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HEALTH PROFILE OF DIABETIC PATIENTS IN AN URBAN SLUM OF MUMBAI, INDIA

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ABSTRACT

Diabetes has been proved to be the leading cause of morbidity and mortality in developed countries, and is gradually emerging as an important health problem in developing countries as well. Diabetes, an iceberg disease could be described as the 'sleeping snake'- which bites when it wakes up. Diabetics, who are joyfully moving in and around us in the society, who are really not aware of the possible catastrophic end results of harbouring this 'sleeping snake'. This study was carried out to assess co-morbidities, Life style factors, Self Care Practices and Illness perception in Diabetic patients. Present descriptive epidemiological study which had adopted exploratory survey design was conducted during January 2011 to June 2011. Total 300 diabetic patients were randomly selected and interviewed using preformed, pretested and semi-structured interview schedule. Mean age of Diabetic patients was 51.6 (SD=5.1) years. Family history of diabetes mellitus was present in 17.7% patients. Associated diseases and complications were present in 185 (61.7%) patients. Hypertension was the most common (58.7%) associated disease followed by ophthalmic diseases (23.7%). 'Major' modification in life style factors and self care practices were done by 14.7% and 21.7% patients respectively after diagnosis. Only 16.7% patients had 'better' perception of illness. Life style modification score, self care practices score and illness perception score was significantly associated with Blood Glucose Level (both fasting and post-prandial blood sugar level). Diabetic patients may benefit from periodical health promotion and education programmes in the area of diet management, self care and adherence to treatment. Family should be considered as a more useful unit of intervention for diabetic individuals when designing diabetes care strategies.

INTRODUCTION

After combating gigantic problem of communicable diseases, like many developing nations, India is also facing the new problem of chronic non communicable diseases such as Diabetes because of rapid urbanization and adaptation of modern life styles. After Hypertension, Diabetes mellitus (DM) is one of the most daunting challenges posed by chronic non-communicable disease. Although many preventive and control measures are available, prevalence of Diabetes is rising and it has become a global problem causing enormous morbidity and mortality in all developed as well as developing countries. In 2000, according to the World Health Organization, at least 171 million people worldwide suffer from diabetes, or 2.8% of the total population. The prevalence of type 2 diabetes mellitus is steadily increasing worldwide with an estimated 366 million patients in 2030 [1]. Type 2 DM is the commonest form of diabetes globally as well as in India. The prevalence of diabetes has shown increasing trend in the last three decades in India. The number of people with diabetes in India currently around 40.9 million is expected to rise to 69.9 million by 2025 unless urgent preventive steps are taken [2].

In type II diabetes, if progress is not prevented it causes multi-organ failure. There is still no magic pill that can cure diabetes. But there is no reason to despair, as with modern knowledge about cause and treatment of diabetes, most diabetics can lead normal and active lives with modification in their life styles. There are many published studies that have examined the effect of interventions on the development of diabetes mellitus type II. Intervention strategies to prevent diabetes are based on efforts to decrease insulin resistance and to promote and sustain pancreatic beta cell function. Various strategies used to control type II DM are lifestyle changes in the form of regular exercise, intake of high fibre, low salt and low fat diet.

Evidence from a small number of studies suggests that the illness perceptions of family members may

influence disease outcomes [3]. Numbers of author have noted that the role of family factors in adult diabetes intervention research has been neglected, particularly in type 2 Diabetes. This is despite recent evidence suggesting that the inclusion of a family member in psychosocial interventions for chronic illness may improve illness outcome [4].

One psychological approach that has been widely used in diabetes research is based on the Self-Regulatory Model of Illness Behavior. This approach proposes that, in response to an illness, or health threat, people form their own common sense, beliefs or illness perceptions about their illness and treatment. These illness perceptions influence the types of health-related behaviors and coping behaviors which a patient uses for managing their illness and which may impact on disease outcomes. Research into illness perception suggests that they encompass five broad dimensions: identity, timeline, causes, consequences, and curability/controllability. Patients' perceptions of their diabetes have been found to influence self-management behaviors which may, in turn, impact on glycemic control [5].

