

Assessment of Blood Sugar Levels and Expenditure Incurred by the Diabetic Subjects of Rajeev Nagar Area, Vijayawada, Andhra Pradesh

Panabaka Ramesh Babu

Assistant Professor, Dept. of Community Medicine, Siddhartha Medical College, Vijayawada, Andhra Pradesh 520008, India.

Chinta Durgakumar

Assistant Professor, Dept. of Community Medicine, Siddhartha Medical College, Vijayawada, Andhra Pradesh 520008, India.

Abstract

Background: India leads the world with largest number of diabetic subjects earning the dubious distinction of being termed the “diabetes capital of the world”. Due to rising prevalence across all countries and it has been granted the status of “public health priority” in most of the nations. *Objectives:* To find out the glycemic status and also the expenditure spent by the diabetics. *Material and Methods:* The present study is conducted over 510 subjects, in Rajeev Nagar (Urban Slum), which is a field practice area of Siddhartha Medical College, Vijayawada. *Results:* In the present study, 510 subjects were analyzed. Among them, the majority (208) 40.8% accounted for the age group of 55-64 years and least (11) 2.2% were in the age group of 35-44 years. The overall mean age of the study subjects was 62.63. The mean HbA1C value for females was 8.5 and for males 8.6 and the overall mean HbA1C value in both sex were 8.5 and it ranges from 4.8 to 12.5. The monthly mean direct expenditure was Rs.670, maximum expenditure was Rs.2450 and minimum expenditure was Rs.150. *Conclusion:* The expenditure incurred in the management of Diabetes depends on the duration of diabetes, the source of health care and the glycemic status and it does not depend on gender, education, and socio-economic status and awareness levels. On the whole, the present study shows that there is still a lot of scopes to reduce the expenditure incurred in the management of diabetes.

Keywords: Diabetes; Glycemic Status; Expenditure.

Introduction

The term “Diabetes Mellitus” describes a metabolic disorder of multiple aetiology characterized by chronic hyperglycemia with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action, or both. The effects of diabetes mellitus include long-term damage, dysfunction and failure of various organs [1].

As per the estimates are given by International Diabetes Federation (IDF), there are about 382 million people worldwide, or 8.3% of adults are estimated to have diabetes and almost half of the adults with diabetes are between the ages of 40 and 59 years.

About 80% of the diabetics live in low- and middle-income countries. All types of diabetes are on the increase, type 2 diabetes in particular and if these trends continue, by 2035, some 592 million people, or one adult in 10, will have diabetes. This equates to approximately three new cases every 10 seconds or almost 10 million per year. The prevalence of diabetes in 2013 in India is 9.1% slightly higher than the world average of 8.3%. However, due to its very large population, India has the world’s largest population living with diabetes after China. India accounts for 65.1 million diabetes cases which contribute to about 17% of the total diabetes cases that are present globally [2].

The National Urban Diabetes Survey (NUDS), a population-based study was conducted in six metropolitan cities reported that the age-standardized prevalence of type 2 diabetes was 12.1% and that the prevalence in the southern part of India was found to be higher-13.5% in Chennai, 12.4%, in Bangalore, and 16.6% in Hyderabad; compared to 11.7% in eastern India (Kolkata), 11.6 percent in northern India

Corresponding Author: Chinta Durgakumar, Assistant Professor, Dept. of Community Medicine, Siddhartha Medical College, Vijayawada, Andhra Pradesh 520008, India.

E-mail: surenderjakkam@gmail.com

Received on: January 21, 2018

Accepted on: February 09, 2018

(New Delhi) and 9.3% in western India (Mumbai). The study also suggested that there was a large pool of subjects with impaired glucose tolerance (IGT), 14 percent with a high risk of conversion to diabetes [3]. In urban and rural India, prevalence rates of diabetes are increasing rapidly with estimation of 2:1 to 3:1. These prevalence rates are being maintained from the last 2-3 decades but in Kerala where rural prevalence rates are caught up or overtaken urban prevalence rates [4].

Need for the Study

The low awareness levels regarding Diabetes and its complications [5-7] leads to the onset of the disease at an early age and also will eventually lead to high costs (both direct and indirect costs) [8-9]. The analysis of healthcare costs set preconditions for further full economic evaluation of patients with Type 2 Diabetes Mellitus management.

