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A community based assessment of quality of Diabetes care in the urban area of Tirupati, A.P.

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ABSTRACT

Abstract: **Introduction**: Diabetes is a significant cause of morbidity and mortality among middle aged adults in India. Diabetes management requires high level of comprehensive integrated care involving multiple stakeholders. The objective of the study is to assess the diabetes care by quality indicators and to determine the factors associated with it in Tirupati area, Andhra Pradesh. **Material and methods**: A cross-sectional study was carried out in the urban areas of Tirupati. A sample of 750 diabetic patients were selected by applying two stage cluster sampling method. The data was collected by using pre-designed and pre-tested questionnaire. **Results:** Only 4.7% of total diabetic subjects have received optimal quality of diabetes care. The proportion for each process indicator received by the subjects was annual dilated eye examination in 22.1%, annual foot examination in 8.1%, urine micro-albumin in 48.4%, HbA1C in 11.5% and lipid profile test in 27.2%. The intermediate outcome indicators of blood pressure and glycemic target were poorly controlled in more than half of them. The self-care practices of regular physical activity (35%), diet control (64%), foot care (79%), drug compliance (86%), self-monitoring of blood glucose (5.5%) and smoking cessation (51%) were observed. **Conclusion:** The quality of diabetes care is poor among the diabetic individuals in this area compared to the recommended guidelines. Barriers identified are related to both patient and health care delivery factors. A comprehensive health care delivery system is required to provide optimal care for diabetic individuals.

Key-words: Process indicators, intermediate outcome indicator, self-care.

INTRODUCTION

Diabetes mellitus is a group of metabolic diseases characterized by chronic hyperglycemia resulting from defects in insulin secretion or action or both, which in turn leads to disturbances of carbohydrate, fat and protein metabolism.[1] Over the past three decades the status of diabetes has changed from being considered as a disorder of elderly to one of the major causes of morbidity and mortality affecting the young and middle aged people.[2] Individuals diagnosed with diabetes are at increased risk of developing chronic complications which affect many organ systems such as retinopathy, neuropathy, nephropathy, cardiovascular disease and foot ulceration.

According to WHO global health estimates, diabetes is ranked within the ten leading causes of deaths by contributing to 2.8 percent of total deaths[3] and is one of the leading cause of years lost due to disability and DALYs in middle and high-income countries.[4] In India, type 2 diabetes mellitus has been rising rapidly, with more than 62 million diabetics, the country being labelled as the diabetes capital of the world.

Diabetes management requires high level of comprehensive quality care involving multiple stakeholders. Worldwide, the quality of care for patients with diabetes has been shown to be variable and suboptimal. Despite of its high prevalence, serious long-term complications, and established evidence-based guidelines for management, translation of recommendations to practice of care is still deficient in many countries.[5,6] The present study was conducted to generate population based data for the quality of diabetes care based on guidelines, as fewer such studies were conducted in this area.

MATERIAL & METHODS

A cross sectional study was conducted in the urban area of Tirupati, Andhra Pradesh from June 2015 to December 2015 to assess the quality of care among type 2 diabetic individuals who have been diagnosed with the condition at least one year before at the time of study. Those who has not given the consent and those seriously ill patients were excluded from the study. The sample size (n=750) was calculated by assuming a prevalence of optimal care for diabetes as 50% with allowable error of 5% and is adjusted for design effect of 1.5 and a response rate of 80%. The required sample was drawn by applying two

stage cluster sampling method. The areas/localities in all the wards of Tirupati are taken as clusters. From the 54 clusters enlisted, 21 clusters were selected in the first stage by probability proportionate to size sampling method. In each area/cluster, the eligible diabetic individuals were enlisted by house to house survey and 36 individuals were selected for interview by simple random sampling in second stage. During the house to house survey, if two diabetic individuals were found in the same house, the person with the lesser duration of diabetes was selected.