Inspite of enormous research in the field of Diabetes Mellitus, its prevalence and complications are rising. A combined qualitative /quantitative needs assessment was conducted to address the issue of illness perceptions, lifestyle and self care adopted by the diabetic patients after diagnosis.

MATERIALS AND METHODOLOGY

Present community based descriptive epidemiological study which had adopted an exploratory survey design was conducted at Shivaji Nagar urban slum after taking prior approvals from higher authorities, during January 2011 to June 2011. Shivaji Nagar urban slum is a field practice area of Department of Preventive and Social Medicine, TN Medical College, Mumbai, India. The necessary approvals were obtained from the Dean, Ethics committee and Head of Department (PSM), TN Medical College, Mumbai and in-charge of Urban Health Center, Cheeta Camp, Mumbai.

Study population was selected from type 2 diabetic patients of age 40 years & above.

Total Population of Study Area = 1, 22,000.

According to National Family Health Survey data 2005 -06, the population of more than 40 years is around 25.8%.

Population of more than 40 years would be around 31476.

Prevalence of Diabetes > 40 years in an urban slum of Mumbai is 9.3% [6].

Expected number of diabetic patients in study population = 2928

Taking 10 % of expected patients = 292.8 Sample size (n) = / > 293. By taking, inclusion and exclusion criteria into consideration, total 300 known Diabetic patients were selected by employing simple random sampling method.

Semi-structured interview schedule was constructed relevant to study. This interview schedule was tested by pilot study on 25 diabetic patients attending geriatric clinic in Shivaji Nagar Urban Health Center (UHC). Appropriate changes were done based on pilot study and the interview schedule was finalized. Voluntary consent form was prepared in English, Hindi and Marathi. Home visits were done between 10.00 am to 4.00 pm on working days. The information was collected about various socioeconomic factors, illness perceptions, family history, addictions, duration of disease, exercise, complications, associated disorders, life style, self care etc. on preformed, pre tested interview schedule by investigator himself. Height, Weight, Blood pressure and Blood sugar were measured by using appropriate techniques. Body mass index (BMI) of all the fishermen was calculated using Quetlet's Index (BMI- Weight in kilograms / height^2 in metres). Based on BMI study participants were categorized into Undernutrition (BMI < 18.5 kg/m^2); Normal weight (BMI -18.5 to 24.99 kg/m^2); Pre-obese (BMI - 25 to 29.99 kg/m^2); Obese (BMI $\geq$ 30 kg/m^2) [2].

At the time of interview, health education comprising of basic information about diabetes, how to control blood sugar and prevention of complications was given to every patient. Patients were also provided with information about hypoglycaemia, how to prevent it and what to do in hypoglycaemic episode. Patients having complications were referred to higher centers for expert's opinion. In dietary advice patients were given information about different types of foods which are harmful or beneficial in diabetes and spacing of meals. Also, patients were motivated for regular blood sugar and eye examination.

Patients' knowledge was assessed about 'life style factors', 'self care practices' and illness perception. Appropriate scoring was done for 'illness perception', 'life style factors' and 'self care practices'.

Life style factors	Self care practices
1. Cut down sweets	1. Taking medicines regularly
2. Cut down oil	2. Regular blood sugar monitoring
3. Intake of fruits & vegetables in diet	3. Compliance to prescribed dose
4. Doing regular physical exercise	4. Taking insulin inj. by self (n-45)
5. No addiction	5. Checking blood or urine sugar at home
6. Carrying medication regularly when going out of station	6. Carrying sugar/biscuits to prevent hypoglycaemic spells
7. Not eating sweets during ceremonies & festivals	7. Care of feet
8. Family members co-operative in giving correct foods at correct time	8. Carrying diabetic card

'One' mark for each above mentioned question in case of 'positive response' and 'Zero' mark for 'negative response'.

Maximum score – 8; Minimum score - 0

'Some' modification of life style factors/ self care practices – 0 to 2 marks.

'Moderate' modification of life style factors/ self care practices – 3 to 5 marks.

'Major' modification of life style factors/ self care practices – 6 to 8 marks.