Evaluation of the economic cost of diabetes mellitus and its predictive factors help to inform policymakers and to motivate their change and reduce healthcare resources. A literature search on cost of diabetes care in developing countries including India showed very few studies and none from Andhra Pradesh. So the present study is conducted to find out the glycemic status and also the expenditure spent by the diabetics in Rajeev Nagar (Urban Slum), which is a field practice area of Siddhartha Medical College, Vijayawada.

Aim and Objectives

1. To estimate the glycaemic status (HbA1C) of the study subjects.
2. To find out the expenditure incurred by the study subjects for the management of Diabetes.

Materials and Methods

This Cross-sectional study was done in Rajeev Nagar Vijayawada from November 2013 to October 2015. Self-reporting diabetic individuals aged 18 and above, Individuals who were permanent residents of the study area, Individuals willing to cooperate and participate in the study and who were certain about staying in the study area for the next one year were included in this study. Type I Diabetics, Gestational Diabetes, seriously ill subjects, Visitors, Those who don't give consent to be a part of the study were excluded from the study.

The pre-tested semi-structured questionnaire used for socio-demographic and diabetic profile and Awareness on diabetes. The printed book let used for recording the expenditure incurred by the diabetic subjects.

Sterile Test tubes containing Ethylene Diamine Tetra Acetic Acid (EDTA) For collecting blood samples. The data collected were tabulated and analysed statistically by using statistical software SPSS (V.12). Descriptive statistics such as mean, percentages and standard deviation were computed. Inferential statistical test such as Chi-square test was applied for analyzing the data.

Results

In the present study, 510 subjects were analyzed. Among them, majority (208) 40.8% accounted in the age group of 55-64 years followed by (165) 32.4% were in 65-74 years, (76) 14.9% were in 45-54 years, (50) 9.8% were in 75-84 years, (11) 2.2% were in 35-44 years and 0% in age group of 18-34 years. The mean age of the study subjects was 62.63. In this study females were (293) 57.5% and males were (217) 42.5%.

Among the study subjects, the majority (421) 82.5% were "Married", Widow/Widowers" were (71) 13.9%, "Unmarried" was (10) 2% and "Divorced" were (8) 1.6%. among the study subjects (249) 48.8% were "unemployed" and (151) 29.6% were unskilled workers. Only (28) 5.5% were skilled workers and (46) 9% were Clerical workers/Shop Owner/Farmers.

In the present study, based on the HbA1C levels it was observed that (108) 21.2% of the diabetics were categorized as "Stabilized Diabetes", (71) 13.9% belong to "Good Control", (98) 19.2% belong to "Fair Control" while (114) 22.4% belong to "Unsatisfactory Control" and (119) 23.3% belong to "Poor Control". The mean HbA1C value for females was 8.5 and for males 8.6 and the overall mean HbA1C value in both sex were 8.5 and it ranges from 4.8 to 12.5.

In the present study majority (273) 53.5% of the diabetic subjects had to pay Rs.301-600 per month for the management of Diabetes while (137) 26.9% of them had to pay Rs.601-900 per month for the management of Diabetes, about (78) 15.3% of the subjects had to pay more than Rs.901 and (22) 4.3% had to pay less than Rs.300 for the management of Diabetes. The monthly mean direct expenditure was Rs.670, maximum expenditure was Rs.2450 and minimum expenditure was Rs.150.

Table 1: Gender vs. Monthly expenditure

		Monthly Expenditure in INR		Total
		< Rs 600	>=Rs 600	
Gender	Male	120 (40.7%)	97 (45.1%)	217 (42.5%)
	Female	175 (59.3%)	118 (54.9%)	293 (57.5%)
	Total	295 (100.0%)	215 (100.0%)	510 (100.0%)

Chi-Square Value- 1.002, df- 1, P value- 0.316

Table 2: Educational status vs. Monthly expenditure

		Monthly Expenditure		Total
		< Rs 600	>=Rs 600	
Education	Illiterate	88 (29.8%)	81 (37.7%)	169 (33.1%)
	literate	207 (70.2%)	134 (62.3%)	341 (66.9%)
	Total	295 (100%)	215 (100%)	510 (100%)

Chi-Square Value- 3.45 df - 1, P- 0.063

Table 3: Socioeconomic status (SES) vs. Monthly expenditure

		Monthly expenditure (In Rs.)		Total
		< Rs 600	>= Rs 600	
SES	Upper middle (16-25)	221 (43.3%)	175 (34.3%)	396 (77.6%)
	Lower middle (11-15)	66 (12.9%)	36 (7.1%)	102 (20.0%)
	Upper lower (5-10)	8 (1.6%)	4 (0.8%)	12 (2.4%)
	Total	295 (57.8%)	215 (42.2%)	510 (100.0%)