Ethical clearance was obtained from institutional ethical committee, Sri Venkateswara Medical College and informed written consent was taken from the study subjects after explaining the purpose of the study. The data was collected from the subjects both by oral interview and by checking the medical reports by using pre-designed and pre-tested questionnaire. Physical measurements of height, weight, waist circumference and blood pressure were recorded by using standardized methods and instruments. The weight of the subject was recorded with weighing machine with light clothing. The height was recorded with stadiometre and waist circumference was measured with non-stretchable measuring tape at the mid-point between lower margin of rib cage and upper border of iliac crest at the level of umbilicus to the nearest 0.1 cm. The blood pressure was measured in sitting position when the patient is comfortable by using standardised sphygmomanometer and stethoscope.

National diabetes quality improvement alliance (NDQIA) indicators were used to assess the diabetes quality of care received by patients.[7,8] Indian Council of Medical Research (ICMR) guidelines[9] for management of diabetes are also comparable to these recommendations. Each indicator was given a score of 1 (maximum score 8) and a total score of 5 and more is considered as optimal care, a score of 3-5 is suboptimal and score of less than 3 is considered as poor care. The data was entered in Microsoft excel and the results were analyzed using SPSS 21 version.

RESULTS

Of the total subjects, 46.1% were males and 53.9% were females. Majority of the subjects belong to the age group of 45-55 years (30.7%), followed by 55-65 years (29.5%), more than 65 years (21.3%) and 35-45 years (18.5%). Majority were Hindus (83%). Illiterates/primary school subjects were 48%, middle/high school subjects were 29%, intermediate/diploma were 11.3% and graduate/postgraduates were 11.7%. Based on BG Prasad socioeconomic classification, 25.5 % of subjects belong to upper class, 38.8% were upper middle, 27% were middle class, 7.7% were lower middle class and 1% belong to lower class. Among the total, 82.8% were married.

Table 1: Distribution of subjects based on disease related variables.

Variable	Male n=346 (%)	Female n=404 (%)	Total n=750 (%)
Duration of diabetes			
≤ 4	115 (33.2)	164 (40.6)	279 (37.2)
05-08	79 (22.8)	100 (24.8)	179 (23.9)
09-12	62 (17.9)	76 (18.8)	138 (18.4)
13-16	66 (19.0)	41(10.2)	107 (14.3)
≥ 17	24 (7.0)	23 (5.6)	47 (6.2)
Health care facility			
Government tertiary hospital	29 (8.4)	36 (9.0)	65 (8.7)
Corporate tertiary hospital	48 (14.0)	36 (9.0)	84 (11.2)
Private diabetologist	213 (61.5)	263 (65.0)	476 (63.4)
Private general practitioner	25 (7.2)	34 (8.4)	59 (7.9)
Urban health centre	29 (8.4)	31 (7.6)	60 (8.0)
Ayurvedic hospital	2 (0.5)	2 (0.5)	4 (0.5)
Homeopathy hospital	0	2 (0.5)	2 (0.3)
Type of treatment taking			
Oral hypoglycemic drugs	272 (78.6)	317 (78.5)	589 (78.5)
Insulin	28 (8.0)	9 (2.2)	37 (4.9)
Insulin & Oral drugs	39 (11.4)	73 (18.0)	112 (15)
Ayurveda	5 (1.5)	2 (0.5)	7 (1.0)
Homeopathy	2 (0.5)	2 (0.5)	4 (0.5)
Others	0	1 (0.3)	1 (0.1)
Hypertension			
Yes	187 (54)	235 (58.2)	422 (56.3)
No	159 (46)	169 (41.8)	328 (43.7)
Total	**346 (100)**	**404 (100)**	**750 (100)**

Table 2: Distribution of Self-care practices among subjects

Self-care practices	Male n=346 (%)	Female n=404 (%)	Total n=750 (%)
Diet plan	198 (57.2)	285 (70.5)	483 (64.4)
Physical activity	171 (49.4)	90 (22.3)	260 (34.7)
Drug compliance	293 (84.7)	354 (87.6)	646 (86.1)
Self monitoring of blood glucose	26 (7.5)	15 (3.7)	41 (5.5)
Foot care	284 (82.1)	307 (76.0)	592 (79.0)
Regular monitoring of blood glucose	169 (48.8)	228 (56.4)	397 (53.0)