'Illness perception scoring' was done after considering five domains -

1. Cause of Diabetes,
2. Timeline for Diabetes (whether temporary or permanent/life-long disease),
3. Cure-control (completely curable or not)
4. Symptoms of Diabetes Mellitus
5. Complications of Diabetes

'One' mark was allotted for 'correct' (either completely or partially) answer and 'zero' mark for 'incorrect answer'.

Maximum score: 8 marks; Minimum score: 0 marks

'Poor' illness perception – 0 to 2 marks;
'Better' illness perception – 3 to 5 marks.
The collected data was numerically coded and entered in Microsoft Excel 2007 and then transferred to SPSS version 19.0 Added data was analysed with appropriate test like Chi-square test to see the association among various parameters. Confidence limit for significance was fixed at 95% level with p value less than 0.05

RESULTS

Total 300 diabetic patients were interviewed. Table 1 describes the socio-demographic profile, education and occupation of study participants. Majority (48.7%) belonged to age group of 51 to 60 years, 183 (61%) participants were living in three generation family, 226 (75.3%) belonged to Class III and Class IV socioeconomic status. Literacy wise, 51.3% females were illiterate, whereas 49.7% males had education upto primary standard. Most males 41% were skilled workers, whereas 70.1% females were housewives and 39 (13%) patients were retired from job. Table 2 reveals health profile of study participants. Majority (45.3%) of study population were diagnosed with Type 2 DM for more than 5 years. Family history of diabetes mellitus was present in 17.7% patients. Hypertension was the most common (58.7%) associated disease followed by ophthalmic diseases (23.7%). Blood sugar level measurement was irregular in study participants. Many patients (32.3%) were checking their Blood Sugar level once in more than 6 months since diagnosis, whereas 11% patients did not check their blood sugar level at all since diagnosis. Even after diagnosis of type 2 DM, 34.7% patients were taking prescribed hypoglycaemic drugs irregularly. 'Feeling of relief' (16.7%) was the most common reason followed by 'too many medications' (11.7%).

Table 3 describes mode of diagnosis and symptoms present at the time of diagnosis. Most patients 185 (61.7%) had some kind of symptoms at the time diagnosis. Table 4 describes mean Blood Sugar level and Blood Pressure of study participants. Table 5 reveals the association of type of family and marital status with associated diseases in study participants. Associated diseases were more common in patients belonging to nuclear family and in single patients. Table 6 describes the significant association of sex with BMI. Females had more BMI compare to males. Table 7 describes the significant association of BMI with Blood Sugar level. Patients having higher BMI had poor control over fasting and Post-Prandial Blood Sugar level.

Tables 8 and 9 reveal 'life style modification', 'self care practices' and 'illness perception' scores of study participants after diagnosis. Only 14.7% patients had 'major modification' in their life style, whereas 21.7% patients had major modification in 'self care practices' to control blood sugar level. Only 16.7% patients and 19% family members of patients had 'better' illness perception even after diagnosis type 2 DM.

Only 10.7% subjects knew that diabetes occurred due to metabolic mechanism. While majority (24.7%) of subjects used to believe that it occurred due to high sugar intake in diet. Very small numbers of subjects used to think that they had developed Diabetes due to migration from their native place to Mumbai. About 23% subjects said that stress was an etiology of Diabetes. Around 30% of subjects said that Diabetes is temporary illness and it will resolve one day due to the medications they are taking. While 26.3% subjects admitted that there is no cure for Diabetes and it is permanent illness. Out of 300, 41.7% subjects said that excess thirst, appetite and increased frequency of micturation are main symptoms of Diabetes. While 20.7% said tingling & numbness are the main symptoms of DM. 30% subjects said that Diabetes can be cured with medicines while 25% knew that it cannot be cured but it can be controlled. Majority i.e.70.3% subjects had no idea about complications that could occur due to DM. Among remaining, 22.3% and 17.7% subjects admitted that Ophthalmic and Renal diseases can occur and 15.3% said foot ulcers can occur if blood sugar is not kept under control. (Non-tabulated)

Table 10 describes the association of life style factors score, self care practices score and illness perception score with blood glucose level. Patients with 'major' modification in life style factors and self care practices, and 'better' illness perception score had better control over fasting as well as post-prandial blood sugar level.

