ORIGINAL ARTICLE

STUDY OF PREVALENCE OF DIABETES MELLITUS TYPE-2 AND IMPAIRED GLUCOSE TOLERANCE AMONG ADULTS 30 YEARS ABOVE IN AN URBAN FIELD PRACTICE AREA OF KATIHAR MEDICAL COLLEGE

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ABSTRACT: OBJECTIVES: 1) To determine the prevalence of diabetes mellitus Type -2 in an urban population of age 30 year and above 2) To determine the prevalence of impaired an urban population of age 30 years and above 3) To study the association of various risk factors with diabetes mellitus Type-2 and Implored Glucose Tolerance. **METHODOLOGY:** A community based cross section study will be carried out in population 30 years above at Sharifganj with District Katihar Bihar during January 2013-June 2013. Population approximately 5000 is an urban field practice area of Katihar Medical College Katihar, during the six months study period. Fasting Blood Sugar (FBS) was estimated to identify the diabetes and the Impaired Glucose Tolerance (IGT). Information from the study population was collected through pre tested questionnaire using several anthropometric measurements. **RESULT:** All of the 910 subjects examined far fasting blood glucose after overnight fast. FBS was detected by using standardized Glucometer (Accu-Check) 32 cases were detected as Diabetic or having Impaired Glucose Tolerance (ITG) prevalence of diabetes and IGT was higher among urban and is increasing with increase in age. Several long and short team steps should be taken for promotion of healthy life style modifications to present diabetes and emergence of its complications.
KEYWORDS: Body mass index, Diabetes, Impaired glucose tolerance, Life modification, Waist hip ratio.

INTRODUCTION: Diabetes mellitus is a syndrome characterize by a state of chronic hyperglycemias causing disturbance of carbohydrate, fat and protein-metabolism, associated with absolute or relative deficiency in insulin secretion or insulin action.[1]

Diabetes is mainly classified as Type-1- insulin dependent Diabetes Mellitus (IDDM). It is the most severe form of disease and is usually seen in individuals less than 30 years of age.

Type-2 non-insulin dependent Diabetes mellitus (NIDDM). It is more common 85 percent of all diabetes mellitus area of Type-2. It occurs mainly in the middle aged and elderly person.

Prevalence of Diabetes is increasing day by day in our country. In addition, prevalence of Impaired Glucose Tolerance (IGT) is also high indicating the potential for a further increase in the number of diabetic patients.[2]

Diabetes mellitus is an "Iceberg" disease. Although the prevalence and incidence of diabetes mellitus type-2 have been increased globally, they have been especially dramatic in societies in economic transition, in newly industrialized countries an in developing country.

Diabetes mellitus is estimated that in the year 2000, 171 million people had diabetes worldwide and it is expected to double by the year 2030 AD.[3]

ORIGINAL ARTICLE

Prevalence of diabetes is higher in Indian subcontinent compared to Britain[3]. It is estimated that 20% of global burden resides in South East Asia Region (SEAR) area, which will be tripled to 228 million by the year 2025 from the current 84 million.[4]

The major determinants for projected increase in the number of Diabetes in SEAR countries are population growth, age structure, and urbanization, Diabetes and its complications pose a major threat to public health resources and WHO has projected the maximum increase in Diabetes would occur in India.[5]

The ration between Diabetes and IGT is considered to be an index of epidemic state in the population.[6]

The prevalence of Diabetes and IGT are high in urban Indian Population It is also rising in rural areas which Indicate the presence of Genetic basis for Diabetes in ethnic group.[7]

Diabetes type-2 usually comes to light in the middle years of life and thereafter begins to rise in frequency. An increase in the prevalence of type-2 diabetes in the younger age group has been noted from the epidemiological studies. The National Urban Diabetes Survey (NUDS) done in 2001 showed that the prevalence of diabetes in those aged below 30 was 5.4 percent.[8] Some population based studies have reported that the prevalence was higher in female. Majority of the population based studies reported similar prevalence of diabetes in males and females.

