Determinants of Expenditure on Diabetes Care: A Community Based Longitudinal Study in a Resettlement Colony of Delhi

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Abstract

Introduction: Diabetes is one of the expensive diseases due to its chronic nature and gradual involvement of multiple organs. Moreover loss of economic productivity further enhances the cost of care. Several factors were reported to have impact on overall economic burden in diabetic patients. So, the present study aims to determine influence of various socio-demographic and clinical factors on expenditure of diabetes care among patients residing in resettlement colony of East Delhi.

Methodology: A community based one year longitudinal study was conducted in Kalyanpuri area of East Delhi. All the diabetes patients aged 25 years and who were the permanent residents of Kalyanpuri, attending the Diabetic Clinic of a government hospital in November-December 2014 were selected for the study. A pre-tested semi-structured interview schedule was used as study tool. Each subject was followed up 3 monthly from January to December 2015.

Results: Data of 150 study subjects was analyzed. Out of 150 subjects 45(30 %) were male and 105 (70%) female. Overall mean age of study subjects was 53 ± 10 years Among socio-demographic factors, Expenditure on diabetes care showed significant association with male gender and among clinical factors, longer duration since diagnosis, use of insulin with oral hypoglycemic drugs, hospitalization and utilization of private care has shown positive association with expenditure on diabetes care.

Conclusions: The present study concludes that there is need of better provisioning of services for diabetes care in government health facilities to cater needs of growing diabetic population.

Introduction

Diabetes is one of the major lifestyle diseases in the world. Globally around 382 million people at a prevalence of 8.3% suffered from diabetes recently and this number is expected to reach 592 million in less than 25 years.1,2 In India too, the rising trend of diabetes is a big concern with more than 65.1 million people lived with diabetes in the year 2013 and will possibly reach 109 million by the year 2035.3

Diabetes is one of the expensive diseases in the world.4 It poses heavy economic burden on national economies and healthcare systems, especially in developing countries. Moreover the spending on diabetes by the countries is not evenly distributed as only 20% of global health expenditure on diabetes is made in low- and middle-income countries where 80% of diabetic population live.5 Studies in India estimated that for a low income Indian family with an adult with diabetes, as much as 25% of family income may be devoted to diabetic care as compared to 10% in USA.6

Cost of care is high because diabetes is a chronic disease, needs lifelong care and if not controlled often leads to multi organ involvement with various complications. Loss of economic productivity is another important attribute that has made diabetes highly expensive disease. Several factors were reported to have impact on overall economic burden in diabetic patients. Studies showed that cost of diabetes are affected by various demographic and clinical factors like age, gender, duration of disease, presence of complication and occurrence of hospitalization.

There is scarcity of valid data in India to estimate per capita annual expenditure on diabetes care and its determinants. Moreover, the available studies rarely addressed the issues in the setting of developing countries. An analysis of the socio-demographic and clinical factors that affect expenditure on diabetes care will help better understand the increasing medical cost of diabetes and better planning and implementation of health services for diabetes patients, especially in developing countries like India. The present study is a part of larger study7 aims to determine influence of various socio-economic and clinical factors on expenditure of diabetes care among patients residing in resettlement colony of East Delhi.

Methodology

Study design and data collection

The study was done at Kalyanpuri, a resettlement colony of East Delhi in the year 2014-15. It was a community based longitudinal study. The study was carried out from November 2014 to December 2015. During first two months enlisting and enrolment of the study subjects were done from the records of Diabetic Clinic of a local Government Hospital. All the diabetes patients (consecutive sampling) aged more than 25 years and who were permanent resident of Kalyanpuri, attending the Diabetic Clinic in November-December 2014 were selected for the study. Patients of gestational diabetes and those who did not give consent for study were excluded. After obtaining
the personal details of the patients from the diabetic clinic house visits were made for the selected subjects. Based on inclusion criteria, 153 subjects were enrolled. A semi structured interview schedule was used after doing adequate pretesting for collection of data. Data was collected by house to house visits to residence of diabetic patients. Each subject was followed up 3 monthly from January 2015-December 2015. In the first visit a small diary was recorded. The subjects were also told to keep record of all prescription and bills made during the study period. The details of expenditure on diabetes care incurred every quarterly by the subjects were recorded.

