RESEARCH ARTICLE

BURDEN OF DIABETES: AN EVIDENCE FROM A SOUTH INDIAN STUDY

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ARTICLE INFO	ABSTRACT
	Introduction: Diabetes mellitus is a chronic metabolic disorder, which has high impact on individual's perspective of living a better life. The raising health care cost and changing quality of life associated with the diseases is alarming towards the worse future of the diseases. Objective **Methodology:** The study was a prospective observational study conducted in a 500 bedded multispecialty tertiary level referral and teaching hospital for a period of 1 year. In this study descriptive survey was used to collect the data. The questionnaires used were Kuppuswamy's socioeconomic status scale, The 8 item Morisky medication adherence scale and WHOQoL-BREF. **Results:** The scores of the four domains of WHOQOL-BREF scale were physical health domain (mean ±SD 45.84±9.67), psychological well-being (mean ±SD 43.94±12.48), social domain (mean ±SD 48.56±20.46) and environmental domain (mean ±SD 55.18±12.77). The average total health care cost of diabetes per year was 43918.23 INR. The total direct cost was found to be 22331.11 INR and indirect cost was 21587.12 INR. **Conclusion:** Diabetes mellitus is one of chronic illnesses which have a significant impact on patient's health related quality of life and economical aspects.

INTRODUCTION

The prevalence as well as global burden of diabetes mellitus is increasing day by day. India has around 51 million diabetic patients and faces potential burden of the diseases. The reason for diabetes burden in India is mainly explained by genetic factors coupled with environmental factors (Kaveeshwar, 2014). Since from 2000, India has topped in the diabetes. As the diseases reaching potentially epidemic, the term 'India- the diabetic capital of world' shows real meaning (Joshi, 2007). Diabetes mellitus is a chronic metabolic disorder, that has high impact on individuals perspective of living a better life. The raising health care cost and changing quality of life associated with the diseases is alarming towards the worse future of the diseases. According to WHO study on Projections of Global Mortality and Burden of Disease, diabetes will be the 7th leading cause of death in 2030 (Mathers, 2006). The 2013 American Diabetes Association report demonstrated that costs of diagnosed diabetes increased by 41% from 2007 to 2012 (American Diabetes Association, 2013). This study mainly focus on different aspects of life of diabetic patients.

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MATERIALS AND METHODS

The study was a prospective observational study conducted in a 500 bedded multispecialty tertiary level referral and teaching hospital for a period of 1 year. In this study descriptive survey was used to collect the data. The patients diagnosed with type 2 diabetes mellitus were explained about the study. In those, patients who were willing to participate were enrolled in to the study after obtaining the signed consent form. Demographics details, laboratory results, given drugs, medical and medication history were documented in to the data entry form and were asked to fill the questionnaires which were in the Malayalam version. The questionnaires used were Kuppuswamy's socioeconomic status scale, The 8 item Morisky medication adherence scale and WHOQoL-BREF. It takes about 10-15 minutes to fill the questionnaire. After being filled it has been collected back for analysis. Data entry and statistical analysis were done using Microsoft office excel 2007 and SPSS 20 statistical software package. Descriptive statistics are given as means and standard deviation for continuous data or as percentage for count.

RESULTS

In the study population, the average age in years is 56.86. Most of the patients were in the age group of 40-60 and above

60(92%). The prevalence ratio among both genders of study population was 2:3, in which female patients were prominent in number (Table 1). In socio economic profile of the population, upper middle (36%) and middle/lower middle classes (34%) contain almost similar number of patients and they together constitute about 70% of the total. The 22% of the group comes under lower/upper lower class, 6% in upper class and 2% in lower class. The patient medication adherence was assessed based on the scores of MMAS (Morisky Medication Adherence Scale)-8 item questionnaire. 20 Subjects (20%) had a low rate, 24 subjects (24%) had a medium rate and 56 subjects (56%) had a high of adherence (Table 2). The scores of the four domains of WHOQOL- BREF scale were physical health domain (mean ±SD 45.84±9.67), psychological well-being (mean ±SD 43.94±12.48), social domain (mean ±SD 48.56±20.46) and environmental domain (mean ±SD 55.18±12.77). (Fig.1) The Qol score were categorised into good and poor Qol scoring the mean score. The score above the men value were labelled as good score and the values below the mean were taken as poor score.

