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Factors contribute to uncontrolled diabetes in diabetic population

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ABSTRACT

The present study was considered based on the prevalence of uncontrolled diabetes in a private multi-speciality hospital with an aim to identify the factors contributing to uncontrolled diabetes in diabetic population. The study included 513 diabetic patients who met all inclusion criteria and none of the exclusion criteria and the data were collected using a well-designed interview questionnaire form. Uncontrolled diabetes was significantly high in male; illiterates; patients with regular alcohol and tobacco consumption; patients treated only with oral hypoglycemic drugs; patients with lack of knowledge about the disease, common symptoms, complications, normal glucose level, proper use of drug and diet control; patients who miss the dose regularly; patients taking drug at inappropriate time; patients without exercise; patients without diet control; patients without regular blood glucose monitoring; patients with frequent travelling. Factors such as gender, literacy status, alcohol and tobacco consumption, treatment strategy, patient's knowledge about disease and treatment, treatment noncompliance, exercise, diet, glucose monitoring has association with uncontrolled diabetes. Factors such as age, knowledge about the prescribed drug doesn't seem to have association with uncontrolled diabetes. However, the result of this pilot study needs to be validated using pivotal studies.

Keywords: Diabetes mellitus, uncontrolled diabetes, Patient's Knowledge, Diet control.

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INTRODUCTION

Diabetes mellitus is the most common chronic disease worldwide and its prevalence in adult was estimated about 285 billion (6.4 %) in 2010 and expected to reach 439 million (7.7 %) by 2030. According to the statistics of International Diabetes Federation (IDF), the first five countries with highest diabetic population in 2010 are India, China, United States, Russia and Brazil. Similarly, the first five countries with highest adult diabetic population in 2010 are Nauru, United Arab Emirates, Saudi Arabia, Mauritius and Bahrain. Adult diabetes is expected to increase about 69 % in developing countries and 20 % in developed countries which may be due to the growing population, obesity, sedentary lifestyle and hereditary nature of the disease. Diabetic research across the globe confirmed that uncontrolled diabetes leads to diabetic related complications either acute or chronic. Acute complications may be due to high blood sugar causing diabetic ketoacidosis and hyperosmolar non-ketogenic coma. Chronic complication may be due to high blood sugar causing high blood pressure and heart problems leading to heart attacks and heart failure; difficulty in vision and eye problems leading to blindness; kidney problems leading to kidney failure; nerve damage primarily leading to problems of the foot; damage to nerves in other parts of the body leading to diarrhoea, constipation, nausea, vomiting etc. Diabetic related complications increases the burden and cost of the treatment and finally results in premature death [1-7].

The present study was considered based on the prevalence of uncontrolled diabetes in a private multi-speciality hospital. The primary aim of the study is to identify factors contributing to uncontrolled diabetes in diabetic population.

MATERIALS AND METHODS

This descriptive observational study was carried out prospectively from April to November 2010 in a private multi-speciality hospital.

Patients

A total of 513 diabetic patients who met all inclusion criteria and none of the exclusion criteria were included in the study.

Inclusion criteria and exclusion criteria

Patients above 18 years of both genders, who have diabetes with or without diabetic complications, were included in the study. However, diabetic patients below 18 years of age mentally retard and pregnant woman were excluded from the study.

Data collection

The data were collected using a well-designed *'Interview Questionnaire Form'*. The questionnaire was organized under three sections. The first section focused on the general

information about the patients, second section focused on treatment and patient's awareness about the disease and treatment, third section focused on treatment compliance. A brief introduction about the study and participant written informed consent section were also included in the questionnaire. Designed questionnaire was peer reviewed by diabetologist for the relevance of contents.

Patients were interviewed by the study personnel and data were documented in *'Interview Questionnaire Form'*. During the interview, patients were briefed about the nature and the expected outcome of the study. Written informed consent was obtained from the participants prior to start of study related interview.

Statistical analysis

The data were analyzed statistically using Chi-square test ('*STATPAC*' Version 3, Bloomington, MN 55420 USA) and P values were determined. Differences between the controlled and uncontrolled diabetes were considered highly non-significant at $P>0.10$, non-significant at $P>0.05$, significant at $P<0.05$, highly significant at $P<0.01$ and extremely significant at $P<0.001$.

RESULTS

Data collected from 513 diabetic patients were analysed to identify the factor that contributes to the uncontrolled diabetes in diabetic population.