The National Urban Diabetes Survey (NUDS) was a population based study conducted in six large cities from different regions of India. The study showed that the age standardized prevalence of Type-2 diabetes mellitus was 12.1 percent. The prevalence was highest in Hydrabad (16.6%) followed by Chennai (13.5%), Bengalaru (12.4%), Kolkata (11.7%), New Delhi (11.6%) and Mumbai (9.3%).[8]

The prevalence of Diabetes in India Study (PODIS) was done in 108 countries of India reported a prevalence of 5.9 percent in urban and 2.7 percent in rural areas.[9]

Impaired Glucose Tolerance (IGT) and impaired fasting Glucose (IFG) collectively called as pre diabetic states, have a high risk of conversion to diabetes. Several studies have shown that those pre diabetic states are also high risk stages for cardiovascular disease.

Ramachandran et al reported a high prevalence of IGT in urban (8.7%) and rural (7.8%) areas in 1989[7] subsequent by the same investigator found that the in 1995 and then to 16.8 percent in 2000.[10,8]

From those data, it appears that there is a rising pattern in the prevalence of type-2, diabetes mellitus in India both in the urban as well as the rural areas obesity (BMI>25kg/m^{2}; waist Hip ration>0.85) is significant risk factor for diabetes type-2. The association has been repeatedly demonstrated in different studies.[11,12,13]

Sedentary life style appears to be an important risk factors for the development of type-2 diabetes mellitus.[12, 13]

Meta-analysis study done by Boule ET al[14] reveals that. Exercise (aerobic) reduces Hb AIC to 0.66 percent independent of change in body weight in people with diabetes.

A high saturated fat intake has been association with a high risk of Impaired Glucose Tolerance and higher fasting glucose and diabetes mellitus type-2.[15] in human intervention studies, replacement of saturated by unsaturated fatty acids leads to improved glucose tolerance.[4]

In many controlled experimental studies, high intakes of dietary fibre have been shown to result in reduces blood glucose levels in people with type-2 diabetes and IGT.[16] U.K. prospective study revealed that dietary modification alone is very effective in lowering blood glucose and is helpful to

ORIGINAL ARTICLE

maintain target glucose control for many years.[13] A randomized control Trial done by Gold Haber et al[17] regarding Medical Nutrition Therapy (MNT) for management of Type-2 diabetes have reported improved Glycemic Control i.e., 1-2 percent decrease in Hb A/C consumption of whole grains cereals is beneficial while refined grains (Polished white rice, refined wheat flour) which contains only the endosperm (Starch) have an adverse effect on cardio-metabolic risk factors including glucose intolerance and diabetes.[18]

Excessive intake of alcohol can increase the risk of diabetes by damaging the pancreas and liver and by promoting obesity[9]. Prevalence of diabetes mellitus is no longer related to socioeconomic status. Previously it has been generally considered a disease of rich and affluent. Now it is becoming a problem even among the middle income and poorer sections of society due to change, in the life style[9]. Diagnostic criteria for diabetes mellitus by oral Glucose Tolerance test (OGTT) in a fasting blood sugar value ≥120 mg/dl and 2 hours after glucose load ≥180mg/dl of venous blood and for impaired glucose tolerance fasting value <120 mg/dl and 2 hours after glucose load 120-180 mg/dl of venous blood Normal fasting blood glucose level 70-120 mg/dl and 2 hours after glucose load= 140 mg/dl; However in case of pregnant women, lower criteria is used. A Fasting Blood Sugar (FBS) of 105 mg/dl or >165 mg/dl, 2 hours postprandial, confirms diabetes mellitus.[19]

The prevalence of diabetes mellitus and impaired glucose tolerance and role of various risk factors in the causation of type-2 diabetes in the local epidemiological setup so the appropriate intervention can be planned. A study will be undertaken and urban field practice area of Katihar Medical College, Katihar, to determine the prevalence of Diabetes mellitus Type-2 in an urban population of age 30 year and above.

METHODOLOGY: A community based cross sectional study will be carried out in population 30 years and above at Sharifganj with district of Katihar, Bihar, during January 2013- June 2013. Population approximately 5000 is an urban field practice area of Katihar Medical College, Katihar.

WHO reported a 2.4 percent prevalence of diabetes mellitus type-2 in rural population of India. Based on this sample size is calculated by adopting the formula.

$$n = \frac{z^2\alpha/2}{\varepsilon^2} \times PQ$$

Where P= prevalence rate of disease
Here P= 2.4% = 0.024
Q = 1-P = Complement of P
Here Q = 97.6% = 0.0976
ε = Allow able error 20% P = 0.048
α = level of Significance (type-lesser)
$z\ \alpha/2$ = 1.96 = Z (α = 0.05) z^2 = 4
ε^2= $(0.048)^2$ = 0.002304

$$n = \frac{4\times0.024}{0.002304} \times 0.976 = 455$$

Here degree of confidence is 95 percent allowing the design effect2, the
n = 455 x 2 = 910
So the sample size will be 910.