Chi-Square Value- 3.03, df - 2, P- 0.220

Table 4: Duration of diabetes vs. Monthly expenditure

		Monthly Expenditure		Total
		< Rs 600	>= Rs 600	
Duration of Diabetes (in years)	1-5	174 (66.4%)	88 (33.6%)	262 (100%)
	6-10	95 (53.6%)	82 (46.4%)	177 (100%)
	>10	26 (36.6%)	45 (63.4%)	71 (100%)
	Total	295 (57.8%)	215 (42.2%)	510 (100%)

Chi-Square Value- 22.267, df - 2, P- 0.001

Table 5: Source of health care vs. monthly expenditure

		Monthly Expenditure		Total
		< Rs 600	>=Rs 600	
Source of health care	Govt.	170 (57.6%)	78 (36.3%)	248 (48.6%)
	Pvt.	125 (42.4%)	137 (63.7%)	262 (51.4%)
	Total	295 (100%)	215 (100%)	510 (100%)

Chi-Square Value-22.68, df - 1, P- 0.001

Discussion

Age, Gender

In the present study, 510 subjects were recruited. Among them, the majority (208) 40.8% accounted for the age group of 55-64 years and least (11) which accounted for 2.2% were in the age group of 35-44 years. The Mean age of males was 61.36 and the mean age of females was 63.56 and the overall mean

age of the study subjects was 62.63. Ankit Mahajan et al. [10] in their study done in Jammu and Kashmir, the age-wise distribution of diabetes in Jammu population showed that approximately one-third of the diabetic patients were in the age group of 40-49 years, the same study in Kashmir population nearly 40% of diabetic patients in the age group of 50-59 years. Mayur Patel et al. [11] in their study conducted in Gujarat revealed that the type 2 diabetic subjects were evenly distributed in

four quartiles of age with the mean of 47.70 ± 10.94 years. Of the study population, 62% were male, and 38% were female. In the present study majority of the study subjects were females accounting for 57.5% of the total patients interviewed. While the percentage of males was 42.5%. (Table 1).

Marital Status

In the present study majority (82.5%) of the study subjects, were "Married", Widow/Widowers" were 13.9%, "Unmarried" were 2% and "Divorced" were 1.6%. Different studies showed that most of the diabetics were married. Mayur Patel et al. [11] in their study revealed that 96% of diabetics are married. This may be accidental as that most of the diabetics are adults who are married by then.

Occupation

In the present study the, the majority of study subjects (249) 48.8% were "unemployed" which includes house wives and 29.6% were unskilled workers. Only 5.5% were skilled workers and 9% were Clerical workers /Shop Owner/Farmers. A Study [12] done in seven Indian states revealed that in both urban and rural areas that most of the diabetics were house wives, i.e. 31.6% in urban area and 38.6% in rural areas.

And in urban after house wives, most of the diabetics were working in managerial status (23.8%), and in rural, after house wives, the diabetics are professionals (21.7%). The present study correlates with other studies as the main occupation of the study subjects were unemployed/house wives.

Glycemic Status

In the present study, based on the HbA1C levels it was observed that 21.2% of the diabetics were categorized as "stabilized diabetes" (HbA1C 4.5-7.0), 13.9% belong to "good control" (HbA1C 7.1-8.0), 19.2% belong to "fair control" (HbA1C 8.1-9.0) while 22.2% belong to "unsatisfactory control" (HbA1C 9.1-9.9) and 23.3% belong to "poor control" (HbA1C ≥ 10). The mean HbA1C value for females was 8.5 and for males 8.6 and the overall mean HbA1C value in both sex were 8.5 with SD ± 1.6 and it ranges from 4.8 to 12.5. The Delhi Diabetes Community (DEDICOM) survey conducted by Jitender et al. [13] revealed that 41.8% had poor glycemic control (A1C $> 8\%$), and 38% are having HbA1C < 7 . This shows the similarity between the present study and the DEDICOM survey that the mean HbA1 C value showed same results i.e. around 8.5.