Table I: Socio-demographic Profile of Diabetic Patients

Variables		Frequency (%)	
		Male (183)	Female (117)
Age groups (in years)	40-50 (77)	53 (28.9%)	24 (20.5%)
	51-60 (146)	91 (49.7%)	55 (47%)
	61-70 (56)	32 (17.5%)	24 (20.5%)
	> 70 (21)	7 (3.8%)	14 (12%)
Religion	Muslim (257)	156 (85.2%)	101 (86.3%)
	Hindu and others (43)	27 (14.8%)	16 (13.7%)
Marital Status	Married (187)	111 (60.7%)	76 (65%)
	Single/Divorced/Widowed (113)	72 (39.3%)	41 (35%)
Type of family	Nuclear (50)	38 (20.8%)	12 (10.3%)
	Three Generation (183)	102 (55.7%)	81 (69.2%)
	Joint (67)	43 (23.5%)	24 (20.5%)
Socio-economic Status	Class I (15)	10 (5.5%)	5 (4.3%)
	Class II (37)	27 (14.8%)	10 (8.5%)
	Class III (107)	69 (37.7%)	38 (32.5%)
	Class IV (119)	60 (32.8%)	59 (50.4%)
	Class V (22)	17 (9.2%)	5 (4.3%)
Education	Illiterate (82)	22(12%)	60 (51.3%)
	Primary (124)	91(49.7%)	33 (28.2%)
	Secondary & above (94)	70 (38.3%)	24 (20.5%)
Occupation	Unemployed (135)	53 (29%)	82 (70.1%)
	Unskilled (30)	10 (5.5%)	20 (17.1%)
	Skilled (82)	75 (41%)	7 (6%)
	Semi-professional (5)	4 (2.2%)	1 (0.8%)

	Professional (9)	7 (3.7%)	2 (1.7%)
	Retired (39)	34 (18.6%)	5 (4.3%)

Table II: Distribution of patients a/c to duration of DM, family history of DM and associated diseases

Variables		Frequency	
		Male (n=183)	Female(n=117)
Duration of DM (in years)	< 1 (42)	30 (16.4%)	12 (10.3%)
	1- 2 (55)	41 (22.4%)	14 (12%)
	2- 5 (67)	45 (24.6%)	22 (18.8%)
	> 5 (136)	67 (36.6%)	69 (59%)
Family H/O DM	Present (53)	27 (14.8%)	26 (22.2%)
	Absent (247)	156 (85.2%)	91 (77.8%)
Associated Diseases	Present (185)	113 (61.7%)	72 (61.5%)
	Absent (115)	70 (38.3%)	45 (38.5%)
*Associated diseases & complications	Hypertension (176)	112 (61.2%)	64 (54.7%)
	Ophthalmic Diseases (71)	43 (23.5%)	28 (23.9%)
	Heart Disease (54)	38 (20.7%)	16 (13.7%)
	Renal Disease (37)	25 (13.7%)	12 (10.3%)
	Foot Ulcer (31)	21 (11.5%)	10 (8.6%)
	Hypercholesterolemia (23)	10 (5.5)	13 (11.1%)
	Others (17)	12 (6.6%)	5 (4.3%)
Frequency of checking Blood Sugar Level	Once a month (36)	34 (18.6%)	2 (1.7%)
	Once in 3 months (44)	38 (20.8%)	6 (5.1%)
	Once in 6 months (90)	65 (35.5%)	25 (21.4%)
	More than 6 months (97)	37 (20.2%)	60 (51.3%)
	Not checked after diagnosis (33)	9 (4.9%)	24 (20.5%)
*Reason for taking irregular treatment (104)	Feeling of relief (50)	12 (6.6%)	8 (6.8%)
	Too many medicines (35)	13 (7.1%)	22 (18.8%)
	High cost (20)	5 (2.7%)	15 (12.9%)
	Less money (18)	7 (3.8%)	11 (9.4%)
	Going out of station (7)	6 (3.3%)	1(0.9%)
	More number of doses (6)	2 (1.1%)	4 (3.4%)
	Family matters (4)	1 (0.5%)	3 (2.6%)

*Overlapping of responses was there.