ORIGINAL ARTICLE

House where survey will be under taken will be selected by systematic random sampling technique. Thus subjects of age 30 years and above will be interviewed in the selected house after establishing good rapport. The different variable for this study will be taken as follows; Age, Sex, Education, Occupation, Family history of diabetes, economic status, housing, Physical activity, dietary habit, weight, height Waist hip measurement, unhealed ulceration itching around genital area, Tingling sensation, Blood Pressure etc. All the information will be recorded in the predesigned and pretested information schedule. Clinical examination will be done.

Next day early in the morning, subject will be screened for fasting and post glucose as recommended by W.H.O. Consent should be taken before taking blood sample. Objectives of the study should clearly explain in Local language to the subjects.

After taking early morning fasting sample they will be given 75gms of anhydrous glucose in 200 ml of water to drink in 5 minutes. Exactly after 2 hours the post glucose sample will be taken. Sample will be tested in the laboratory on the same day. Results will be analyzed as per WHO criteria "All data will be computerized. Appropriate statistical procedure will be adopted to analyse the observation."

OBSERVATION AND RESULT:

Age Group	Male	Female	Total
30-40	75	73	148(16.26%)
41-50	216	213	429(47.14%)
51-60	145	130	275(30.21%)
61-70	30	28	58(6.37%)
	466(51.2%)	444(48.79%)	910(100%)
Table 1: Distribution of total study subjects			

In our study, Out of 910 subjects, 148 (16.26%) are in the age group of 30-40 years, In 41-50 year these are 216 male and 213 Female total 429 (47.14%) among 51-60 years there are total 275 (30.21%) and in 61-70 years 58 (6.37%).

Factor influencing diabetic Age Group	Type 2 DM	IGT	Normal	Total
30-40	2(6.25%)	14(18.67%)	130(16.18%)	146
41-50	10(31.25%)	20(26.67%)	410(51.05%)	440
51-60	15(46.87)	34(45.31%)	225(28.04%)	274
61-70	5(15.63)	7(9.33)	38(4.73%)	50
	32(100%)	75(100%)	803(100%)	910(100%)
Physical Activity	**Type 2 DM**	**IGT**	**Normal**	**Total**
Sedentary	14(43.75%)	28(37.34%)	208(25.90%)	250(27.48%)
Mild	10(31.25%)	25(33.34%)	360(44.84%)	395(43.40%)

ORIGINAL ARTICLE

Moderate	6(18.75%)	20(26.66%)	200(24.90%)	226(24.84%)
Heavy	2(6.25%)	2(2.66%)	35(4.36%)	39(4.28%)
	32(100%)	75(100%)	803(100%)	910(100%)
Monthly Income (In Rs) Socio economic class	**Type 2 DM**	**IGT**	**Normal**	**Total**
I	7(21.87%)	15(20%)	250(31.33%)	272(29.89%)
II	10(31.25%)	25(33.34%)	400(49.8%)	435(47.82%)
III	8(25%)	20(26.66%)	88(10.98%)	116(12.74%)
IV	5(15.63%)	10(13.34%)	50(6.22%)	65(7.14%)
V	2(6.25%)	5(6.66%)	15(1.86%)	22(2.41%)
	32(100%)	75(100%)	803(100%)	910(100%)
Body Mass Index	**Type 2 DM**	**IGT**	**Normal**	**Total**
BMI	17(53.13%)	52(69.34%)	758(94.40%)	827(90.87%)
Normal	15(46.87%)	23(30.66%)	45(5.60%)	83(9.13%)
Over weight	32(100%)	75(100%)	803(100%)	910(100%)
Waist Hip Ratio(WHR)				
Risk Group	**Type 2 DM**	**IGT**	**Normal**	**Total**
Low	5(15.63%)	40(53.34%)	600(74.73%)	64(70.87%)
Moderate	20(62.5%)	31(41.33%)	197(24.53%)	248(27.26%)
High	7(21.87%)	4(5.33%)	6(0.74%)	17(1.87%)
Total	**32(100%)**	**75(100%)**	**803(100%)**	**910(100%)**

