

Original Research Article

ECONOMIC BURDEN AND QUALITY OF LIFE OF PATIENTS WITH TYPE 2 DIABETES IN A RURAL AREA OF MALAPPURAM DISTRICT, KERALA

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ABSTRACT

Background: Diabetes mellitus increases healthcare costs and reduces patient productivity, leading to long term financial strain and poorer quality of life. Due to the paucity of data on the economic burden and quality of life among type 2 Diabetic patients in Kerala, this study was planned to assess the economic burden and quality of life of patients with type 2 Diabetes mellitus in a rural area of Malappuram district, Kerala.

Materials and Methods: A community based cross-sectional study was done over a 14-month period among 306 chronic Type 2 DM patients. Malayalam version of WHO-BREF QOL questionnaire was used to assess quality of life. Economic burden was assumed when health expenditure equaled or exceeded 10% of total household expenditure. **Results:** The mean age of the study participants was 61.62 ± 10.52 years. About three-fourth of the study population were having co-morbidities along with Diabetes mellitus. About 70% were having macro-vascular complications whereas only 37% were having micro-vascular complications. About 36% of the study participants were having economic burden. The economic burden was significantly associated with macro vascular and micro vascular complications, private source of treatment, oral hypoglycemic agents and emergency costs. More than half participants (52%) were having poor quality of life. Poor quality of life was significantly associated with economic burden. **Conclusion:** Comprehensive diabetes management strategies should go beyond clinical care and also address financial challenges, provide psychosocial support, and improve access to affordable treatment.

Keywords: Diabetes mellitus, Economic burden, Kerala, Quality of life, Type 2 Diabetes mellitus.

INTRODUCTION

South Asia, which is home to about a quarter of the world's population, is going through an epidemiological transition right now, with a huge rise in the number of non-communicable diseases.^[1] Diabetes is a growing concern and continues to pose a serious threat to most Indian households. The prevalence of diabetes in India has risen to a staggering 10.1 crore in recent times.^[2] Diabetes imposes a significant financial strain on the healthcare system. It requires lifelong care and if not

treated appropriately can lead to multi-organ complications. In addition, loss of economic productivity will impose a significant economic burden on the affected individuals and their families.^[3] The cost of diabetes therapy increases linearly along with the duration of the disease. The average life-time cost of all drugs used in diabetes management is estimated at ₹ 19,45,135. The average total expenditure per patient per month was ₹ 1,265, out of which medical expenditure was ₹ 993 and nonmedical expenditure was ₹ 271.^[4,5]

In addition to the financial consequences of diabetes, uncontrolled diabetes frequently results in complications that impair the patient's quality of life (QoL). Effective management of diabetes necessitates strict adherence to treatment. However, these treatment regimens may impose significant lifestyle adjustments which may disrupt daily routine. When the perceived burden of treatment outweighs its benefits, patients may choose to compromise on achieving tight glycemic control, in favour of maintaining a sense of well being.^[6]

Estimating the cost burden of diabetes is crucial for understanding the magnitude of its economic impact and for guiding evidence-based policy and planning. Such insights are particularly valuable in resource-limited settings, where strategic allocation of health resources is imperative. Moreover, identifying key epidemiological and demographic factors associated with high expenditure can support the development of targeted interventions to reduce out-of-pocket spending. This will in turn help improve the overall quality of life among the diabetic patients. In this context, the present study aims to assess economic burden of diabetic patients and its impact on their quality of life.

MATERIALS AND METHODS

A cross-sectional study was conducted to assess the economic burden among patients with Type 2 Diabetes Mellitus. The study was carried out in Puzhakkattiri Panchayath, located in Malappuram district, Kerala, India. Five subcentres under this Panchayath were included in the study: Mannamkulam, Ramapuram, Kattilassery, Main centre, and Kadungapuram. Data collection was done by visiting households of patients registered under these 5 subcentres. The study was conducted over a 14-month period among chronic Type 2 DM patients with more than 5 years of the disease. Patients diagnosed with Type 1 Diabetes Mellitus; stroke or chronic bedridden illness; severe psychiatric illness and those who did not provide informed consent were excluded from the study.