Gender

Prevalence of diabetes was higher in male (54.39 %) than in female (45.61 %). Uncontrolled diabetes was significantly high in male (61.65 %) than in female (49.15 %) (P: 0.004; $P < 0.01$) (Refer Table 1).

Table 1: General factors contributing to uncontrolled diabetes

Factors	Diabetic Population		
	General	Controlled	Uncontrolled
Gender			
Male	279 (54.39 %)	107 (38.35 %)	172 (61.65 %)
Female	234 (45.61 %)	119 (50.85 %)	115 (49.15 %)
Age			
18-29 Yrs	009 (01.75 %)	003 (33.33 %)	006 (66.67 %)
30-40 Yrs	137 (26.71 %)	059 (43.07 %)	078 (56.93 %)
41-50 Yrs	152 (29.63 %)	062 (40.79 %)	090 (59.21 %)
51-60 Yrs	083 (16.18 %)	039 (46.99 %)	044 (53.01 %)
61-70 Yrs	086 (16.76 %)	037 (43.02 %)	049 (56.98 %)
Above 70 Yrs	046 (08.97 %)	026 (56.52 %)	020 (43.48 %)
Literacy status			
Literate	118 (23.00 %)	077 (65.25 %)	041 (34.75 %)
Illiterate	395 (77.00 %)	149 (37.72 %)	246 (62.28 %)

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Age

Prevalence of diabetes was higher in the age group of 41-50 Yrs (29.63 %) followed by 30-40 Yrs (26.71 %). However, the prevalence of uncontrolled diabetes between different age groups was statistically, highly, non-significant (P: 0.499; $P > 0.10$) (Refer Table 1).

Literacy status

Incidence of diabetes was higher in illiterates (77.00 %) than in literates (23.00 %). Uncontrolled diabetes was extremely significant in illiterates (62.28 %) than in literates (34.75 %) (P: 0.0000; $P < 0.001$) (Refer Table 1).

Table 2: Behavioral factors contributing to uncontrolled diabetes

Factors	Diabetic Population		
	General	Controlled	Uncontrolled
Alcohol consumption			
Regular user	021 (04.09 %)	000 (00.00 %)	021 (100.0 %)
Occasional user	024 (04.68 %)	020 (83.33 %)	004 (16.67 %)
Stopped	023 (04.48 %)	023 (100.0 %)	000 (00.00 %)
Non alcoholic	445 (86.74 %)	183 (41.12 %)	262 (58.88 %)
Tobacco consumption			
Regular user	067 (13.06 %)	023 (34.33 %)	044 (65.67 %)
Occasional user	023 (04.48 %)	008 (34.78 %)	015 (65.22 %)
Stopped	017 (03.31 %)	014 (82.35 %)	003 (17.65 %)
Non Tobacco	406 (79.14 %)	181 (44.58 %)	225 (55.42 %)

Alcohol consumption

Prevalence of diabetes was more prevalent in non alcoholic consumers (86.74 %) than in present and past alcoholic consumers (13.25 %). Incidence of uncontrolled diabetes was extremely significant in diabetic patients consuming alcohol regularly (100.0 %) than in non-alcoholic consumers (58.88 %) and occasional alcohol consumers (16.67 %) (P: 0.0000; $P < 0.001$). Diabetic patients who stopped consuming alcohol demonstrated good glycemic control (100.0 %) (Refer Table 2).

Tobacco consumption

Diabetic prevalence was common in non-tobacco consumers (79.14 %) than in present and past tobacco consumers (20.86 %). Uncontrolled diabetes was significantly higher in diabetic patient consuming tobacco regularly (65.67 %) than in non-tobacco consumer (55.42 %), occasional tobacco consumer (65.22 %) and patients who stopped consuming tobacco (17.65 %) (P: 0.0036; $P < 0.01$) (Refer Table 2).

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Family history of diabetes

Prevalence of diabetes was higher in patient with no family history of diabetes (57.31 %) than in patient with family history of diabetes (42.69 %). Prevalence of uncontrolled diabetes was extremely significant in patient with no family history of diabetes (69.39 %) than the patient with family history of diabetes (37.90 %) (P: 0.0000; $P < 0.001$) (Refer Table 3).