Table 2: Distribution of several factors influencing emergence of diabetes

Features	Yes (%)	No. (%)	Total (%)
Family history of diabetes	9(28.13%)	23(71.87%)	32(100%)
IGT	12(16%)	63(84%)	75(100%)
Hypertension(diabetes)	24(75%)	8(25%)	32(100%)
Hypertension(IGT)	20(26.66%)	55(73.33%)	75(100%)

Table 3: Pattern of Hypertension and family history
of diabetes among diabetes and IGTS

Life Style Modification	Number	Percentage
Dietary Planning	01	3.12%
Yoga/Regular Exercise	02	6.25%
Irregular Exercise	04	12.5%
No Life style Modification	25	78.12%
Total	**32**	**100%**

Table 4: Life Style modifications among detected diabetes

ORIGINAL ARTICLE

All of the 910 subjects examined for fasting Blood glucose (FBG) after overnight fast. FBC was detected by using standardized Glucometer (Accu-check). 32 cases were detected as Diabetic or having Impaired Glucose Tolerance (IGT).

Majority of the study population belonged to 51-60 year age group. Coming to age wise distribution of detected Diabetes and IGT 15.63% of age group and 9.33%, 61-70 & 46.87%, 45.33 of 51-60 age group. 31.25%, 26.67% of 41-50 age group and 6.25%, 18.67% of 30-40 age groups. It was also observed that as the age increase the incidence of Diabetes and IGT also increase. And was maximum in the age group of 51-60 years of age Table (2).

Table-2 also shows that from each category i.e. sedentary, mild, moderate and heavy 43.57% 31.25% 17.75%, 6.25% diabetic and IGTs were 37.34%, 33.34, 26.66%, 2.66% detected. The physical activity was estimated

Distribution of study population according to BG passed class I of 21.87% diabetes and 20% IGT & class II of 31.25% diabetes used 33.34% IGT and class 3 of 25% diabetes and 26.66% IGTS, and class 4 of 15.63% of a diabetes and 13.34% IGTs and class 5 of 6.25% diabetes, 6.66 of IGTS

It is also evident from Table 2 that 53.13% diabetic and 69.34%, IGTS population having BMI normal but 46.87%, diabetics and 30.66% IGTs having over weight.

Distribution of study population according to waist Hip ratio (WPR) showed that low risk group 5(15.63%) of type 2 Dm and 40(53.34%) if IGTs respectively, moderate risk group 20(62.5%) of Type 2 Dm and 31(41.33) and high risk were 7(21.87%) of Type 2 Dm and 4(5.33%) IGTs respectively (Table-2).

In Table-3, 9(28.13%) cases of family history of diabetes among diabetics and IGTs, 23(71.87%) was no family history similarly most of them (24.75%) having hypertension and (8.25%) were detected hypertension during the study for first time.

Table 4 showed that, 3.12% of total cases with diabetic and IGT follow strict dietary regulation while 6.26% follow yoga or some sorts of exercise regularly, 12.5% cases did not stick to the regular exercise pattern. 78.12% of diabetes or IGT did not know about the life style modifications reminded for maintaining a healthy life.

DISCUSSION: The study of prevalence of Diabetes mellitus type 2 and impaired glucose tolerance (IGT) among adults 30 years above in and urban field practice area Sharifganj Katihar of Katihar Medical College Katihar Bihar during the study period January 2013 to June 2013 among 910 subjects selected by systematic random sampling technique. In the present study it has been found that 32 (3.5%) subjects have type2 diabetes and 75 (8.24%) have IGT and total abnormal tolerance have 107 (11.75%) as shown table 2.

In our study among the detected type-2 diabetes and IGT majority belongs to the 51-60 year of group. Similar study done by Ramachandran ET al[20] shows that, the prevalence of Diabetics increase with age and maximum in 60-69 years of age group. That study had also revealed that, maximum numbers of cases in the age group of 51 to 60yrs diagnosed. Similarly in a study done by Ramachandran[21] it was obsessed that, there is on set of diabetes among younger age group in Asian Indians.

The result of physical activity table 3 there are 6.25% Heavy, 18.75 moderate, 31.25% mild and 43.75% secondary in type-2 diabetes.

And IGT Study subjects among total sedentary life style 37.34% mild 33.34, moderate 26.66%, 2.66% heavy physical activity.

ORIGINAL ARTICLE

Pournik et al (2011)[22] observed that at the age increase people maximum time in sitting rather than moving out. The increasing age group percentage of diabetes and sedentary life increases.