Education Vs Expenditure Incurred

In the present study, out of 295 study subjects whose monthly expenditure on diabetes is $< \text{Rs.}600$, 29.8% of the study subjects are illiterates and 70.2% of the study subjects are literates and out of 215 study subjects whose monthly expenditure on diabetes is $\geq \text{Rs } 600$, 37.7% of the study subjects are illiterates and 62.3 % of the study subjects are literates and there is no significant association between education and expenditure but when compared to the study done in Karachi [8], it shows that more educated study subjects spend more on diabetes care and this difference was significant ($p < 0.001$). (Table 2).

SES Vs. Expenditure

In the present study, out of 396 study subjects who belong upper middle socioeconomic status, 221 (43.3% $n=510$) study subjects are spending $\text{Rs.} < 600/\text{month}$ for diabetes management and 175 (15.9% $n=510$) study subjects are spending $\geq \text{Rs } 600/\text{month}$ but out of 102 study subjects who belong to lower middle socio economic status 66 (12.9% $n=510$) study subjects spending $\text{Rs.} < 600/\text{month}$ for diabetes management and 36 (7.1% $n=510$) study subjects are spending $\geq \text{Rs } 600/\text{month}$ and there is no significant association between socio economic status and expenditure. Another study [8] showed that by a monthly family income, the direct and indirect cost was greater for the higher income families compared to lower income families and this difference was also significant ($p < 0.001$). Persons of higher SES were spending more as compared to those of lower SES and this difference was found to be significant for both direct ($p < 0.001$) and indirect ($p < 0.001$) costs. This difference in the present study from the previous studies might be because in our study there were no study subjects from upper and lower socio economic status and most of the study subjects from upper middle and lower middle. (Table 3).

Duration of Diabetes Vs Expenditure Incurred

In the present study, out of 262 subjects whose duration of diabetes is between 1 to 5 years, 174 subjects (66.4%) has the monthly expenditure of < 600 and 88 subjects (33.6%) has the monthly expenditure of > 600 . Similarly out of 71 subjects whose duration of diabetes is more than 10 years, 26 subjects (36.6%) has the monthly expenditure of < 600 and 45 subjects (63.4%) has the monthly expenditure of > 600 . This difference was found to be statistically significant ($p < 0.05$). A study in Chennai, on Expenditure on health care incurred by diabetic subjects in a

developing country by R. Shobhana et al. [14] revealed that those who had >5 years duration of diabetes spent more than those who had <5 years of duration~ Rs.5570 (360-75 200) and Rs.3220, (460-25 600), respectively. All differences between these subgroups were statistically significant. Within the ambit of economic aspects of the population in a developing country, the direct cost of diabetes health care is very high for many people. The subjects attending the private hospital were economically better off than those visiting the Government General Hospital (GGH). In the GGH, the treatment was free of cost to the patients since the Government takes care of the expenses involved. Hence the expenses incurred by the Private Hospital for Diabetes Mellitus (PHD) patients are highlighted. The direct cost involved was high in the case of PHD patients. Their median expenditure was Rs.4510. (360-75 200) per year. This clearly shows that the similarity between the present study and previous studies that the expenditure on diabetes increases with duration of diabetes. This may be because of complications, hospital admissions, development of co morbid conditions because of diabetes. (Table 4).

Source of Health care vs. Expenditure

In the present study, out of 295 study subjects whose monthly expenditure is < Rs.600, 57.6 % of the study subjects are using government source and 42.4% are using private Source for health care, out of 215 study subjects whose monthly expenditure is ≥Rs 600, 36.3% of the study subjects are using government source and 63.7% are using private Source for health care for management of diabetes. This is statistically significant. A study in developing country by R. Shobhana et al. [14]. Reported that the diabetic patients attending the private hospital were economically better than those visiting the Government General Hospital (GGH). In the GGH, the treatment was free of cost to the patients since the Government takes care of the expenses involved. Hence the expenses incurred by the Private Hospital for Diabetes Mellitus (PHD) patients are highlighted. The direct cost involved was high in the case of PHD patients. Their median expenditure was Rs.4510. (360-75 200) per year. (Table 5).

Conclusions

In this study overall mean age of the study subjects was 62.63 yrs. one-third of diabetics were “illiterates”.

Nearly half of the diabetics were “unemployed”. The mean duration of diabetes was 6.42 yrs. Almost all diabetics completely depend on medication for management of diabetes. Nearly fifty percent of the diabetics are using government source for health care.

The family history of Diabetes is more in females and the co-morbid conditions are more in males. Overall mean HbA1C value of diabetics was 8.5 and nearly half of study subjects’ glycemic status is unsatisfactory to poor control. Half of the study subjects are having cardio vascular problems. 56.7% of the study subjects had the family history of Diabetes Mellitus.

