Original Article

DIRECT COST OF TREATMENT OF DIABETES MELLITUS TYPE 2 IN PAKISTAN

MUDASSAR HUSSAIN[1], SYED BAQIR SHYUM NAQVI[2], MAQSOOD AHMED KHAN[3], MEHWISH RIZVI[3], SHAZIA ALAM[3], ATTA ABBAS[3], MUHAMMAD AKRAM[1]

[1]Faculty of pharmacy, University of Karachi Sindh Pakistan, [2]Faculty of Pharmacy Hamdard University Karachi Sindh Pakistan, [3]Faculty of Pharmacy Ziauddin University Karachi Sindh Pakistan.
Email: pharmacist.mudassar@yahoo.com

ABSTRACT

Objective: Diabetes is a serious illness. It is a key and growing threat to the health of the global world. The prime concern of this research was to estimate the cost-of-illness of type 2 diabetes in Karachi, a major metropolitan city of Pakistan. This study was performed on the basis a community perspective to calculate the economic burden of diabetes mellitus type 2 in Pakistan.

Methods: This study was conducted in all districts of Karachi, the patients were taken from all economic segment of society from low income group, average revenue and high revenue group. A preliminary test questionnaire was used to collect the data directly from patients and in some locations conducted interviews with patients due to lack of understanding and un-educated patients. The total of 885diabetes patients was selected with convenient random sampling.

Results: The average direct cost of all these expense bear by diabetic patient in Pakistan is Pak Rupees Rs.5542 per month. The cost range starts from Rs. 650/month to 20000 per month on the basis of patient economic condition and disease state. The average appointment fee of a physician, laboratory test and medicines came to Rs. 700/visit, 400/test, and 1100/visit precisely. The average travel and food spent was Rs.200/visit and 1000/month. Medicine accounted for largest cost followed by consultation with the physician.

Conclusion: This is clearly indicated by this study that considerable cost is amounted by diabetes, it is suggested that a huge amount of resources could be prevented by taking care, initial understanding of the disease and a decrease in diabetes co-morbidities and complications through better diabetes mellitus treatment. Very extensive and cost-effective programs should be started to maximize health benefits and to diminish the prevalence of this epidemic.

Keywords: Diabetes, Cost of illness, Economic burden, Direct cost.

INTRODUCTION

Diabetic mellitus type 2 is a widespread and persistent disease which displays undue burden on society [1]. Among types of diabetes mellitus the global prevalence of diabetes mellitus type 2 is approximately 100 million people which may exceed up to 300 million in 2025 as reported by the forecast [2]. The probability of other diseases including cardiovascular disease, obesity, hypertension and dislipidemia become higher in patients suffering from diabetes mellitus type 2 [3].

These complications lower the scale of quality of life of patients as the ratio of morbidity and mortality increase [4] whereas society undergo in extreme burden due to health care cost [5, 6]. One of the studies conducted in 1998 in Europe reported three times more spending of healthcare facilities in the treatment of diabetes complications as compared to the onset of the disease before its complications [7]. Another study reported approximation about people mortality due to diabetes was 2.9 million [8]. Comparatively South Asia is found to be the place where diabetes is spreading more rapidly, the important countries of the said region comprises of India, Pakistan, Bangladesh, Nepal, Sri Lanka, Bhutan and Maldives where the predicted increase in diabetes from the year 2000 to 2030 is 40% [9]. An assessment has done by IDF Diabetes Atlas [10] on the global spending for the prevention and treatment of diabetes and its adverse events will be exceed by 114 USD billion in 2030.

The approximate calculation of worldwide health expenditure to stop and treat diabetes and its complication was at least 376 billion dollars (USD) in 2010. by 2030 this number exceeds 490 billion US dollar (USD). There is a huge inequality in health care expenditure on diabetes between regions and countries. Above 80% of the universal expenditure on diabetes are made in worlds' economically richest countries not in the low and middle income countries where 80% of people with diabetes will soon live [11].