Manson et al (1991),[23] (1992)[24] Folsom et al (2000)[25] obsessed engaging in vigorous exercise at least- once a week had a lower incidence of self-reported type-2 compared with who did not exercise weekly.

The Social class of the study subjects was classified according to the modified BG passed scale. In present study shown in table 2 21.87% of class I, 31.25% of Class II, 25% of class III, 15.63% of class IV, 6.25% of class V, of type-2 diabetic subjects majority of subjects are in middle and lower social-economics class. Among IGT subjects, 20% of class I, 33.34% of call II, 26.66% of class III, 13.34% class IV, and 6.66% of class V majority of class II, III respectively.

Jerlin et al (2011)[25] the percentage type 2 diabetes is different income group reveals that, around 4.7% incidence is in the poor class, 8.6% in the middle class and 16.18% in the upper class.

In study out of 60 over weight (BMI) $25(g/m^2)$ study subject 15 (26.32%) subjects are suffering with type 2 diabetes, and 2.04%, subjects relation of BMI with type 2 diabetes is significant (P<0.001), X^2 test is 88.35

In this study among over weight subject 36.66% have IGT and 6.22% normal weight group have IGT, and relation of BMI with type2 diabetes is found significant (p<0.001), X^2 test is 71.633.

Muninarayana et al (2010)[26] reported that 22% of the diabetic patients were overweight. This may be due to consuming whole grain meal rather than refined meal and being mere physically active and less sedentary than the urban people.

Khatib et al (2008)[27] also reported that the proportion of diabetics was more among those who had BMI (more than 25) 24.1%.

Waist hip ratio as shown in table 2 In the present study 8.60% type 2 diabetic are with category of WHR for male 0.96<1, 0.81-0.85 for female and 50% diabetic having WHR greater than 0.85 for female and 1 for males relation of WHR with type 2 diabetes is significant (p < 0.001), X^2 test is 100.14%.

In this study 13.31%, IGT subjects have WHR greater than 0.85 for female and 1 for male, relation of WHR with IGT is significant (p<0.001), X^2 test is 24.056.

Jerlin et al (2011)[28] noticed than 2.01%, diabetics are having less than 0.85 waist hip ratio, 4.27%, are with 0.86-0.9 category, 6.56% are showing 0.91-0.95 waist hip ratio and 11.82% diabetics are having greater than 1.0 waist hip ration.

In the present study 9(28.13%) type-2 diabetic have positive family history and its relation with type 2 diabetes is found significant (p<0.001), X^2 test is 66.064.

In the present study 12(16%) IGT study subjects had family history of diabetes as shown in table 3.

Ramachandran et al (1988)[29] reported that 47% people who had diabetes positive family history.

Gupta et al (2008)[30] reported 12% type 2 diabetic respondent had positive family history.

The present study Blood pressure concludes that type 2 diabetic most of them (24.75%) were having hypertension and (9.25%) were detected hypertension during the study for the first time similarly IGTs 20(26.66) and 55 (73.33%) respectively shown Table 3.

Jerlin et al (2011)[31] reported that 7.04% diabetics are normotensives and 9.42%, patients are hypertensions.

ORIGINAL ARTICLE

In our study, it was found that, 3.12% of the total cases with diabetes and IGT follow strict dietary regulation while 6.26% follow yoga or some sorts of exercise regularly 12.5% of them had irregular exercise habit. 25% cases with diabetes of IGT did not know about the Life Style modification required for maintaining a healthy life table 4.

A UKPDS study revealed that dietary modification alone is very effective in lowering blood glucose and is helpful to maintain target glucose control for many years.[32]

A Randomized control Trial done by Goldhaber et al[33] regarding Medical Nutrition Therapy (MNT) for management of Type2 Diabetes have reported improved Glycemic content i.e., 1-2% decrease is HbA1.

In a meta-analysis of non-diabetes people done by Yupoth et al[34] MNT restricting saturated for to 7-10% of daily energy and dietary cholesterol to 200-300 mg/day resulted in 10-13% declined in total cholesterol, 12-16% decline in LDL & 8% decline in triglycerides which would have been a great help in controlling Diabetes.

CONCLUSION: A stress free working environment, physical activity like regular exercise, blood sugar estimation after 30 years, life style modification for persons with a positive family history are some of the recommendations which can control Diabetes among adults. 30 years above.

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