The sample size was estimated based on 15% prevalence of economic burden by Pandey et al.^[7] The formula $Z_{\alpha/2} \sqrt{pq/d^2}$ was used with $Z_{\alpha/2}$ = standardized normal deviate at 95% Confidence interval (1.96); $p=15\%$; $q = (100-p) = 85$; d =absolute precision of 5%. Minimum sample size (n) was 306 (with the design effect=1.5). Data was collected from 310 patients. There are a total of 1170 Chronic Diabetic patients in Puzhakkattiri Panchayath. Proportional sample size in each subcentre was calculated to be Mannamkulam (56), Ramapuram(74), Kattilassery(60), Main center (60), Kadungapuram(56) respectively. By using Systematic random sampling, the required sample size was taken from 5 subcentres of Puzhakkattiri FHC. The sampling interval was calculated for each subcentre, $k = 217/56 = 4$. If a household contains

more than one diabetic patient for more than 5 years, only one subject will be taken. If the study participant was not present during house visit, investigator contacted them over phone and visited them by taking a prior appointment.

The purpose of the study was explained to the patient and a written informed consent was obtained from the participants. Study subjects were interviewed by employing a predesigned structured questionnaire which included socio-demographic details, comorbidities, complications, treatment details, total costs for treatment (for assessing Economic burden), along with a Malayalam version of WHO-BREF QOL Questionnaire (for assessing Quality of life). Economic burden was assumed when health expenditure equaled or exceeded 10% of total household expenditure.^[7] Those study participants having total scores equal or higher than the mean total scores were considered to have good quality of life. The domains included Domain 1: physical health, Domain 2: psychological health, Domain 3: social relationships and Domain 4: environmental health. The data was analysed using SPSS version 25. Association between economic burden, quality of life and various factors were analysed using Pearson's chisquare test. The Fisher exact test was used when the expected count was lower than 5. The level of significance was estimated with 95% confidence intervals and p value <0.05 . Variables found to be associated with economic burden and quality of life was subjected to logistic regression.

RESULTS

Mean age of the study participants is 61.62 ± 10.52 (Minimum= 30 Years and Maximum=90 years). Majority (85.8%) were belonging to the age group more than 50 yrs. The proportion of males and females were comparable. More than half of the study participants were Muslims, followed by Hindu and Christian religion. About half of the study participants have completed Higher secondary or Upper –primary level of education. Nearly 15% had less than lower primary level of education. About 5% could either read or write their name. Only 1.3% of the study participants were illiterates. But nearly 7% of them have either completed degree or professional level of education. Most of the participants (73.5%) are unemployed/ retired. Among the employed ones, most of them were having semi-skilled work as occupation followed by clerical, unskilled and skilled. Nearly 3% of them were professionals. [Table 1]

About three-fourth of the study population were having co-morbidities along with DM. 66.7% of the study participants were having hypertension only and 31.9 % of the study participants were having dyslipidemia only as co- morbidity. Only 26.9% were having both hypertension and dyslipidemia. Among the 29% of Diabetics with macro-vascular complications, 23.5% were suffering from coronary

heart disease, 4.5% of them were suffering from peripheral vascular disease and 4.2% of them had stroke as complication of DM. Among the 36.5% of Diabetics with Microvascular complications, 23.9% of the study participants were suffering from Diabetic neuropathy, while 14.8 % were having Diabetic retinopathy and only 7.4% of them were having Diabetic nephropathy. [Figure 1]

More than half (63%) of the study participants were seeking Allopathy treatment from private hospital and only 32.6% of the study participants were taking from Government Hospital. Less than 1% was taking other types of treatment including Ayurveda and Homeopathy.

The median direct cost was higher (INR 1215) when compared with indirect costs. About 36% of the study participants were suffering from economic burden, i.e., they were spending more than 10% of household expenditure on total costs for treatment.