Diabetes is known to be the costly disease due to its chronic nature and complications. Internationally, the lowest predictable direct disbursement of diabetes among 20 to 79 years of age is $153 billion per annum. Premature death, patient disability due to diabetes causes loss of productivity which ultimately produced economic burden on society. There is the huge difference in the economic burden among patients living in different countries depending upon their financial status and policies implemented on them. Healthcare spending of families in Latin America is 40-60% while in India the mediocre patients pay out 25% of their whole earnings [12]. The estimated direct cost for the diabetic patient in Karachi was $197 per year [13].

MATERIALS AND METHODS

We choose a study design of prevalence base "Cost of Illness" to find out the direct cost of treatment expenditure of diabetes mellitus in different 15 outpatient clinic setting at 5 different sites in Karachi, Pakistan. Karachi, consists of more than 15 million residents and is regard a superior and economic zone of Pakistan. At the foundation, economic burden of the disease show a specific economic procedure [13]. This study was conducted in 5 districts of Karachi. The study was carried out in 15 different outpatient clinics at 5 selected sites of five Karachi districts. The patients were selected from all socio economic segment of society from the low income group, average income and significant revenue earning class to avoid any business in selection. The diabetic patients were selected with the help of doctor diagnosis of the patient and the patient who are fulfilling the eligibility criteria were choosing by random sampling technique. From each setting two clinic diabetic managements, clinic/family practice/general medicine/internal medicine was selected.

A format of precise pre test questionnaire was set to gain the information on socio-demographic and clinical individuality and in some locations conducted interviews with patients due to lack of

understanding and un-educated patients. The total of 900 diabetes patients was approached based on proportionate attendance of patient, with convenient random sampling. From all randomly selected individuals 885 were found willing to participate in the study Exclusive criteria consist of pregnant women, people having age of less than 20 years and those having an age of more than 60 years relevant data regarding direct cost were obtained from the patients. We use pharmacy guide for the purpose of calculation of the cost of medicines. All costs were used in Pakistani Rupee; a rate of Rs 106 per US$ was used to represent costs in terms of international currency.

Perspective

Perspective signifies the type of cost to be included in the study. The societal perspective was taken to find out the direct cost of treatment.

Ethical approval

Ethical approval permission was ensured from the Board of Advance Study and Research (BASR) of the University of Karachi. Prior consent was taken from doctors and patients for this study. All educated patients read the permission paper. For the uneducated patients, the interviewer explain and teach the consent paper to them and if they show commitment and agreement, then taken the interview with the help of questionnaire.

Data Analysis

Data were authorized following double entry as given the code number of all filled questionnaire and then data was first input in the excel sheet and then analyzed further on SPSS, mean, variance, valid frequency of answer, percentage and cumulative percentage was taken. The histogram of data was taken for further understanding. The significance level is of 5%. The direct and indirect costs were taken from patients to calculate the total economic burden of the diabetes mellitus type 2. The costs for consultation and other diabetes management services were used the approximate average cost of different services in Karachi.

RESULTS AND DISCUSSION

Demographic and clinical properties

Totally 885 individuals with diabetes were asked with a highest percentage of age group with more than 51 years of age is (51.5%). A Majority (53.7%) of study subjects were female and male was 46.2% and of the total 33.1% individuals had graduation qualifications or having superior qualification. Of the total, less than Rs 15000 household income was 20.6%. More than Rs 45000 income range was 12.2% using NHSP criteria. Family histories of diabetes patients were recorded. The percentage of family history with diabetes was 58% and family history without diabetes was 41.5%.