Table 1. Demographics of the sample population

Age	56.86±9.90
Sex	
Male	20(40%)
Female	30(60%)
Marital status	
Single	6(12%)
Married	44(88%)
Domicile	
Urban	30(60%)
Rural	20(40%)
Education	
0-4	6(12%)
4-8	9(18%)
8-12	18(36%)
12-16	13(26%)
16-20	4(8%)
Occupation	
Employed	28(56%)
Unemployed	22(44%)

Table 2. Characteristics of the study population

Variables	Sample population
SES	(Kuppuswamy questionnnaire)
Upper	6
Upper middle	36
Middle/Lower middle	34
Lower/Upper lower	22
Lower	2
Medication adherence	(Morisky medication adherence scale)
Low	20
Medium	24
High	56

Table 3. The scores of the four domains of WHOQOL- BREF scale

QoL domain	Domain score	SD	Good score (≥50%)	Poor score (≥50%)
Physical domain	45.84	9.67	44	56
Psychological domain	43.94	12.48	58	42
Social domain	48.56	20.46	62	38
Environmental domain	55.18	12.77	60	40

The 44% of the population had good physical domain and 56% had poor score. In psychological domain good scores were obtained in 58% of the study population. In case of social and

environmental domain the scores were comparable (Table 3). The physical domain of QoL and age are negatively correlated (significant at 0.01 level; r= -0.377; p=0.007). Psychological domain and age are negatively correlated (significant at 0.5 level= -0.357; p=0.011).Age and social domain have a negative correlation (significant at 0.01 level; r= -0.444; p=0.001). Physical domain and marital status correlated negatively in diabetic patients. Married patients have high score for physical domain (significant at0.5 level; r= -.359; p=.010). Physical domain has Positive correlation with occupation (r=0.339; p=0.016; at 0.5 level). Psychological domain positively correlated with education (significant at0.01 level=0.373; p=0.008) and with occupation (significant at0.01 level; r=0.421; p=0.002). Married patients have increased score of social domain (significant at0.01 level; r=-0.362; p=0.010). Social domain has a positive correlation with occupation (significant at 0.05 level; r= 0.337; p=0.017). Occupation is positively correlated to environmental domain (significant at 0.01 level; r=0.454; p=0.001). (Table 4) Physical domain is positively correlated to psychological domain (significant at 0.001 level; r=0.539; p=0.000) and social domain (significant at0.01 level; r=0.553; p=0.00).There is positive correlation between psychological and social domains (significant at0.01 level; r=0.656; p=0.00).

Table 4. Association of QoL domains with socio demographics of diabetes patients

Variables	Physical domain	Psycological domain	Social domain	Environmental Domain
Gender	-.175	-.089	-.186	-.207
Age	-.377[**]	-.357[*]	-.444[**]	-.165
Marital status	-.359[*]	-.152	-.362[**]	-.243
Occupation	.339[*]	.421[**]	.337[*]	.454[**]
Education	.277	.373[**]	.216	.196

Table 5. Association between domains of QoL

Domains	Physical domain	Psycological domain	Social domain	Environmental Domain
Physical domain	1	.539[**]	.553[**]	.237
Psycological domain	.539[**]	1	.656[**]	.377[**]
Social domain	.553[**]	.656[**]	1	.368[**]
Environmental domain	.237	.377[**]	.368[**]	1

