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A study of risk factor profile of type 2 diabetes mellitus cases attending Diabetes clinic, Agartala Government Medical College and Govind Ballabh Pant Hospital, Agartala.

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Introduction

Prevalence of diabetes in adults worldwide was estimated to be 4.0% (135million) in 1995 and was expected to raise to 5.4% (300 million) by the year 2025.[1] In 2012 the world had 371 million people living with diabetes at 8.3% prevalence and another 50% undiagnosed. In South East Asia there are 70 million diabetics at 8.7% prevalence; 51.1% undiagnosed, 1 in 5 of all undiagnosed cases of diabetes are in this region. 1 in 4 deaths due to diabetes occurred in this region.[2] Diabetics suffer increased morbidity and reduced quality of life, premature death, and large adverse economic effects due to higher healthcare and non healthcare costs. This further leads to losses in economic productivity and growth causing large losses in national income from diabetes and its complications. A series of studies from Chennai showed that the percentage of adult urban subjects affected with diabetes increased from 5.2% in 1984 to 8.2% in 1989, 11.6% in 1995 and13.9% in 2000[3] and further increased to 14.3% in 2004.[4] The contributing factors were chiefly the improved socioeconomic condition which encompasses an increase in family income, educational status, availability of motorised transport, a shift in occupational structure. As a consequence of lifestyle transition there is an increased in the prevalence of diabetes in the rural population too from 2.2 to 6.4%.[5] With such a high prevalence and burden of Diabetes, India is regarded as the "Diabetic Capital" of the world.[6] In 2011, India had 62.4 million people with type 2 diabetes, compared with 50.8 million the previous year, according to the International Diabetes Federation (IDF) and the Madras Diabetes Research Foundation. The nationwide prevalence of diabetes in India now tops 9%, and is as high as 20% in the relatively prosperous southern cities. By 2030, the IDF predicts, India will have 100 million people with diabetes.30 In 2012 India had 63 million people with

diabetes with a prevalence of 9.01%.[7] National Family Health Survey (NFHS) in 2005-06 suggested the prevalence of type2 diabetes mellitus in rural India were highest in Kerala, Tripura, West Bengal, Goa and Sikim, 1500 to >2000 individuals per 100,000 population. Tripura have a relatively high (>1.5%) number of women with type 2 diabetes mellitus similar to the states of Tamil Nadu, Goa, West Bengal and Delhi. Among men the prevalence is > 1.5% similar with states of Kerala, Goa, west Bengal, Andhra Pradesh and Sikim.[8] A complex disease like diabetes the genetic predisposition and environmental exposure play an important role in the susceptibility to develop diabetes. The present study objective was to identify the different risk factors among the diabetic cases attending the Diabetes Clinic in a tertiary care Hospital in Agartala city.