Direct cost of diabetes care

The costs are based on answers of patients during interview and survey, then it confirm by Laboratories, Doctors feedback, Medicine cost refer by Drug Pharmaguide 2014. The average expense of appointments with a physician, laboratory examinations and medicines cost is up to Rs. 700/visit, 400/test, 1100/visit sequentially. The average expense for travel and food acquire was Rs.200/visit and 1000/month, average expense is given in the following table.
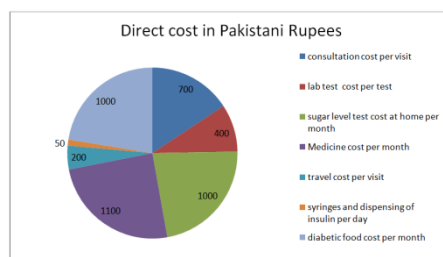

Fig. 1: Direct cost of Diabetes Mellitus Type patients in PKR per visit

Table 1: Socio-Demographic characteristics of Diabetes Mellitus Type 2 patients of Karachi Pakistan (n=885)

Characteristics	Number of Patients	Percentages %
(Age)		
20 – 30 years	33	3.7
31 – 40 years	90	10.1
41 – 51 years	306	34.5
51-60years	456	51.5
(Sex)		
Male	406	46.2
Female	476	53.7
(Marital Status)		
Single	40	4.5
Married	822	92.8
Divorced	19	6.4
Not Answer	4	0.4
(Education)		
Primary	108	12.2
Middle	51	5.7
Secondary	136	15.3
Inter	178	20.1
Graduate	293	33.1
Master	116	13.1
Not Answer	3	0.3
(Family History of Diabetes)		
Yes	514	58.0
No	368	41.5
Not Answer	3	0.3
(Monthly Income)		
Less than 15000	183	20.6
15000 – 30000	272	30.7
31000 – 45000	201	22.7
More than 45000	108	12.2
Not Answer	120	13.5

Table 2: Direct cost of Diabetes Mellitus Type 2 patients in Pakistani Rupee per visit

Variables	Average Cost in Rupees
Direct Cost	
Consultation	700/ Visit
Lab Test	400/Test
Sugar level test at home	1000/ Month
Medicine	1100/Month
Travel Cost	200/Visit
Syringes & Dispensing of Insulin	50/Day
Others (Diabetic food)	1000/Month

RESULTS AND DISCUSSION

Diabetes mellitus is very expensive illness throughout the world and its expenditure affects most of the members of our society and government and private health institutions [13]. Diabetes mellitus is the main cause of expense of health care portion and lead to economic burden. The integrated Healthcare System has a set of actions to encourage health, prevention, diagnosis, management, professional training, monitoring and pharmaceutical care and services, and research for diabetes care [14]. Numerous socio-economic factors and health care delivery associated issues influence the consequences of diabetes and as a result the expense and vice-versa [15]. The decision makers have to allocate resources effectively and efficiently.

Key finding related to the cost have concluded from this study. This study help in better health planning and it indicates how much society is spending on the management of type 2 diabetic mellitus. Once the diabetes is developed then it is needed to control diabetes to avert the diabetes co-morbidity and complication which can again cause significant cost. It indicates the cost of diabetes, which can then be used for prevention of diabetes programs. This study identifies the divers' component of the cost and magnitude of the

contribution of each cost. This research has been carried out using societal perspective, which is usually preferred for public health decisions.

Total 885 individuals with diabetic mellitus were consulted for interview the questions were asked related to demography and socioeconomic status of the patients and related to consultation, laboratory test, sugar level test at home, medicine, travelling cost, syringes & dispensing of insulin and diabetic food. The study shows that averagely the individual person cost for diabetes is Rs.700 per visit on consultation, Rs.400 per lab test, Rs.1000/month on sugar level test at home, Rs.1100/month on medication Rs. 200/visit travel cost Rs.50/day on syringes & dispensing of insulin Rs. 1000/month on diabetic food. Medicines consumed largest cost followed by laboratory examination, lab test and sugar level test at home). Same kind of results have founded in some other studies [16, 17, 18], as well as in developing countries.