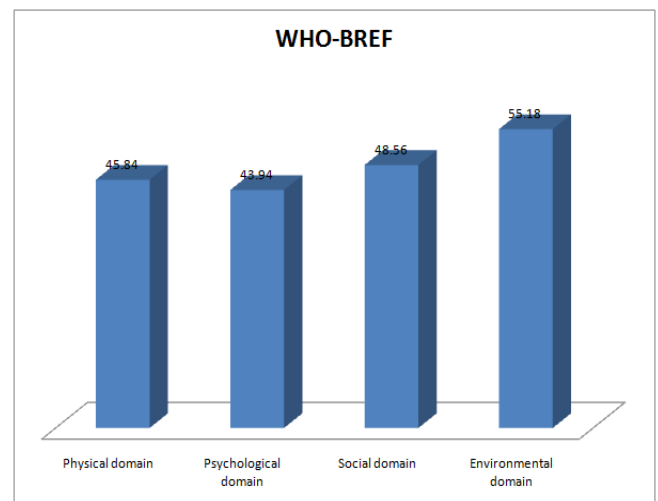**Figure 1. Domains of Quality of Life**

Table 6. Total healthcare cost of diabetes

| S.No.	Items	Mean	Median	Std. Deviation	Minimum	Maximum
1	Op medications	12880.47	11401.05	6733.18	4500.00	37589.80
2	Op investigations/ lab test	2084.65	1831.30	919.45	725.00	5000.00
3	Op services	805.40	800.00	216.91	400.00	1500.00
4	Op travel cost	973.98	772.50	593.06	400.00	3000.00
5	Op total	16744.51	15891.75	7138.59	7500.00	41364.80
6	Ip medication	1894.54	1921.98	2115.67	0.00	13000.00
7	Ip services	322.20	350.00	268.08	0.00	1100.00
8	Ip nursing care	296.53	300.00	242.02	0.00	800.00
9	Ip residential care	965.00	800.00	928.59	0.00	3250.00
10	Ip investigations	945.00	950.00	809.97	0.00	3000.00
11	Ip travel cost	524.38	500.00	468.95	0.00	2000.00
12	Ip other	919.00	1000.00	783.50	0.00	3000.00
13	Ip total	5860.72	6381.20	4663.63	0.00	19500.00
14	Total direct cost	22331.11	19316.68	11684.56	5160.89	52827.94
15	Loss of procuctivity patient	16032.84	10571.04	19725.49	3547.36	133026.00
16	Loss of productivity caregiver	5554.29	4689.58	3890.59	665.13	22500.00
17	Total indirect cost	21587.12	16379.65	20081.71	5321.04	139677.30
18	*Total cost of illness*	*43918.23*	*35696.33*	*31766.27*	*10481.93*	*192505.24*
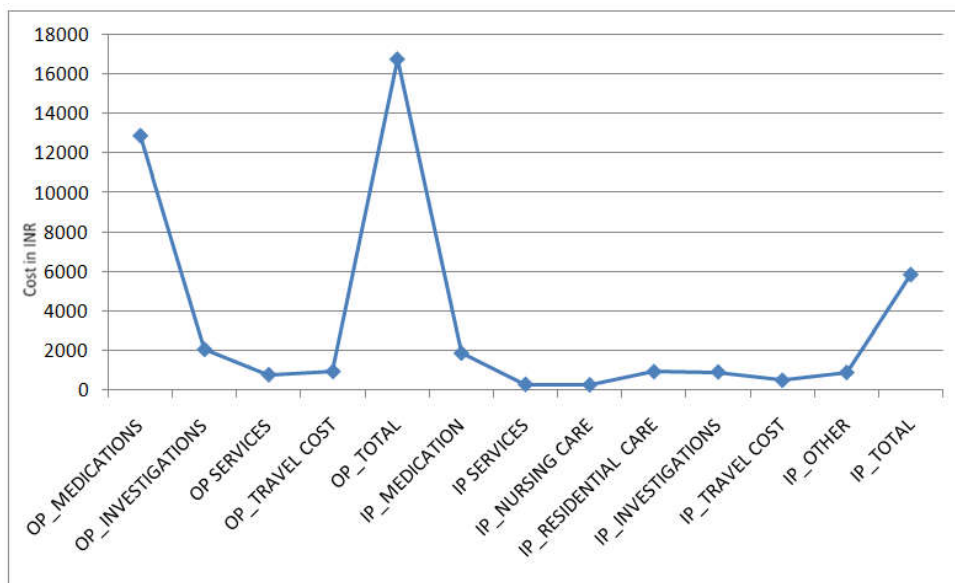
Figure 2. Different direct costs in managing diabetes