Table 3: Family history and co-existing diseases in uncontrolled diabetes

Factors	Diabetic Population		
	General	Controlled	Uncontrolled
Family history of diabetes			
With family history	219 (42.69 %)	136 (62.10 %)	083 (37.90 %)
Without family history	294 (57.31 %)	090 (30.61 %)	204 (69.39 %)
Co-existing diseases			
Hypertension	197 (38.40 %)	053 (26.90 %)	144 (73.10 %)
Blurred vision	102 (19.88 %)	031 (30.39 %)	071 (69.61 %)
Abdominal pain	013 (02.53 %)	012 (92.31 %)	001 (07.69 %)
Angina	003 (00.58 %)	000 (00.00 %)	003 (100.0 %)
Myocardial Infarction	002 (00.39 %)	000 (00.00 %)	002 (100.0 %)
Convulsions	001 (00.19 %)	000 (00.00 %)	001 (100.0 %)
No co-existing diseases	195 (38.01 %)	096 (49.23 %)	099 (50.77 %)

Co-existing diseases

In the study, about 62 % of diabetic patient suffer with co-existing diseases. Co-existing diseases are extremely significant in patient with uncontrolled diabetes than in patient with controlled diabetes (P: 0.0000; $P < 0.001$). Hypertension was the most common co-existing disease (38.40 %) than the other diabetic compliances. Hypertension (73.10 %) was higher in patient with uncontrolled diabetes than in patient with controlled diabetes (26.90 %). Prevalence of angina (0.58 %), myocardial infarction (0.39 %) and convulsion (0.19 %) were uncommon in the study however, there prevalence (100 %) were seen only in patient with uncontrolled diabetes (Refer Table 3).

Treatment strategy

Table 4: Treatment strategy contributing to uncontrolled diabetes

Factors	Diabetic Population		
	General	Controlled	Uncontrolled
Treatment strategy			
Insulin	039 (07.60 %)	039 (100.0 %)	000 (00.00 %)
OHD*	071 (13.84 %)	015 (21.13 %)	056 (78.87 %)
OHD + Diet control	243 (47.37 %)	115 (47.33 %)	128 (52.67 %)
OHD + Diet control + Exercise	160 (31.19 %)	111 (69.38 %)	049 (30.63 %)

*Oral Hypoglycaemic Drug (OHD)

Patient receiving insulin had good glycaemic control (100 %) than any other treatment mode. Prevalence of uncontrolled diabetes was extremely significant in patient receiving only oral hypoglycemic drugs (78.87 %) than the other treatment mode (P: 0.0000; $P < 0.001$) (Refer Table 4).

Basic Disease Knowledge

Table 5: Patient's knowledge contributing to uncontrolled diabetes

Factors	Diabetic Population		
	General	Controlled	Uncontrolled
Basic disease knowledge			
Patient with knowledge	047 (09.16 %)	045 (95.74 %)	002 (04.26 %)
Patient without knowledge	466 (90.84 %)	181 (38.84 %)	285 (61.16 %)
Common symptoms knowledge			
Patient with knowledge	298 (58.09 %)	219 (73.49 %)	079 (26.51 %)
Patient without knowledge	215 (41.91 %)	068 (31.63 %)	147 (68.37 %)
Acute complications knowledge			
Patient with knowledge	024 (04.68 %)	018 (75.00 %)	006 (25.00 %)
Patient without knowledge	489 (95.32 %)	168 (34.36 %)	321 (65.64 %)
Chronic complications knowledge			
Patient with knowledge	024 (04.68 %)	017 (70.83 %)	007 (29.17 %)
Patient without knowledge	489 (95.32 %)	181 (37.01 %)	308 (62.99 %)
Knowledge of normal glucose level			
Patient with knowledge	034 (06.63 %)	024 (70.59 %)	010 (29.41 %)
Patient without knowledge	479 (93.37 %)	202 (42.17 %)	277 (57.83 %)
Knowledge about the given drug			
Patient with knowledge	007 (01.36 %)	004 (57.14 %)	003 (42.86 %)
Patient without knowledge	506 (98.64 %)	223 (44.07 %)	283 (55.93 %)
Knowledge of proper use of drug			
Patient with knowledge	473 (92.20 %)	272 (57.51 %)	201 (42.49 %)
Patient without knowledge	040 (07.80 %)	012 (30.00 %)	028 (70.00 %)
Knowledge about diet control			
Patient with knowledge	297 (57.89 %)	201 (67.68 %)	096 (32.32 %)
Patient without knowledge	216 (42.11 %)	080 (37.04 %)	136 (62.96 %)

About 91 percent of patients in the study were not aware of the basic disease knowledge. Prevalence of uncontrolled diabetes was extremely significant in patient without basic disease knowledge (61.16 %) than in patient with basic disease knowledge (04.26 %) (P: 0.0000; $P < 0.001$) (Refer Table 5).