This is finding out from this study that those patients with longer duration of treatment with diabetes with more complication and co morbidities bear high cost. Same kind of result has achieved from other studies perform in develop and none develop countries [19, 20] recommended that complication is the key reason for increasing the cost of treatment in diabetic patients which will influence the healthcare system. The study is not for the purpose to find association of cost among demographic factor and diabetic mellitus management [21], studied the association between costs and demographical characteristics and clinical individuality in 1,371 Dutch individual with diabetic mellitus using a statistical tool.

It is concluded that independent associations exist between age, insulin use, presence of macro vascular complications, presence of micro vascular and macro vascular complications, hyperlipidemia, and expense. there is a difference between our study and this study in many ways. First demographic characteristics, management of diabetes were analyzed by questionnaire but not with the help of medical chart review.

Second, costs were calculated as an average rather than multiplicative models. Third, we did not analyze the association among individual micro vascular and macro vascular complications and expense to analyze the cost of illness provide useful knowledge for health professionals and policy makers and this information are helpful for decision makers of the national health professionals for prioritizing research and fund allocations by indicating the inappropriate use of resources [13].

None of the persons with diabetes indicated that their cost is born by an insurance company or their employer. Almost all the cost is out of pocket from individual or family income. This is not exactly similar to some other studies, but Grover and colleagues reported that 95% of cost is met by patient and their families in India [22].

The total number of diabetic patients in Pakistan is 6.6 million with age group of 20 to 79 according to International diabetes federation (IDF). So if calculate the total economic burden of diabetes mellitus in Pakistan with average cost of diabetes management in Pakistan is rupees 5542. The total cost is Pakistan Rupees 36,577,200,000 per month which is tremendously high economic burden of diabetes in Pakistan. This estimated cost may be high or low as in this study the average cost is calculated and may be all patients not bear the all expense so their diabetes management cost is low, but on the other hand it is high then this value if add the cost of hospitalization, work days lost due to diabetes.

The result of this study is alarming for Pakistani society and should take action to control this disease in Pakistan and try to minimize the economic burden of this disease. The further studies required in this field and to evaluate on yearly basis the economic loss due to diabetes mellitus in Pakistan and 5.5% patient in Pakistan bears Rs.4200 treatment cost of diabetes.

Determining the cost of a specific disease is claimed to furnish useful information for health policy making and it is proved that such information can help nations to prioritize research funding and improve efficiency by indicating areas where inefficiencies may exist and savings could be made

CONCLUSION

In developing countries, the disease based economic studies are very rare and in Pakistan very few studies has previously been documented. The approximate calculation of these studies provides very helpful information related to the disease management cost and the impact that a society faces from such illness.

The primary research can further need investigation in which cost effective intervention could be evaluated to decrease the economic burden of diabetes. In this study, there are some limitations, which would be considered before generating the results. First the inclusive criteria were restricted to outpatient and the 20 to 60 years age group and the exclusive criteria consist of pregnant women, people having age of less than 20 years and those having an age of more than 60 years. This information is quite enough to make some suggestion and recommendation, for example an affordable and easily reachable health service is needed for all diabetic patients.

Policy makers need to ensure efficient implementation of prevention programs at primary healthcare units and availability of cost effective and cheaper anti diabetic drugs to reduce the medication cost. It is the responsibility of the pharmaceutical company to produce improves quality and lower price drugs for the diabetic patients. Pharmaceutical companies should promote and allocate funds for the disease based research to know the financial burden of the disease to propose a better policy. It is important to understand and upgrade the current disease knowledge and best practices for better treatment of diabetes.

Particularly this will help in developing preventive strategies to overcome the irrational prescribing by emphasizing rational use of drug and their benefit of decreasing economic cost to the patient and society. There is an urgent need that the authorities and public and private organizations to work closely for the reduction of the economic burden.