Quality of life was poor in more than half of the study subjects (52%). Among the four domains of quality of life among the study participants, the psychological health domain score was the lowest and social relationships domain score was the highest. Among the Diabetic patients with poor quality of life, scores of domain 4 was highest followed by domain 3, domain 1 and domain 2 (domain 4>3>1>2) in decreasing order whereas among the good quality of life, scores of domain 2 is

highest followed by domain 1, domain 3 and domain 4 (domain 2>1>3>4) in decreasing order.

Economic burden was higher among those with microvascular and macrovascular complications as compared to those who did not have these complications. The difference was found to be highly significant (p= 0.006 and p=0.0001 respectively). More than half opted private hospitals for their diabetic treatment and had proportionately higher economic burden as compared to those who opted for government hospitals (p=0.001). Statistically significant economic burden was noted among those on Oral hypoglycaemic agents (OHA) and insulin when compared to those on OHA alone (p=0.003). [Table 2]

Poor quality of life was noted in 70% of subjects with economic burden as compared to 43% without economic burden. The difference was found to be statistically significant (p=0.001). On multivariate logistic regression, economic burden was significantly associated with macrovascular complications, the source of treatment and emergency costs. [Table 3] Quality of life was found to be significantly associated with marital status, socio-economic status, physical exercise, emergency cost and economic burden. [Table 4]

Table 1: Distribution of study participants according to socio-demographic variables

Domain	Variable	N (%)
Age	≤50 years	44(14.2)
	>50 years	266(85.8)
Gender	Female	153(49.4)
	Male	157(50.6)
Religion	Christian	16(5.2)
	Hindu	102(32.9)
	Muslim	192(61.9)
Marital status	Currently married	256(82.6)
	Not married	48(15.5)
	Widowed/ Divorced	6(1.9)
Educational status	Illiterate/ Up to higher secondary	197(63.5)
	More than higher secondary	113(36.5)
Occupation	Skilled worker and above	43(13.9)
	Others	267(86.1)
Socio economic classification	Class 1	144(46.5)
	Class 2	103(33.2)
	Class 3	45(14.5)
	Class 4	16(5.2)
	Class 5	2(0.6)
Type of family	Single	5(1.6)
	Nuclear	104(33.5)
	Three generation	116(37.4)
	Joint	85(27.4)

Table 2: Association between diabetic variables and economic burden

Diabetic variables		Economic burden		Total	p value
		Absent	Present		
Microvascular	Absent	137 (69.5)	60(30.5)	197	0.006
	Present	61(53.9)	52(46.1)	113	
Macrovascular	Absent	170(76.9)	51(23.1)	221	0.0001
	Present	28(31.5)	61(68.5)	89	
Source of treatment	Government	85(84.2)	16(15.8)	101	0.001
	Private	113(54.1)	96(45.9)	209	
Treatment modality	OHA	182 (66.9)	90 (33.1)	272	0.003

	Insulin alone/ OHA plus Insulin	16 (42.1)	22(57.9)	38	
Cost for emergency	Absent	188	29	217	0.001
	Present	10	83	93	

Table 3: Logistic regression analysis of economic burden with significant variables

Determinants of Economic Burden	P-value	Adjusted odd's ratio	95% CI for odd's ratio	
			Lower	Upper
Macrovascular complications	0.028	0.414	0.188	0.911
Microvascular complications	0.9	0.953	0.446	2.033
Source of treatment	<0.001	0.201	0.081	0.503
Treatment modality	0.246	0.526	0.178	1.556
Cost for emergency	<0.001	0.022	0.009	0.052

Table 4: Logistic regression analysis of quality of life with significant variables