Common symptoms knowledge

`About 58 percent of patients in the study were aware of common symptoms of diabetes. Prevalence of uncontrolled diabetes was extremely significant in patient without knowledge of common symptoms (68.37 %) than in patient with knowledge of common symptoms (26.51 %) (P: 0.0000; $P < 0.001$) (Refer Table 5).

Acute complications knowledge

About 95 percent of patients in the study were not aware of acute complication of diabetes. Prevalence of uncontrolled diabetes was highly significant in patient without knowledge of acute complication of diabetes (65.64 %) than in patient with knowledge of acute complication of diabetes (25.00 %) (P: 0.001; $P < 0.01$) (Refer Table 5).

Chronic complications knowledge

About 95 percent of patients in the study were not aware of chronic complication of diabetes. Prevalence of uncontrolled diabetes was extremely significant in patient without knowledge of chronic complication of diabetes (62.99 %) than in patient with knowledge of chronic complication of diabetes (29.17 %) (P: 0.0009; $P < 0.001$) (Refer Table 5).

Knowledge of Normal glucose level

About 93 percent of patients in the study were not aware of normal glucose level in the blood. Prevalence of uncontrolled diabetes was highly significant in patient without knowledge of normal glucose level (57.83 %) than in patient with knowledge of normal glucose level (29.41 %) (P: 0.0013; $P < 0.01$) (Refer Table 5).

Knowledge about the given drug

About 99 percent of patients in the study were not aware of drug given for the treatment. However, difference between controlled and uncontrolled diabetes was highly non-significant between patient with knowledge and patient without knowledge about the given drug (P: 0.7578; $P > 0.10$) (Refer Table 5).

Knowledge of proper use of drug

About 92 percent of patients in the study were aware of proper use of drug. Prevalence of uncontrolled diabetes was highly significant in patient without knowledge of proper use of drug (70.00 %) than in patient with knowledge of proper use of drug (42.49 %) (P: 0.0014; $P > 0.01$) (Refer Table 5).

Knowledge about diet control

About 57 percent of patients in the study were aware of diet control. Prevalence of uncontrolled diabetes was extremely significant in patient without knowledge of diet control (62.96 %) than in patient with knowledge of diet control (32.32 %) (P: 0.0000; $P < 0.001$) (Refer Table 5).

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Missed Dose

Table 6: Treatment noncompliance contributing to uncontrolled diabetes

Factors	Diabetic Population		
	General	Controlled	Uncontrolled
Missed dose			
Missed dose once a week	131 (25.54 %)	070 (53.44 %)	061 (46.56 %)
Missed dose twice a week	109 (21.24 %)	027 (24.77 %)	082 (75.23 %)
Missed dose thrice a week	030 (05.85 %)	002 (06.67 %)	028 (93.33 %)
Never missed dose	243 (47.37 %)	212 (87.24 %)	031 (12.76 %)
Drug at inappropriate in time			
Patient taking drug in time	076 (14.81 %)	069 (90.79 %)	007 (09.21 %)
Patient not taking drug in time	437 (85.18 %)	218 (49.89 %)	219 (50.11 %)

About 52 percent of patients in the study miss the dose either once a week or twice a week or thrice a week. Prevalence of uncontrolled diabetes was extremely significant in patient missing dose than in patient don't miss the dose (P: 0.0000; $P < 0.001$). Percentage of uncontrolled diabetes increases with number of missed dose (i.e. once a week (46.56 %), twice a week (75.23 %) and thrice a week (93.33 %) (Refer Table 6).

Drug at inappropriate in time

About 85 percent of patients in the study were not taking drug in time. Prevalence of uncontrolled diabetes was extremely significant in patient not taking drug in time (50.11 %) than in patient taking drug in time (9.21 %) (P: 0.0000; $P < 0.001$) (Refer Table 6).