Table III: Distribution of patients according to mode of diagnosis and symptoms at the time of diagnosis (n=300)

Variables		Frequency
Mode of diagnosis	During routine check-up as doctor advised	202 (67.3%)
	Suffering from some symptoms or complication	72 (24%)
	During Pre-operative check-up	26 (8.7%)
*Symptoms at the time of diagnosis	Increase frequency of urine	152 (50.7%)
	Excessive thirst	134 (44.7%)
	More Eating	122 (40.7%)
	Generalised tiredness	78 (26%)
	Infection and delayed wound healing	22 (7.3%)
	No symptoms	115 (38.3%)

*Overlapping of responses was there.

Table IV: Descriptive Statistics (n=300)

Parameters	Mean	Standard deviation	Minimum	Maximum
Fasting Blood Sugar (mg/dl)	176.78	15.8	94	212
Post-Prandial Blood sugar (mg/dl)	223.71	19.4	132	281
Systolic Blood Pressure (mm of Hg)	136.62	9.3	90	166
Diastolic Blood Pressure (mm of Hg)	96.21	7.9	76	104
Age (in years)	51.6	5.1	41	76
Duration of Diagnosis (in months)	46.31	15.7	13	180
Body Mass Index (kg/m^2)	27.85	1.9	17.3	35.6

Table V: Association of type of family and marital status with associated diseases in patients

Variables		Associated Disease		p- value
		Present	Absent	
Type of family	Nuclear (n=50)	33 (66%)	17 (34%)	p - 0.019; Significant association
	Three Generation (n=183)	102 (55.7%)	81 (44.3%)	
	Joint (n= 67)	50 (74.6%)	17 (25.4%)	
Marital Status	Married (n=187)	102 (54.5%)	85 (45.5%)	p- 0.002; significant association
	Single/Divorced/Widowed (n=113)	83 (73.5%)	30 (26.5%)	

Table VI: Association of Sex with Weight (Body Mass Index)

Sex	Body Mass Index in kg/m^2			p-value
	Underweight & normal(122)	Overweight (107)	Obese (71)	
Male (n=183)	89 (48.6%)	63 (34.5%)	31 (16.9%)	< 0.01; significant association
Female (n=117)	33 (28.2%)	44 (37.6%)	40 (34.2%)	

TABLE VII: Association of Weight with Blood sugar level

BMI	Fasting Blood Sugar (FBS)			Post-Prandial Blood Sugar (PPBS)		
	< 110 mg/dl	110 – 140 mg/dl	> 140 mg/dl	< 110 mg/dl	110 – 140 mg/dl	> 140 mg/dl
Underweight & normal (n=122)	67(54.9%)	45(36.9%)	10 (8.2%)	60(49.2%)	37 (30.3%)	25 (20.5%)
Overweight/ Pre-obese (n=107)	25 (23.4%)	27 (25.2%)	55 (51.4%)	28 (26.2%)	40 (37.4%)	39 (36.4%)
Obese (n=71)	10 (14.1%)	21 (29.6%)	40 (56.3%)	11 (15.5%)	28 (39.4%)	32 (45.1%)
Chi-square value	x2- 72.6 ; df- 4; p < 0.01			x2- 28.6 ; df- 4; p < 0.01		

Association	Significant Association	Significant Association

Table VIII: Life style and self-care practices after diagnosis among patients (n=300)

