286.67	22419.85
Per Capita Income	642.86	33333.33	4560.67	5379.61
Expenditure on Diabetes Treatment	100	4000	1730.67	1240.09
Expenditure % of PCI	5%	392%	64.76%	71.74%

(Approximate exchange rate used is 1 USD = ₹83.33 on the day of data analysis)

Table 2: Distribution of cost of treatment per month among the study participants

Cost of treatment per month	Frequency	Percent
100 Rs or Less	1	1.3%
100 to 500 Rs	15	20.0%
501 to 1000 Rs	18	24.0%
1001 to 1500 Rs	8	10.7%
1501 to 2000 Rs	8	10.7%
2001 to 3000 Rs	14	18.7%
More than 3000 Rs	11	14.7%
Total	75	100.0%

Table 3: Treatment cost as compared to PCI

Treatment cost as compared to PCI	Frequency	Percent
21 - 50%	26	34.7%
5 - 20%	19	25.3%
51 - 75%	10	13.3%
76-100%	4	5.3%
100 - 200%	12	16.0%
200 - 400%	4	5.3%
Total	75	100.0%

DISCUSSION

The rising burden of diabetes poses significant challenges, particularly in terms of out-of-pocket expenditure, which places a substantial financial strain on patients, especially in resource-limited settings where healthcare costs, including medications, consultations, and associated expenses, are borne directly by individuals.

In our study, we examined 75 cases to evaluate their out-of-pocket expenditure related to diabetes management, providing a comprehensive overview of the financial burden faced by patients in our cohort. We observed a mean age of 53.6 years among diabetes patients, which aligns with previous findings that suggest a higher prevalence of diabetes in older age groups. Specifically, Basu et al. reported a focus on patients up to 65 years, highlighting that age is a significant factor influencing out-of-pocket (OOP) expenditures (Basu).[7] The demographic distribution in our study also revealed a near-equal representation of males and females, reflecting similar gender ratios reported in studies by Swain et al and Ghosh et al, indicating that diabetes affects both sexes comparably.[8-9]

Regarding family size and economic status, our study participants had an average family size of 5.4 members and a wide variation in total family income, with a mean of ₹21,286.67 (USD 255.44). This variability highlights the economic burden diabetes imposes on families, a finding echoed by Swain et al, who noted significant OOP expenses related to medical treatment.[8] The per capita income in our study ranged from ₹642.86 to ₹33,333.33, demonstrating a similar disparity as noted by Ghosh et al, where inequity across income quintiles was emphasized as a critical determinant of diabetes-related expenditures.[9]

The mean monthly expenditure on diabetes treatment in our study was ₹1730.67 (USD 20.77), significantly impacting families' financial resources.

This finding is consistent with Swain's report of an average expenditure of ₹1265, further underscoring the financial strain diabetes places on patients. Notably, we found that expenditure as a percentage of per capita income (PCI) averaged 64.76%, with some patients spending over 392% of their PCI, indicating catastrophic health expenditure, a concern also highlighted in studies by Ghosh et al and Brar et al.[9,10]

The frequency of blood sugar monitoring among our participants showed that 42.7% monitored their levels weekly, which is crucial for effective diabetes management. This practice was less prevalent in Basu's et al study, where a high burden of missed appointments was noted, suggesting that accessibility and adherence to treatment plans are vital to managing diabetes effectively.

Moreover, our findings regarding medication use indicate that a majority (62.7%) of patients were on a combination of insulin and oral hypoglycemic agents, similar to the treatment regimens reported in the studies by Swain et al and Ghosh et al.[9] The high dependency on medications aligns with the substantial monthly OOP expenses reported across various studies, including Brar et al, where the OOP expenditure on outpatient consultation for diabetes was reported at ₹4381 per month. Furthermore, Saini P et al,[11] found that the mean annual expenditure on diabetes management reached up to ₹25,000, indicating an increasing financial burden on families over time, which mirrors trends observed in our study.

S Murade et al concluded that the out-of-pocket expenditure also includes various screening for diabetes complications like diabetic retinopathy, neuropathy and nephropathy.[12] A Chate et al studied complications of diabetes and evaluated various causes of extra expenditure in diabetes treatment including treatment for diabetes skin diseases.[13]

Finally, our study's insight into transportation costs and other associated healthcare expenses emphasizes the comprehensive financial burden

diabetes imposes on families. This is further corroborated by M Nanda et al., who reported that transport costs accounted for nearly 15% of total OOP expenditure among diabetes patients.[14] Additionally, Patil R S et al. noted that 45% of patients reported borrowing money to meet their diabetes-related expenses, underscoring the financial distress faced by many families.[15] The recognition of these economic challenges is essential for developing targeted healthcare policies to alleviate the financial strain on diabetes patients and improve their overall quality of life.

Furthermore, our results stress the importance of policy interventions aimed at reducing these costs. Physical exercise must be particularly promoted to the newly diagnosed diabetic patients as it costs almost nothing. Measures to enhance rural employment, the socioeconomic status and purchasing power parity and reducing the cost on daily consumables so as to reduce the inflation can go a long way in achieving the objectives. By understanding the economic implications of diabetes care, healthcare providers and policymakers can develop targeted strategies to alleviate the financial burden on patients. This could involve enhancing access to affordable medications, implementing comprehensive health insurance coverage, and promoting patient education on cost-effective management strategies. Ultimately, addressing the out-of-pocket expenses associated with diabetes is crucial for improving the quality of life for patients and ensuring better health outcomes.

CONCLUSION

In conclusion, our study highlights significant insights into the out-of-pocket expenditure incurred by patients with diabetes, emphasizing the financial challenges they face in managing their condition. The results suggest that costs related to medications, regular monitoring, and complications significantly contribute to this financial strain, underscoring the need for effective financial support systems for diabetes management.

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