The glycemic status does not depend on age gender literacy occupation socioeconomic status, awareness levels, and duration of diabetes. The glycemic status depends on the source of health care, management of diabetes and expenditure incurred. Even though the findings of the study showed that there was an association between educational status and awareness levels about Diabetes, the awareness levels are not showing any impact on glycemic status and expenditure incurred.

The monthly mean direct expenditure was Rs.670 and only 7.8% subjects had good awareness of diabetes. The expenditure incurred in the management of Diabetes depends on the duration of diabetes, the source of health care and the glycemic status and it does not depend on gender, education, and socio-economic status and awareness levels.

On the whole, the present study shows that there is still a lot of scopes to reduce the expenditure incurred in the management of diabetes. This would help the people not only financially but also to improve their health status and not to move in the direction of complications but to lead a healthy and economically productive life.

References

1. World Health Organization. Department of Non-communicable Disease Surveillance. Definition, diagnosis and classification of diabetes mellitus and its complications: report of a WHO consultation. Part 1, Diagnosis and classification of diabetes mellitus [Internet]. Geneva: World Health Organization; 1999. 59p.WHO/NCD/NCS/99.2. Accessed on 26/11/2013.Available at URL:http://apps.who.int/iris/bitstream/10665/66040/1/WHO_NCDNCS_99.2.pdf.
2. Yesudian CAK, Grepstad M, Visintin E and Ferrario A. The economic burden of diabetes in India: a review of the literature. *Globalization and Health* 2014; 10:80. (Online). on (13/03/2014).Available from URL:

- <http://www.globalizationandhealth.com/content/10/1/80>.
3. Mohan V, Sandeep S, Deepa R, Shah B, Varghese C. Epidemiology of type 2 diabetes: Indian scenario. *Indian J Med Res.* 2007 Mar;125(3):217-30.
 4. Gupta S, Singh Z, Purty A, Kar M, Vedapriya D, Mahajan P et al. Diabetes prevalence and its risk factors in rural area of Tamil Nadu. *Indian J Community Med.* 2010;35(3):396.
 5. Rujul D, Vadgama P, Parth D. Effect of awareness of diabetes on clinical outcomes of Diabetes: An observational study at a private hospital in Gujarat. *National J Med Res.* 2012;2(4):493-96.
 6. Khapre MP, Mudey A, Goyal RC, Wagh V. Low awareness of diabetes affecting the clinical outcome of patient A cross-sectional study conducted in rural tertiary care hospital. *Int J Biol Med Res.* 2011;2(3): 627-30.
 7. Hoque MA, Islam MS, Khan MAM, Ahasan HAMN. Knowledge of diabetic complications in a diabetic population. *J Medicine* 2009;10(2):90-93.
 8. Khowaja L, Khuwaja A, Cosgrove P. Cost of diabetes care in out-patient clinics of Karachi, Pakistan. *BMC Health Services Research.* 2007;7(1):189.
 9. Kankeu HT, Saksena P, Xu K and Evans DB. The financial burden from non-communicable diseases in low and middle-income countries: a literature review. *Health Res Policy Syst.* 2013 Aug 16;11:31.
 10. Mahajan A, Sharma S, Dhar MK, Bamezai RNK. Risk factors of type 2 diabetes in population of Jammu and Kashmir, India. *J Biomed Res.* 2013 Sep;27(5): 372-379.
 11. Patel M, Patel IM, Patel YM, Rathi SK. A Hospital-based Observational Study of Type 2 Diabetic Subjects from Gujarat, India. *J Health Popul Nutr.* 2011 Jun;29(3):265-72.
 12. Ramchandran A, Ramchandran S, Snehalatha C, Augustine C, Narayanasamy M, Viswanathan V et al. Increasing expenditure on health care incurred by diabetic subjects in a developing country. *Diabetes Care* 2007 Feb;30(2):252-56.
 13. Nagpal J, Bhartia A. Quality of Diabetes Care in the Middle- and High- Income Group Populace - The Delhi Diabetes Community (DEDICOM) survey. *Diabetes Care* 2006;29:2341-48.
 14. Shobhana R, Rama Rao P, Lavanya A, Williams R, Vijay V, Ramachandran A. Expenditure on health care incurred by diabetic subjects in a developing country – a study from southern India. *Diabetes Res Clin Pract.* 2000 Apr;48(1):37-42.
-