Life style factors	Frequency	**Self care practices**	Frequency
Cut down sweets	213 (71%)	Taking medicines regularly	185 (61.7%)
Cut down oil	94 (31.3%)	Regular blood sugar monitoring	216 (72%)
Intake of fruits & vegetables in diet	84 (28%)	Compliance to prescribed dose	166 (56.3%)
Doing regular physical exercise	71 (23.7%)	Taking insulin inj. by self (n-45)	18 (40%)
No addiction	100 (33.3%)	Checking blood or urine sugar at home	40(13.3%)
Carrying medication regularly when going out of station	63 (21%)	Carrying sugar/biscuits to prevent hypoglycaemic spells	12 (4%)
Not eating sweets during ceremonies & festivals	153 (51%)	Care of feet	80 (26.7%)
Family members co-operative in giving correct foods at correct time	209 (69.7%)	Carrying diabetic card	28 (9.7%)
Life style factors scoring	Frequency	**Self care practices scoring**	Frequency
Some (0-2)	77 (25.7%)	Some (0-2)	70 (23.3%)
Moderate (3-5)	179 (59.7%)	Moderate (3-5)	165 (55%)
Major (6-8)	44 (14.7%)	Major (6-8)	65 (21.7%)

Table IX: Illness perception score after diagnosis (n=300)

Illness perception score	Poor (0-2)	Better (3-5)
Patients	250 (83.3%)	50 (16.7%)
Family members	243 (81%)	57 (19%)

Table X: Association of life style factors, self care practices and patients' illness perception with Blood Sugar Level

Life style factor score	Fasting Blood Sugar in mg/dl			Post Prandial Blood Sugar in mg/dl		
	< 110	110-140	> 140	< 140	140-180	> 180
Some (n=77)	13 (4.3%)	12 (4%)	52(17.3%)	16 (5.3%)	16 (5.3%)	45 (15%)
Moderate (n=179)	59 (19.7%)	73 (24.3%)	47(15.7%)	55 (18.3%)	82 (27.3%)	42 (14%)
Major (n=44)	30 (10%)	8 (2.7%)	6 (2%)	28 (9.3%)	7 (2.3%)	9 (3%)
Chi-square test	Chi-square value - 68.5; df-4; p < 0.01			Chi-square value -54.1; df- 4 , p < 0.01		
Self care factors score	Fasting Blood Sugar in mg/dl			Post Prandial Blood Sugar in mg/dl		
	< 110	110-140	> 140	< 140	140-180	> 180
Some (n=70)	8 (2.7%)	20 (6.7%)	42 (14%)	7 (2.3%)	14 (4.7%)	49 (16.3%)
Moderate (n=165)	50 (16.7%)	55 (18.3%)	60 (20%)	52 (17.3%)	74 (24.7%)	39 (13%)
Major (n=65)	44 (14.7%)	18 (6%)	3 (1%)	40 (13.3%)	17 (5.7%)	8 (2.7%)
Chi-square test	Chi-square value -62.2; df- 4 , p < 0.01			Chi-square value -80.9; df- 4 , p < 0.01		
Illness perception score	Fasting Blood Sugar in mg/dl			Post Prandial Blood Sugar in mg/dl		
	< 110	110-140	> 140	< 140	140-180	> 180
Poor (n=250)	79(26.3%)	76(25.3%)	95(31.7%)	64(21.3%)	97(32.3%)	89(29.7%)
Better (n=50)	23 (7.7%)	17 (5.7%)	10 (3.3%)	35(11.7%)	8 (2.7%)	7 (2.3%)
Chi-square test	Chi-square value -6.5; df- 2, p- 0.03			Chi-square value -37.2; df-2 , p < 0.01		

DISCUSSION

Present community based descriptive study was carried out during Jan 2011 to June 2011, where 300 diabetic patients were interviewed. Majority patients were (48.7%) from 51-60 years age group which by itself is one of the important risk factor for many non- communicable diseases including diabetes mellitus. Late 50s is the age of retirement, which collectively causes stress, mental tension and low physical activity resulting in gradual deviation of blood sugar from normalcy and ultimately reaching to the diabetes [7]. A cross-sectional, hospital-based study reported that the prevalence of diabetes, in the age group 40-49 years, which was quite high (40.5%) compared with other age groups [8].

In our study total 27.3% patients were illiterate. Females were more illiterate compare to males. Weinstein et al. reported respondents with < 12 years of education had 50% excess risk compared with those with more education [9]. Hiltunen et al. found that diabetes was more common among women with lower education as compared to higher level of basic education [10]. Rubin et al. in their study observed that education appears to have a major effect on diabetes prognosis. Whether this was related to greater understanding of the illness and therefore greater commitment to self-care and therefore better access to medical care, or both, was difficult to say [11].