Exercise

Table 7: Exercise, diet and glucose monitoring contributing to uncontrolled diabetes

Factors	Diabetic Population		
	General	Controlled	Uncontrolled
Exercise			
Up to 30 minutes	287 (55.95 %)	195 (67.94 %)	092 (32.06 %)
Up to 60 minutes	102 (19.88 %)	093 (91.18 %)	009 (08.82 %)
Regular	291 (56.73 %)	224 (76.98 %)	067 (23.02 %)
Occasional	098 (19.10 %)	062 (63.27 %)	036 (36.73 %)
No exercise	124 (24.17 %)	034 (27.42 %)	090 (72.58 %)
Diet control			
Regular	218 (42.50 %)	165 (75.69 %)	053 (24.31 %)
Occasional	075 (14.62 %)	047 (62.67 %)	028 (37.33 %)
No diet control	220 (42.88 %)	010 (04.55 %)	210 (95.45 %)
Glucose monitoring			
Regular	097 (18.91 %)	090 (92.78 %)	007 (07.22 %)
Occasional	396 (77.19 %)	142 (35.86 %)	254 (64.14 %)
No monitoring	020 (03.90 %)	000 (00.00 %)	020 (100.0 %)

About 75 percent of patients in the study were exercising either regularly or occasional. Uncontrolled diabetes was extremely significant in patient not exercising (72.58 %) in comparison with patient exercising regularly (23.02 %) and occasionally (36.73 %) (P: 0.0000; *P* < 0.001). Study also demonstrated good glycemic control in patient exercising up to 1 hour (91.18 %) than in patient exercising up to 30 minutes (67.94 %) (P: 0.0000; *P* < 0.001) (Refer Table 7).

Diet control

Study reveals that about 57 percent patients were practicing diet control either regularly or occasionally. Uncontrolled diabetes was extremely significant in patient without diet control (95.45 %) than in patient with diet control (61.64 %) (P: 0.0000; *P* < 0.001). Patient with regular diet control demonstrated significantly good glycemic control (75.69 %) than in the patient with occasional diet control (62.67 %) (P: 0.0428; *P* < 0.05) (Refer Table 7).

Glucose monitoring

About 96 percent of patients were monitoring the blood glucose level either regularly or occasionally. Prevalence of uncontrolled diabetes was extremely significant in patient not monitoring the blood glucose level than in patient monitoring the blood glucose level either regularly or occasionally (P: 0.0000; *P* < 0.001). The study demonstrated good glycemic control in patient with regular glucose monitoring (92.78 %) than the patient with occasional blood glucose monitoring (35.86 %) (P: 0.0000; *P* < 0.001) (Refer Table 7).

Reason for noncompliance

Table 8: Reason for noncompliance that contributes to uncontrolled diabetes

Factors	Diabetic Population		
	General	Controlled	Uncontrolled
Reason for noncompliance			
Lack of awareness about treatment	209 (40.74 %)	093 (44.50 %)	116 (55.50 %)
Travelling	109 (21.25 %)	032 (29.36 %)	077 (70.64 %)
Work schedule	157 (30.60 %)	074 (47.13 %)	083 (52.87 %)
Family problems	038 (07.41 %)	027 (71.05 %)	011 (28.95 %)

The study demonstrated the lack of awareness about treatment was the main reason for treatment noncompliance (40.74 %). Uncontrolled diabetes was extremely significant in patient with regular travelling (70.64 %) than in patient with lack of awareness about treatment (55.50 %), patient with work schedule (52.87 %) and patient with family problems (28.95 %) (P: 0.0001; *P* < 0.001) (Refer Table 8).

DISCUSSION

Gender

Many studies and surveys are being carried across the globe which shows men are prone to have diabetes compared to female and vice versa and these statistics vary from country to country. According to international diabetic federation, diabetes was more prevalent in male in comparison with female [2]. The present study has shown that men are more prone to diabetes and uncontrolled diabetes than women. The expected hypothesis for the obtained result may be men are more indolence and obese than women. However, the precise mechanism is yet to be explored.

Age

In India, diabetic population is peak at 40-50 years according to international diabetic federation [2]. The present study has also shown that the prevalence of diabetes was peak at 41-50 years. There are many hypotheses stating that change in hormone levels, stress, physiological change contributes to diabetes at the age group of 40-50 years. However, the accurate mechanism is yet to be explored. The prevalence of uncontrolled diabetes between different age groups was statistically highly non-significant. Hence age would not be a contributing factor for uncontrolled diabetes.