Data about Direct and indirect expenditure were collected. Direct expenditure included the cost of medicine, doctor’s fees, investigation, inpatient care (in case of hospitalization) and treatment of complications like cataract operation, laser, dialysis etc. Cost of transportation and diet modification were also included in direct expenditure. Loss of wages for visiting the doctor, illness or premature loss of work was considered as indirect expenditure. Besides expenditure, information on various socio-demographic factors like, age, gender, education, occupation, total monthly family income and socioeconomic status was collected. Clinical details of patients were also taken like type of disease, duration since diagnosis, place of care, number of visits, type of medications, presence of history of any hospitalization due to cause related to diabetes or its complications in preceding 3 months of each visit. Details of complications were collected from medical records and in some case self reported history was also taken.

Statistical analysis

SPSS version 16 was used for entering data. Mean, median and standard deviation were calculated for quantitative data. Proportions were calculated for qualitative data. Due to skewness of data, test of normality was used to see Gaussian pattern of data. For parametric test, Mann whitney U test and Kruskal Wallis test were used to compare mean expenditure among various socio-demographic and clinical factors and p value <0.05 has been considered statistically significant.

Ethical approval

Ethical approval was taken from ethical body of Lady Hardinge Medical college. Permission was granted from the Government Hospital for enrolment of diabetes patients. Written consent from literate and thumb impression from illiterate subjects were taken after informing them the purpose of the study.

Results

Out of 153 subjects initially enrolled, 2 migrated and 1 died during the course of study. Hence 150 subjects were analysed at the end of study. Out of 150 subjects 45(30 %) were male and 105 (70%) female. More than half of study participant i.e.63.5% belonged to age group 45-65 years. Overall mean age of study subjects was 53 ± 10 years. The mean age for men was 53 ±11 years and for women 53 ± 9 years.

Almost half of study subjects i.e. 49.2% were illiterate. Illiteracy rate was more in female (64.8%) as compared to male (13.3%) (x² 40.28, p value <0.001). Maximum study subjects i.e. 73(48%) belonged to upper lower socio economic status followed by middle i.e. 71(47.3%) whereas 6(4 %) study subjects belonged to upper socioeconomic class. None of the subjects were from lower socioeconomic status.

In the study almost all subjects 149 (99.3%) were type 2 diabetes except one case of type 1 diabetes. So, data related to type I diabetes could not be analyzed separately.

The pattern of expenditure has already been explained in our previous work. Here we tried to find out the association of expenditure pattern with demographic and clinical profile of diabetics.

The mean annual expenditure was found significantly higher in male as compared to female (Rs. 11,815 vs Rs.7, 733) (p< 0.05). Other factors like age, education and socioeconomic status were not significantly associated with diabetes expenditure (Table 1).

There were significant positive association of mean annual expenditure with (longer) duration of diabetes (p value <0.013), receiving of both insulin and oral hypoglycemic drugs (OHA) (p value < 0.003), history of hospitalization during study period (p value<0.001) and utilizing private care facilities(<0.05) have been found in our study. Though annual expenditure was higher for diabetics with complications but results were not found statistically significant. (Details about co morbidities and complications has been put in another yet unpublished paper) (Table 2).

Discussion and Recommendations

There are very limited studies on assessment of diabetes expenditure and its determinants especially in India. Most of available studies are cross sectional which might not give exact pattern of annual expenditure and so, difficult to comment on determinants also. The present study is a sincere effort to overcome such limitation. Also all the patients were enrolled specifically from a tertiary care government hospital in a resettlement colony of East Delhi where majority are from lower and lower middle socioeconomic status. So, this study helps us to know the