Table.1 shows the distribution of subjects according to variables related to diabetes. The majority of subjects were of lesser diabetes duration (<8 years). The majority (63.5%) were seeking private diabetologist for their regular check-ups. Oral hypoglycemic drugs were the mainstay of treatment for 78% of the subjects. Insulin requirement increased with increase in duration of

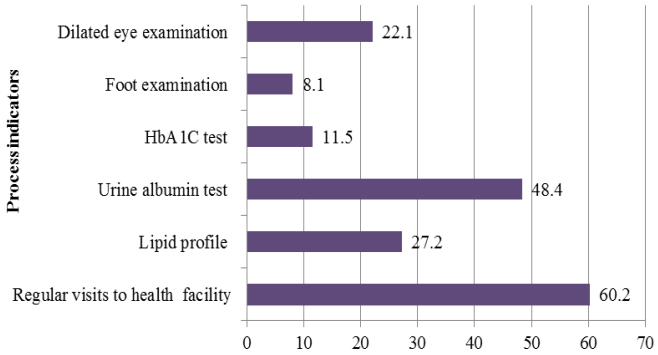
diabetes (p<0.001). The family history of diabetes was observed in 38% of subjects. The most common condition found with diabetes was hypertension (in 56.3%) followed by hypothyroidism (6%) and respiratory illness (5%).

The knowledge regarding diabetes condition and care among the study subjects was assessed by a set of questions. The knowledge score was good (9-12) in 31%, average (5-8) in 62.6% and poor (0-4) in 6.4% of subjects.

Table 3: Distribution of subjects based on risk factors.

Variable	Male (n=346) (%)	Female (n=404) (%)	Total (n=750) (%)
Body mass index			
Underweight	24 (7.0)	0 (0)	24 (3.2)
Normal	124 (35.8)	119 (29.4)	243 (32.4)
Overweight	146 (42.3)	149 (36.9)	295 (39.3)
Obesity stage 1	43 (12.4)	107 (26.5)	150 (20.0)
Obesity stage 2	5 (1.4)	24 (6.0)	29 (3.9)
Obesity stage 3	4 (1.1)	5 (1.2)	9 (1.2)
Abdominal obesity			
Present	131 (37.8)	321 (79.5)	452 (60.3)
Absent	215 (62.2)	83 (20.5)	298 (39.8)
Smoking			
Non-smokers	173 (50.1)	404 (100.0)	577 (77.0)
Former smokers	93 (26.9)	0 (0)	93 (12.4)
Current smokers	80 (22.9)	0 (0)	80 (10.6)
Total	**346 (100)**	**404 (100)**	**750 (100)**

Fig 1: Proportion of subjects receiving recommended care process indicators



Self-care practices among the subjects (Table. 2) were found to be proper diet plan (64.4%), regular physical activity (34.7%), self-monitoring of blood glucose (5.5%), drug compliance (86%) and foot care (78.9%). The body mass index (BMI) was found to be overweight in 39.3% and obese in 25.1% of subjects. Abdominal obesity (WHR >1 in males and > 0.85 in females) was found in 60% of subjects. Among the males, 23% are currently smoking and 27% were former smokers. (Shown in Table.3)