Literacy status

Dean Schillinger *et.al.* has proved that poor health literacy associated with worse glycemic control in diabetic population and contributes to diabetes related burdens [8]. The present study has shown that prevalence of diabetes and uncontrolled diabetes has significantly high in illiterates. Hence the present study result has validated the pervious result as there was a significant positive correlation between literacy status and uncontrolled diabetes.

Alcohol consumption

Epidemiological studies have found an association between light to moderate alcohol consumption decreases the risk of type 2 diabetes to approximately 30 percent. Light to moderate alcohol consumption significantly reduced blood glucose values which may be due to (a) increase in NADH as a result of alcohol metabolism, leading to a reduction in hepatic gluconeogenesis; (b) increased glycogen phosphorylase activity reduces the hepatic glycogen stores; (c) increase in hepatic insulin sensitivity, leading to the restoration of glycogen stores and reduction in blood glucose levels [9, 10]. The present study has shown the prevalence of diabetes more in non-alcoholic than in alcoholic which has validated the previous results. The present study has also shown that uncontrolled diabetes was extremely significant in diabetic patients consuming alcohol regularly which may be due to drug-alcohol interaction leading to reduction of potency of oral hypoglycemic drug as much as 50 % by alcohol. Consumption of alcohol with insulin therapy may leads to low blood sugar which in turn cause irreversible neurological damage, coma, and death. Diabetic patients who stopped consuming alcohol

during the therapy demonstrated good glycaemic control which proves the association of alcohol in the metabolism of oral hypoglycemic drugs.

Tobacco consumption

Maisonneuve *et.al.* has shown tobacco smoking increases the risk of pancreatic calcifications and to a lesser extent the risk of diabetes. In 1986, Eric B Rimm *et.al.* studied the association of smoking and the incidence of non-insulin dependent diabetes mellitus in 41810 male health professionals and result showed that men who smoked 25 or more cigarettes daily had a relative risk of diabetes compared with non-smokers [11-15]. But the present study has shown the prevalence of diabetes in non-tobacco consumer than the tobacco consumer which needs to be explored by a pivotal study. The present study has also shown that the uncontrolled diabetes was significantly prevalent in diabetic patient consuming tobacco regularly which may be due to an increase in plasma clearance and decrease in absorption of oral hypoglycemic drug; induction of cytochrome P450 enzymes which in turn increase the metabolism of oral hypoglycemic drugs; increase the plasma endothelia level causing vasoconstriction and resulting in tissue hypoxemia which in turn decreases the peripheral glucose utilization; direct effect on insulin receptor affinity, thus leading to decreased peripheral insulin effectiveness. Diabetic patients who stopped consuming tobacco during the therapy demonstrated good glycaemic control which proves the association of tobacco in the prevalence of uncontrolled diabetes.

Family history

Mallikarjun V. Jali *et.al*. has reported more male patients without family history of diabetes and female patients with family history of diabetes. [16]. The present study has shown the prevalence of diabetes in patients with no family history than with family history which indicates the growth of new diabetic cases which may arise from other sources other than hereditary nature of the disease.

Co-existing diseases

In the present study, hypertension, blurred vision, abdominal pain, angina, myocardial infarction, convulsions were observed as co-existing diseases. Persons with diabetes are twice as prone to have hypertension compared to the general population which may be due visceral obesity, insulin resistance, oxidative stress, endothelial dysfunction, activated renin-angiotensin system, increased inflammatory mediators, and obstructive sleep apnea which results in induce sympathetic over activity, vasoconstriction, increased intravascular fluid, and decreased vasodilatation, leading to development of hypertension in diabetes. Blurred vision is due to high blood sugar which pulls fluid from the blood vessels and leaks into the retina causing swelling of the retina. Chronic abdominal pain may be due to chronic mesenteric ischemia or intestinal angina. The fundamental pathological mechanism in cardiovascular diseases in diabetes is the process of atherosclerosis. Convulsions are due night time hypoglycemia which leads to seizures and convulsions. Convulsions may also occur as a consequence of insulin

induced hypoglycemia [17-21]. The present study demonstrated that co-existing diseases are extremely significant in patient with uncontrolled diabetes.