CONFLICT OF INTEREST

None to declare

REFERENCES

1. Ike A J. Tri Murti Cost analysis of anti-diabetic drugs for diabetes mellitus outpatient in Kodya Yogyakarta Hospital. Malaysian Sci 2007;5(1):19-23.
2. F J. Direct medical costs for patients with type 2 diabetes in Sweden. Med 2000;248: 387-96.
3. Gregory A. Type 2 Diabetes: Incremental medical care costs during the 8 years preceding diagnosis. Diabetes Care 2000;23;11.
4. J. Stamler other risk factors, and 12-yr cardiovascular mortality for men screened in the multiple risk factor intervention trial. Diabetes Care Bull World Health Organ 1993;16:434-44.
5. Henriksson F, Jönsson B. Diabetes: the cost of illness in Sweden. J Int Med 1998;244(6):461-8.
6. Henriksson F, Agardh CD, Berne C, Bolinder J, Lönnqvist F, Stenström P, *et al*. Direct medical costs for patients with type 2 diabetes in Sweden. J Int Med 2000;248(5):387-96.
7. Abdulmohsen H, Med J. Al-Elq, Current practice in the management of patients with type 2 diabetes mellitus in Saudia Arabia. Saudi Vol. Bull World Health Organ 2009;30(12):1551-6.
8. MOWH, CBM Joses. Economic burden of diabetes mellitus in the region. Health and Human Rights 6. Bull World Health Organ; 2009. p. 9.
9. CBM, Ranil Jayawardena. Prevalence and trends of the diabetes epidemic in South Asia: a systematic review and meta-analysis. Health 380. Bull World Health Organ; 2012. p. 12.
10. Abdulmohsen H, Med J. Al-Elq, Current practice in the management of patients with type 2 diaetes mellitus in Saudia Arabia. Saudi Vol. Bull World Health Organ 2009;30(12):1551-6.
11. FID. Economic impact of diabetes. atlas fourth edition; 2009.
12. Zhang P, Zhang X, Brown J, Vistisen D, Sicree R, Shaw J, *et al*. Global healthcare expenditure on diabetes for 2010 and 2030. Diabetes Res Clin Pract 2010;87(3):293-301.

13. Liaquat A, CBM. Cost of diabetes care in out-patient clinics of Karachi, Pakistan. Services Research 189. Bull World Health Organ 2007;7.
14. Anna Paula de Sá Borges. Economic evaluation of outpatients with type 2 diabetes mellitus assisted by a pharmaceutical care service. Arq Bras Endocrinol Metab. Bull World Health Organ 2011;55(9):686-91.
15. Anil Kapur. Economic analysis of diabetes care. Indian Res p. Bull World Health Organ 2007;125:473-82.
16. Barcelo A, Aedo C, Rajpathak SS. Robles America and the Caribbean. Bull World Health Organ 2003;81(1):19-27.
17. Aihw S. AU. Australian Institute of Health and Welfare. Costs of diabetes in Australia Bulletin No 26 No Australian Institute of Health and Welfare; 2005. p. 2000-01.
18. Dawson KG, Gomes D, Gerstein H, Blanchard JF, Kahler KH. The economic cost of diabetes in Canada, 1998. Diabetes Care 2002;25(8):1303-7.
19. Rayappa PHJ. Economic Cost of Diabetes care. The Bangalore Urban District Diabetes Study Int 1999;19:87-97.
20. Rayappa PH. Economic Cost of Diabetes care. The Bangalore Urban District Diabetes Study. Int J Diab 1999;19:87-97.
21. Redekop WK, Koopmanschap MA, Rutten GEHM, Wolffenbuttel BHR, Stolk RP, Niessen LW. Resource consumption and costs in Dutch patients with type 2 diabetes mellitus. Results from 29 general practices. Diabetic Med J Bri Diabetic Association 2002;19(3):246-53.
22. Grover S, Avasthi A, Bhansali A, Chakrabarti S, Kulhara P. Cost of ambulatory care of diabetes mellitus: a study from north India. Postgrad Med J 2005;81(956):391-5.