Table 4: Association of quality of care with relevant variables

Variable	Quality of diabetes care				Significance
	Optimal	Sub-Optimal	Poor	Total	
Gender					
Male	15	67	265	346	$\chi2$ =0.17
Female	20	78	305	404	p=0.9;NS
Age group (years)					
35-45	5	19	115	139	
45-55	19	54	157	230	$\chi2$ =27.3
55-65	2	52	167	221	p=0.000;S
>65	9	20	131	160	
Education					
Illiterate/primaryschool	14	70	276	360	
Middle/high school	9	36	172	217	$\chi2$= 19.9
Intermediate/diploma	2	20	63	85	p=0.003;S
Graduate/postgraduate	10	18	60	88	
Socioeconomic class					
Upper	24	44	123	191	
Upper middle	5	55	231	291	$\chi2$=48
Middle	6	41	155	202	p=0.000;S
Lower middle	0	5	53	58	
Lower	0	0	8	8	
Duration of diabetes					
≤ 4	9	38	232	279	
05-08	13	24	142	179	$\chi2$ =31.6
09-12	7	35	96	138	p=0.000;S
13-16	5	33	69	107	
≥17	1	15	31	47	
Health care facility					
Govt tertiary hospital	0	14	51	65	
Corporate tertiary hospital	16	32	36	84	$\chi2$ =98.6
Private diabetologist	19	102	355	476	p=0.000;S
Private general practitioner	0	4	55	59	
Urban health centre&others	0	0	66	66	
Type of treatment					
Insulin user	7	59	83	149	$\chi2$ =49.6
Non-insulin users	28	86	487	601	p=0.000;S
Diabetes knowledge score					
Good	19	73	140	232	
Average	15	70	385	470	$\chi2$ =48.7
Poor	1	2	45	48	p=0.000;S
Total	**35**	**145**	**570**	**750**	

Quality of care indicators

Process indicators

Among the study subjects during the past year, the urine albumin test was done in 48.4% of subjects, lipid profile (LDL cholesterol) was tested in 27.2%, dilated eye examination was recorded in 22.1%, HbA1C was tested in 11.5% and foot examination was done in only 8.1%. Among them, 60% were regularly visiting the health care facility for follow-up. Fig.1.

Outcome indicators:

The intermediate outcome indicators of blood pressure and glycemic control were measured among the study subjects. The blood pressure was in recommended range (<140/90 mm hg) among 48.5% of subjects. The glycemic control (PPBS <180mg/dl) was satisfactory in only 28% of them.

Overall, the subjects who received optimal care (≥5 score) was only 4.7%. In the remaining, the diabetes care was suboptimal in 19.3% and poor in 76%.

Dilated eye examination was found to be significantly associated with duration of diabetes (p=0.001), type of health facility (p=0.0001), type of treatment (p=0.004) and with the diabetes knowledge score (p=0.0001) among subjects. No association was found with gender (p=0.58), age (p=0.45), education (p=0.46) and socioeconomic status (p=0.41) of the individual.

Urine albumin testing was significantly associated with age group (p=0.0001), type of health facility (p=0.0001), type of treatment taking (p=0.0001), and knowledge score (p=0.0001) of subjects. There was no association found with gender (p=0.7), education (p=0.2), socioeconomic status (p=0.06) and duration of diabetes (p=0.13).

Foot examination has been found to be significantly associated with age group (p=0.02), socioeconomic status (p=0.004), type of health facility (p=0.001) where subjects are seeking care. While no such association was found with gender (p=0.14), education (0.28), duration of diabetes (p=0.2), type of treatment (0.17) and knowledge score of diabetes (p=0.23).

The variables which were significantly associated with testing of HbA1C are education status of subjects (p=0.0001), socioeconomic status (p=0.001), duration of diabetes (p=0.025), type of health facility (p=0.0001) and knowledge score of individual (p=0.0001).

Lipid profile checkup was associated with education (p=0.02), socioeconomic status (p=0.001), type of health facility (p=0.0001) and knowledge score (p=0.0001). No association was found with age (p=0.09), gender (p=0.33) and duration of diabetes (p=0.29).

Table. 4 shows the association of quality of care with socio demographic and disease related variables. Factors of socioeconomic status (p=0.001), health care facility type (p=0.000), knowledge score (p=0.000) and duration of diabetes (p=0.001) are significantly associated with quality of diabetes care among the study subjects even after adjusting.

DISCUSSION

This study documented the poor quality of care among diabetic individuals in Tirupati which is one of the densely populated urban area in Andhra Pradesh. Only ~5% of subjects have received optimal care for diabetes. Few hospital based studies have depicted the suboptimal quality of care, nevertheless, this is the first population based study conducted in South India region to assess the diabetes care.