Treatment Strategy

In the present study, four treatment strategies were analysed. Insulin therapy proves to be efficient in maintaining the glycaemic level as there were no uncontrolled diabetic patients in the patient receiving insulin therapy. Uncontrolled diabetes was significantly prevalent in patient receiving only oral hypoglycemic drugs. Hence the study re-established the need of diet control and exercise which play vital role in glycaemic control.

Patient's knowledge about the disease and treatment

The present study shown that patient with basic disease knowledge had better glycaemic control than the patient without basic knowledge. The proposed hypothesis is that patient with basic disease knowledge will be aware about the root cause of the disease and try to avoid the elevating factors.

Prevalence of uncontrolled diabetes was extremely significant in patient without knowledge of common symptoms, acute complication and chronic complication than in patient with knowledge. The propose hypothesis is that patient with awareness about the common symptoms such as frequent urination, unquenchable thirst, extreme fatigue, tingling or numbness in hands, legs or feet and increased appetite; acute complication such as diabetic ketoacidosis; and chronic complications such as diabetic retinopathy, diabetic neuropathy, diabetic nephropathy, diabetic foot ulcers gives an indication about the increase in glycaemic level and fear about the irreversible damages which will make the patient to seek medical assistance at the regular interval and comply with treatment.

The present study has shown the patient with knowledge about normal glucose level has less incidence of uncontrolled diabetes. Most of the diabetic patients are trained to monitor their blood glucose at home and the knowledge of normal blood glucose is necessary to achieve the treatment goal.

The research team anticipated the knowledge about the prescribed drug may have its significance in maintaining the glycaemic level but the study shown that the knowledge about prescribed drug had no association with uncontrolled diabetes as the difference was statistically non significant.

The study has shown that the patient with knowledge about proper use of the drug had lesser incident of uncontrolled diabetes. Pharmacological action of drugs will be at maximum when it is used properly. Hence the awareness about the proper use of the drug is vital in controlling the glycaemic level.

The study also confirmed that patient with diet control knowledge had lesser incidence of uncontrolled diabetes. Reduced intake of carbohydrate sources is an alternative strategy in maintaining the glycaemic level. Awareness about the diet control will have it significance in the maintaining glycaemic level.

Missed Dose

Due to busy schedule in today's life there are very high chances to skip or forget regular and scheduled activities. The study has shown that the uncontrolled diabetes increases with number of missed dose.

Drug at inappropriate time

Taking drug at inappropriate time may not bring the exact pharmacological action of the drug and patient taking drug at inappropriate time regularly may contributes to uncontrolled diabetes which has been proved by the study.

Exercise

The present study confirmed that patient with regular and occasional exercise significantly maintains the glycaemic control as the exercise burns calories increases the demand of glucose in muscles, increases the tissue sensitivity to Insulin. In obese person, beta cell are strained however, exercise reduce the body weight and increase the life of beta cells for normal functioning.

Diet control

Many studies across globe proved that diet control effectively maintain the glycaemic control. Similarly the current study validated the previous results as the glycaemic control is significantly high in patient with regular and occasional diet control than the non diet control patients.

Glucose monitoring

Self-blood glucose monitoring allows to know blood glucose level at any time and helps prevent the consequences of very high or very low blood sugar. Monitoring facilitates tighter glycaemic control, which decreases the long term and short term risks of diabetic complications. The study also proved that patient with regular blood sugar monitoring significantly maintains the glycaemic level than the occasional and patient without glucose monitoring.

Reason for treatment non compliance

There are many reasons for the non compliance of treatment however; the study reveals the first four main reasons for treatment non compliance which are lack of awareness about the treatment, travelling, tight work schedule, family problems which contribute to treatment non compliance. Frequent travelling is the main reason for the treatment non compliance which contributes to 70 % of uncontrolled diabetes.

CONCLUSION

Factor such as sex; literacy status; alcohol and tobacco consumption; treatment strategy; patient's knowledge about the disease, symptoms, acute and chronic complication, proper use of drugs; treatment non compliance such as miss dose, drug taken at inappropriate time; exercise, diet control, glucose monitoring and other factors like frequent travelling, tight work schedule, family problems contributes to uncontrolled diabetes. Factors such as age, Knowledge about the given drug doesn't contribute to uncontrolled diabetes. Pivotal study should be attempt in future to establish whether this association is causal and to clarify its mechanisms.

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