Family history of diabetes was present in 17.7 % subjects. Studies have shown that genetic factors play an important role in causation of diabetes. Results of a study conducted in Chennai found a positive correlation between obesity, family history and diabetes [12]. Study conducted in Sweden by Hilding et al. suggested more pronounced effect of a family history on the risk of type 2 diabetes. In men odds ratio was 3.1 and in women odds ratio was 1.7 [13]. According to the family history of diabetes, the prevalence of diabetes among family members with diabetic father was 6.48%, diabetic mother 10%, and both parents being diabetic was 14.94% [14].

Mean age of the subjects in this study was 51.6 (SD=5.1) years and mean duration of disease was 46.31 (SD=15.7) months. Many patients 136 (45.3 %) had diabetes for more than 5 years. It was observed in the Bangalore Urban district Diabetes (BUD) study, the mean age at diagnosis was 48.3 years for those who were aware of diabetes compared to 50.1 years for those not aware [15]. In the CODI (Cost of diabetes in India) study, it was noted that unless patients had a family history of diabetes, the symptoms tended to be ignored, leading to late diagnosis and possible complications [16].

In this study 185 (61.7%) subjects had associated diseases and complications like hypertension (58.3%), heart diseases (18%), ophthalmic diseases (23.7%), renal diseases (12.3%), foot ulcer (10.3%) etc. Reddy et al. in their study found that 33.3% of diabetic patients also had hypertension [17]. Ramachandran et al.[18] had reported prevalence of CHD in diabetics as 14.2% in the population based study in Chennai [18]. A population based study by Ranjit et al. reported that the prevalence of Overt Nephropathy was 2.2% in Indians, while Microalbuminuria

was present in 26.9 % [19]. A retrospective analysis by Patel et al. of 4349 diabetics case records, admitted into Bombay Hospital, Bombay reported that hypertension was the commonest complication, followed by ischemic heart disease and cerebrovascular accidents [20]. Hamidon et al. conducted a study in Malaysia to assess the impact of diabetes mellitus on in-hospital stroke mortality, where 163 patients with acute ischemic stroke were enrolled. Type 2 diabetes mellitus was present in 90 (55.2%) patients. Diabetes was a significant independent predictor of mortality [21].

In present study, complications and associated diseases were more common in single patients (unmarried and widow/widower) (73.5%) as compared to among married and staying with spouse (54.5%). Also associated diseases and complications were more in nuclear families. The high prevalence of these associated diseases like hypertension and IHD in nuclear families is probably because of ignorance towards personal health and mental tension [22]. Similar results were seen in many studies. A study in USA by Lee et al. reported that availability of friends and close family had a long term effect on mortality rates. Men and women rated lowest in the availability of family support were more than twice as likely to suffer a fatal illness in the course of 9 years, as were those rated highest in such family support [23]. Schafer et al. reported that more negative interactions with family members was prospectively predictive of poorer regimen adherence for measures of glucose testing, insulin injection, and dietary adherence and ultimately associate with higher HbA1 levels [24]. A prospective analysis by Karter et al. of marital relationship factors and quality of life in diabetes showed that greater satisfaction with aspects of the diabetes care regimen was predicted by better marital adjustment and greater perceived marital intimacy [25]. Paula et al. found that better marital satisfaction was related to higher levels of diabetes-related satisfaction and less impact, as well as less diabetes-related distress and better general quality of life [26]. Lidfeldt et al. found that women living alone had 2.68 times increased risk of developing diabetes complications, mostly explained by smoking, alcohol, and dietary habits [27]. Epple et al. reported that active family nutritional support, as measured by culturally relevant categories, was significantly associated with control of HbA1c levels [28].