The prevention of micro and macro vascular complications of diabetes demands a high level of quality care. Guidelines have been framed for management and monitoring of diabetes by various associations like American Diabetes Association and ICMR etc. In developing countries like India where the health care system is overburdened with maternal and child health care and communicable diseases, the diabetes care is often shown to be suboptimal.[2]

The proportion of diabetic individuals who have received the dilated eye examination in the past year of this study was 22.1%. It was, 16.2% in Nagpal et al., study done among the urban diabetics in Delhi (DEDICOM),[10] 28.5% in a secondary care hospital based study[11] and 56.8% in the tertiary care hospital study[4] conducted in South India. The number of subjects who received at least one dilated eye examination ever since diagnosis of diabetes is remarkably low against the recommendation of dilated eye examination immediately after diagnosis.

The urine micro albumin test is the popular process indicator received by higher proportion of subjects (48%) which is similar to the Nagpal et al., study[10] in Delhi where half of the subjects had routine urine testing in the past year. While 8.1% of subjects received foot examination in this study, Nagpal et al., study reported only 3.1%.[10] None of the patients have received foot examination in the tertiary care hospital study in Bangalore.[5]

The finding for HbA1C testing (11.5%) is comparable to the finding in those studies done in Delhi (13%) and an urban health centre audit[11] in south India (15.5%). It was reported to be 40% in Bangalore hospital based study.[5] The serum LDL cholesterol check-up was done in 27% of subjects in last one year in this study while it was 32% and 34% in Nagpal et al., study[10] and Badawi et al., study[12] respectively.

Hypertension is a condition itself responsible and also a risk factor in diabetes for development of long-term complications. Blood pressure control is an important goal in diabetes management to prevent complications.[6] Unfortunately, more than half (51.5%) of study subjects have poor blood pressure control (SBP >140 mm hg and

DBP >90 mmhg). Similarly in Delhi diabetes community survey,[10] 63% of diabetic patients had uncontrolled hypertension. The glycemic control was poor in 72% of subjects. Only 28% of subjects were found to have good glycemic control which is similar to Ramachandran et al., study[13] (29%). The Delhi survey has reported 42% of poor glycemic control (HbA1C >8%).

Diabetes self-management education was proven to play a role in reducing complications through various studies by improving diabetes awareness and self-care practices among the patients.[14,15] In this study, 35% of subjects were following advice on regular physical activity. Self-monitoring of blood glucose was being practiced only by 5% of study subjects. Adherence to advice on diet plan, medication and foot care was seen in more than two thirds of subjects. Similar results were observed in Gopichandran V et al., study[16] and Padma K study[17] in South India. Higher BMI (>25 kg/m^2) was seen in 64% and abdominal obesity in 60% of subjects in this study similar to Ramachandran et al study[13] whereas DEDICOM survey[10] in Delhi has reported relatively higher proportions (75% & 89%). While 23% of males were currently smoking in this study, 19% were current smokers in DEDICOM survey.[10] Out of the total, 40% of the subjects have not visited the health care facility in last 6 months, while 22% of subjects were not monitoring their blood glucose levels regularly (recent 3 months).

Conclusion

The quality of diabetes care is poor among the study subjects both in terms of process and outcome (intermediate) indicators. Though guidelines are available to monitor the diabetes so as to prevent and detect complications early, the practical application of these guidelines is very poor. The self-care practices among the subjects are also not satisfactory. Several factors related to patient, health care system and provider are identified as barriers for the implementation of these recommendations. A comprehensive and integrated system of health care with regular audit can improve the quality of care being provided to diabetic individuals in India.

Limitations

The indicators list used in this study to assess quality of care is inclusive but not exhaustive. The glycemic control is recommended to assess with HbA1C, but due to cost/logistics reasons postprandial blood glucose level was measured in this study. The factors which are associated with diabetes care are multiple and complex. In this study, some of the feasible variables were studied.

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