Psychological domain and environmental domain are correlated positively (significant at 0.01 level; r=0.377; p=0.007). Environmental domain and social domain are positively correlated (significant at 0.01 level; r=0.368; p=0.009) (Table 5). The average total health care cost of diabetes per year was 43918.23 INR. The various elements of cost estimation are direct cost and indirect cost associated with diabetes. Direct cost include expenditure related to the management of illness such as outpatient and inpatient medication costs, services of a range of professionals (doctors, nurses etc.), investigation costs, travel cost, residential care and day care. Indirect cost was assessed by considering loss of productivity of patient and caregiver due to the illness, disability or injury of patients. The total direct cost was found to be 22331.11 INR and indirect cost was 21587. 12 INR. The health care costs of diabetes are given in the table (Table 6; Fig 2). The direct cost occupies 50.84% of total cost of illness and indirect cost is 49.15%. OP medication cost account for 29.32% of the total cost and it was found to be 12880.47 INR.

DISCUSSION

In this study, scores of psychological domain was the lowest and environmental domain was the highest. One of the QoL studies using WHO BREF scale showed highest score for social domain and poor score for psychological domain (Gholami, 2013), which in this study was at second position and last position respectively. The correlation studies of quality of life showed different results. The correlation between educational status and QoL was proved significant in some studies (Gholami, 2013; Monjamed, 2006 and Glasgow, 1997). In a QoL study of 120 patients reported that there is no association between QoL and education. (Baghiani Moghadam et al., 2007) Psychological domain positively correlated with education and with occupation in this study. Single and unemployed patients had a low score of physical QoL. One study showed there is significant correlation with marital status and diabetic QoL (Gholami et al., 2013) at the same time another study showed there is no relation between the two (Monjamed, 2006). Married patients have increased score of social domain. Some QoL studies reported the association of gender and QoL. Overall QoL score was good in men than diabetic women (Glasgow, 1997; Baghiani Moghadam, 2007; Jacobson, 1994 and Dias, 2005). Some QoL studies reported females have better QoL (Monjamed, 2006; Ragonesi, 1998 and Lloyd, 2001). As similar to our results, many studies proved that the physical QoL domain score was high in young patients (Glasgow, 1997; Dunn, 1986; Ahroni, 1994; Rubin,

1999 and Keinänen, 1996). Our study also proved older patients had a low psychological and social QoL. While investigating the association between domains, it was found that physical domain is positively correlated to psychological domain and social domain. There is positive correlation between psychological and social domains. Psychological domain and environmental domain are correlated positively. Environmental domain and social domain are positively correlated.

In this study the total annual cost of diabetes per person was 42512.71 INR, which includes both direct cost and indirect cost. The direct cost of the study was found to be higher than a similar study conducted in south India (Akari, 2013; Grover, 2005), one of the cost of illness studies reported an increased value of direct cost than our study (Chidambaram, 2013). The presence of co morbidities have a great impact on health care cost of diabetes. An average a diabetic patient with hypertension spent 1.4 times more than a without hypertension (Tharkar, 2009). The expected global health expenditure on diabetes is about least USD 376 billion or ID 418 billion in 2010 and USD 490 billion or ID 561 billion in 2030 (Zhang, 2010).

Conclusion

Diabetes mellitus is one of the most major health issues due its chronic nature and complications. In the study, 44% of the population had good physical domain and 56% had poor score. In psychological domain good scores were obtained in 58% of the study population. In case of social and environmental domain the scores were comparable. The average total health care cost of diabetes per year was 42512.71 INR. The total direct cost was found to be 22331.11 INR and indirect cost was 21587.12 INR

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