In present study 178 (59.3%) of the subjects had BMI more than 25. Mean BMI was 27.85 kg/m^2 (SD=1.9 kg/m^2) which is above the normal BMI. Shishoo et al. reported the multivariate-adjusted hazard ratios were 1.15 for normal-weight inactive, 3.68 for overweight active, 4.16 for overweight inactive, 11.5 for obese active, and 11.8 for obese inactive participants. This study had found that BMI was significantly higher in females [29]. Similarly Candyce et al. in USA on working women with diabetes found that 84% of women had BMI > 25 and 15% had positive family history [30]. Mishra et al. reported the prevalence of diabetes mellitus, obesity, generalized and regional obesity was found to be high particularly in females. In this study both fasting and post prandial blood sugar levels were high in patients having BMI more than 25 kg/m^2 [31]. Gupta et al. in his study found similar results that BMI correlate significantly with fasting blood sugar, and negatively with physical activities. There was a significant increase in fasting blood sugar with increasing BMI. Any physical activity was inversely related to BMI. A steep increase in the prevalence of diabetes was observed in at BMI >25 [32].

In our study, only 44 (14.7%) and 65 (21.7%) patients did 'major' modification in 'life style' and 'self care practices' respectively after diagnosis. Very few (16.7%) patients had 'better' illness perception score. Only 28% subjects had increased consumption of vegetables and fruits in diet, 23.7% were doing regular exercises and 33.3% had no addictions. Few (13.3%) of subjects used to check urine and blood sugar at home, 26.7% used to take care of their feet and 4% used to carry the sugar or biscuit and water during the travelling to avoid hypoglycaemic spells. For most of them, the main concerns were only their curative treatment. Patients who had 'some' modification in life style and self care practices, and patients with 'poor' illness perception score had poor control over blood glucose level (both fasting and post-prandial blood sugar). Kaur et al. reported, of the 60 diabetic individuals, 48 subjects knew that sweets and fatty foods should be avoided but only 18.3% were avoiding them, monitoring of blood sugar was poor (46.7%), and none of the patients knew about self therapy [33].

Gopalan et al. observed, most of the patients were aware of the need for dietary care or medication, but only 50% modified their diet. Of the 97% using anti-diabetic agents, some were using them wrongly and only 10.6% of the subjects tested their urine, although 71% were aware of the need. None of the patients had any formal education regarding diabetes and only 34% consulted the physician regularly [34]. Rayappa et al. reported only seven respondents out of 611 (1.1%) undertook home monitoring of blood glucose [15]. Mohammed et al. observed attitude of patients regarding different self care behaviours. Nearly half of them paid frequent attention towards testing blood sugar (45.5%), compliance to medications (51.3%), diet (41.5%) and exercise (10.5%) [35].

This study shows that, 104 (34.7%) were taking treatment irregularly. Similar result was seen in a study conducted by Puria et al. where 28% patients were taking treatment irregularly. Reasons for irregular treatment in 28% were mainly failure to understand the importance of adhering to the treatment, lack of family support and expensive medicine [36]. Diabetic patients should examine their blood sugar once in three months, but in this study only 36 (12%) subjects used to check their blood sugar once a month, while 44 (14.7%) subjects used to check sugar once in 3 months. Similar findings were noted in the CODI study where only 6% of patients monitored their diabetes more than once a month. The rest monitored their diabetes once every two months or more (48%), or once every three months or more (47%) [16]. Similar result was seen in study by Kapur et al. which reported that only 6 % of patients monitored their diabetes more than once a month. The rest monitored their diabetes once every 2 months or more or once every 3 months or more (47%) [37].

CONCLUSION AND RECOMMENDATIONS

Study participants had poor awareness about Diabetes. They may benefit from periodical health promotion and education programmes in the area of diet management, self care and adherence to treatment. Family is a more useful unit of intervention for diabetic individuals when designing diabetes care strategies. Health education programme should also be designed for family members of diabetic patients for better family support to improve diet

management, self care and adherence to treatment. Clinicians involved with managing cases of diabetes should give sufficient importance to improve life style, exercise pattern among their patients to achieve better control of diabetes. Importance of regular monitoring of blood sugar should be explained to all diabetes patients. Overweight or obese patients with diabetes should be encouraged to do regular physical exercise and to adopt the dietary recommendations known to reduce the risk of diabetes.

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