### Table 1: Comparison of annual expenditure on the basis of socio-demographic profile

<table>
<thead>
<tr>
<th>Sociodemographic factors</th>
<th>Total expenditure (in Rs) (%)</th>
<th>Mean ±2SD</th>
<th>Median</th>
<th>Range</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age (in years)</strong></td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>25-65 (n=124)</td>
<td>11,01,209 (82.0)</td>
<td>8,880±11,337</td>
<td>5,094</td>
<td>200-65,280</td>
<td>&lt;0.202*</td>
</tr>
<tr>
<td>≥ 65 (n=26)</td>
<td>2,42,501 (18.0)</td>
<td>9,326±13,560</td>
<td>3,206</td>
<td>00-51,556</td>
<td></td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male (n=45)</td>
<td>5,31,689 (39.6)</td>
<td>11,815±14,415</td>
<td>5400</td>
<td>00-59,460</td>
<td>&lt;0.049**</td>
</tr>
<tr>
<td>Female (n=105)</td>
<td>8,12,021 (60.4)</td>
<td>7,733±10,164</td>
<td>3818</td>
<td>200-65,280</td>
<td></td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
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</tr>
<tr>
<td>Illiterate (n=74)</td>
<td>8,12,021 (60.4)</td>
<td>7,965±9,326</td>
<td>3,726</td>
<td>200-65,280</td>
<td>&lt;0.948***</td>
</tr>
<tr>
<td>Primary and middle school</td>
<td>8,63,116 (46.9)</td>
<td>9,864±13,792</td>
<td>4,980</td>
<td>00-65,280</td>
<td></td>
</tr>
<tr>
<td>High school and above</td>
<td></td>
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<tr>
<td>(n=64)</td>
<td>1,22,979 (9.2)</td>
<td>10,248±13,256</td>
<td>5,260</td>
<td>2,632-49,275</td>
<td>&lt;0.948***</td>
</tr>
</tbody>
</table>

*(Mann Whitney U test, **Unpaired t-test, ***Kruskal Wallis test)
Determinants of diabetes expenditure in such population taking treatment from a government hospital where it is expected that most of services will be free of cost.

In our study, annual per capita expenditure was found significantly higher in males as compared to females (p value <0.049). The same finding has been reported by Akari et al, Rayappa et al and many foreign studies. The higher indirect expenditure in terms of wage loss may be the possible justification for this difference as most of male diabetics were daily wage earners and the females in majority were homemakers. Also, better health seeking behavior could be another reason for higher expenditure among male.

Expenditure on diabetes care significantly increased with duration of diabetes (p value < 0.013) and same has been echoed by Akari et al, Ramachandran et al, Kumar et al, Rayappa et al and also by some foreign studies conducted in Thailand, China and Singapore. Complications increase with duration of diabetes, resulting in additional cost on medication, monitoring and hospitalization. In this study also, complication was present in 87.5% patients with duration more than 10 years as compared to only 34.7% of patients with duration of disease less than 10 years.

In present study annual mean per capita expenditure was significantly high (p value <0.033) among subjects on insulin injections and oral hypoglycemic agents (OHA) as compared to subjects on OHA only. This association has also been reported by various Indian and foreign studies. The higher cost is not only attributed by the cost of insulin itself (if not available free of cost) but also the cost of syringes. Type 2 diabetics become insulin dependent in later stages of their life after a long duration of disease.

We found that the cost of care significantly increased among study subjects with history of hospitalization despite presence of a well functional government hospital in the study area (p value <0.001). As much as 42.9% of all diabetes related hospitalisations in our study was made in private hospitals which is a matter of challenge for Government health policies. Akari et al, Rayappa et al and some global studies have also reported the inpatient treatment as one of the strong determinant of expenditure on diabetes care.

Cost of care was also higher in subjects aged more than 65 years which is coherent with the fact that diabetes related complications increased with age and duration of disease. However, we feel that the expenditure is underestimated as awareness of complications of diabetes is likely to be low in an underprivileged community.

Though not statistically significant, the mean per capita annual expenditure was higher in subjects belonging to lower socioeconomic status than the well-off subjects. The low literacy level and lack of awareness are likely to be associated with under-privileged section which may lead to delay in diagnosis, poor health seeking, non-compliance and complication.

Our study concludes that expenditure on diabetes care was significantly higher among male patients, those who had longer duration of disease since diagnosis, those who taking both oral hypoglycemic drugs and insulin, had history of hospitalisation and taking treatment from private care facilities. Preventive measure to maintain controlled blood sugar level in diabetes patients has to be strictly taken which would decrease dependence on insulin, rate of complications and number of hospitalization. Also, there should be better provision of services for both acute and chronic complications of diabetes in Government health facilities so that preference to private facilities can be reduced. We also recommend similar large scale studies for estimation of cost on diabetes.

### References