Determinants of quality of life	P-value	Adjusted odd's ratio	95% CI for odd's ratio	
			Lower	Upper
Age class	0.051	0.431	0.185	1.003
Marital status	<0.001	4.655	2.031	10.668
Occupational status	0.484	0.788	0.405	1.534
Socio-economic status	0.001	0.081	0.033	0.199
Associated-comorbidities	0.147	0.625	0.331	1.18
Source-of treatment	0.623	1.172	0.622	2.21
Treatment modality	0.068	0.466	0.205	1.059
Physical exercises	<0.001	4.672	2.283	9.561
Cost emergency	0.039	2.778	1.051	7.345
Economic burden	<0.001	0.161	0.061	0.427

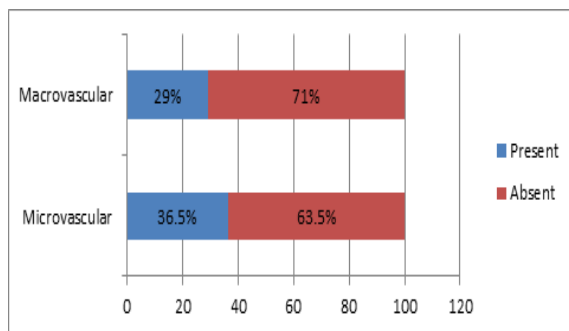


Figure 1: Vascular complications of Diabetes Mellitus among the study subjects

DISCUSSION

In this study, we aimed to assess economic burden of chronic Type 2 diabetic patients and its impact on their quality of life.

Among 310 study participants, about 36% were found to have high economic burden. The median direct cost was higher (INR 1215) when compared with indirect costs. In a study done by Eshwari et al, the annual median (IQR) expenditure incurred by T2DM patients was 5041 (2516–11,224) with direct cost of INR 4282 (1926–9521) and indirect cost of INR 462 (150–1557).^[8] This was higher when compared to the present study. In a systematic review done by Sathyanath et al, the mean expenditure on diabetes and its complications was calculated as INR 15,535 per year, with a pooled mean of INR 17,080 per year.^[9] A study done in Gujarat found Mean total cost associated with Diabetes mellitus to be 12391.84 INR. Contributions from direct medical cost, direct non-medical cost and indirect cost were 74%, 2% and 24% respectively.^[10]

Economic burden was observed to be notable high in those with microvascular and macrovascular complications. A study done in Bangladesh by Afroz et al found that the presence of any complication were significantly associated with higher costs.^[11] A study done in Chennai observed that patients with foot complications (19020 INR) and those who had two complications (17633 INR) spent four times more and patients with renal disease (12690 INR), cardiovascular (13135 INR) and retinal complications (13922 INR) spent three times more than patients without any complications (4493 INR).^[12]

Those who opted for private hospitals for their treatment had proportionately higher economic burden as compared to those who opted for government hospitals in the present study. A study in Karnataka observed that more than 80% patients availed diabetes-related care from private health-care facilities and the expenditure was eight times higher than people visiting government facilities.^[8,13]

In the current study, economic burden was higher among those who were on insulin along with or without oral hypoglycemic drugs. This is in line with studies done by Jalilian et al and Afroz et al.^[14,11] Similar finding was noted in a study done in South India with median cost of illness found to be higher among diabetic patients on insulin.^[15] Medical emergencies other than that of diabetes were also observed to increase the economic burden significantly in the present study. Events of hospitalization were identified as significant predictors of expenditure in a study done in Karnataka.^[8]

Higher economic burden was a significant predictor of poor quality of life in the present study. The Maastricht study done in Netherlands showed that

people with type 2 diabetes have substantially higher societal costs and lower quality of life than people with normal glucose tolerance.^[16] A study done in Ethiopia found that poor glycemic control, longer duration of diabetes, insulin usage and having diabetes-related complications were significant negative predictors of HRQoL.^[17]

CONCLUSION

The findings of the study highlight that diabetes imposes a considerable economic burden on patients, influencing both direct and indirect medical expenses. Beyond the expenses, diabetes also affects patients' quality of life, particularly the physical and psychological domains. These results underscore the importance of comprehensive diabetes management strategies that go beyond clinical care to also address financial challenges, provide psychosocial support, and improve access to affordable treatment.

Declaration

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