Methodology

A cross-sectional study conducted in the Diabetes Clinic, in a tertiary care hospital in Agartala city in the year from November 2011 to October 2013. The equation $n= (Z)^2 pq/L^2$ was used to determine the sample size. Where: n= sample size, 'Z' value=1.96 at 95% confidence interval and at 5% level of significance p=prevalence. (Prevalence of obesity among diabetic patients 68 %).[9] q= 1- p =100-68 = 32. L=allowable error taken at 10% of p (68/100×10) = 6.8, n=181. Sample size = 181 + 10% (non response rate) of 181added up to = 199 ≈ 200. Cases were selected by concurrent sampling technique from the diabetic clinic of a tertiary care hospital till the sample size was achieved. Person aged ≥20 years with Type 2 Diabetes Mellitus diagnosed by the Physician were included in the study. Pregnant mother and cases attending more than once in clinic and from whom data had been collected and DM2 cases with amputation of either limb were excluded from the study. Mercury Sphygmomanometer (Ashoka R, IS: 3390 ISI, CM/L-852267, Scale=0-300mmHg, Mkfd. by Meditech Industries, Delhi-110051, Pkd. Sept. 2005). Stethoscope: Life line stethoscope. Stadiometer, (Scale=120-200 cm.). Bathroom weighing scale (Libra, ISO 9001:2008, SC=0 – 125kg, Mkfd. By Edrly India, Madel Chorao, Tiswadi. Goa-403102, month & year of Mkfd: July 2010). Measuring tape, Crown, Tailors Tape.SC=152cm, Made in India. Harpenden skin callipers (Scale = 0-50mm) and Interview schedule were used for data collection. Smoking refers to the subject behaviour to consume tobacco in smoking forms. This study categorised participants into Current Smoker (subjects who are smoking currently), Non smoker (Subjects who does not smoke in life time) and Ex-smoker (Subjects who quitted smoking for the last six months). Alcoholic drinking refers to the subject behaviour to consume alcohol. Quitters refer subjects who quitted consuming alcohol in the last six month). Dietary Habits refers to the food habits of the participants either Vegetarian or Non vegetarian. Physical activity categorised into three groups in this study. Sedentary life style- Involves official work and not much walking around during normal work or no work and no walk. Moderate work- Consist of individuals involved in a minimum of 45 minutes of jogging or brisk walk for at least 4 days in a week. Heavy work consist of individuals involved in strenuous employment or involved in strenuous household work (Gardening, mopping, frequent climbing of stairs etc).[10] Hypertension - Define as the systolic blood pressure (SBP) of ≥140mmHg and diastolic blood pressure level of ≥90mmHg147 or subjects who presented with arterial blood pressure below these levels but reported the use of anti hypertensive drugs were consider hypertensive. Obesity refers to excess fat accumulation in the body. To find obesity Proxy anthropometric measures like: Body Mass Index, Hip Circumferences, Waist/Hip ratio and Skin fold thickness are used. BMI (Body Mass Index) = Weight in Kg/ height in meter2): refers to the measure to evaluate the body weight in relative to the person's height. This study classified BMI into four groups Underweight (BMI <18.5Kg/m2), Normal (BMI 18.5 to 24.9Kg/m2), Overweight (BMI 25 to 29.9Kg/m2) and Obesity (BMI more than 30Kg/m2).[11] Waist Hip Ratio: Upper limit; for male >0.90 and for female > 0.85.[12](149) Waist Circumferences: Upper limit; for male ≥ 90cm and for female ≥ 80cm.[13] Diabetes: Refers to subject who have fasting Plasma glucose level of 126mg/dl or greater and diagnosed by the physician

based on repeated blood glucose level on different days. The waist circumference was measured at the level of the high point of the iliac crest with the measuring tape all around the body in horizontal plane over light clothing and the tape is just snug not compressing the skin, measurements are recorded at minimal respiration to the nearest 0.5 centimetre.[14] Hip circumference was measured at the widest portion of the buttock using measuring tape, placed in horizontal plane over light clothing the tape is hold snug not tightly and measurement recorded to nearest 0.1 centimetre.[15] Standing Height measured after removing the shoes, cap or hair ornaments the participant was asked to stand with his / her back to the height scale. The occipital protuberance, back, buttocks, calves and heels should be touching upright, with feet together. The top of the external auditory meatus should be level with the inferior margin of the bony orbit and the participant was asked to look straight, the head piece of the stadiometer or the sliding part of the measuring rod was lowered so that the hair is pressed flat. Height recorded to the nearest 0.1 centimetres. Weight was measurement was recorded by bathroom weighing scale with light clothing and without foot wears to the nearest 0.5 kilogram**.** Skin fold thickness was measure from the; Biceps, Triceps, Sub scapular and supra iliac region to the nearest 0.1mm using a standard procedure.[16]Blood Pressure was measured by mercury sphygmomanometer in the sitting position to the nearest 2mmHg, with the cuff at the middle 2/3rd of the extended arm. Two measurement were made and the average recorded.[17]

Data Collection

Data was collected using a pre-tested interview schedule in the diabetic clinic. Informed consent was obtained from the patients and strict confidentiality was maintained. A face to face interview of the patients was carried out using the pre-designed and pre-tested structured interview schedule and responds recorded in the schedule. Blood Pressure, height, weight, waist, hip circumference and skin fold thickness were measured and noted down in the interview schedule.

Data Analysis

Data collected were analyzed in terms of Descriptive statistics in frequency, percentage; means, standard deviation, and range. Inferential statistics, to find the relation between the independent and the dependent variable was done by Chi square test and t test. Significant result was considered at p value < 0.05 performed using Microsoft excel 2007, Epi Info 7 and SPSS 15.0.

Ethical Consideration

The study was approved by the Institutional Ethics Committee of Agartala Government Medical College & G B Pant Hospital, Agartala, Tripura.

Result

A cross sectional study was conducted among DM2 patients attending Diabetic clinic of AGMC & GB Pant hospital Agartala. This study reveals that 4.5% cases belong to the age group of 20-29 years and 16% of the cases belong to the age group of 60-69years respectively. 12.5% of the cases were illiterate and 43.5% of the cases were unemployed. 50.5% of the cases had no family history. 19.5% is current smoker and 27.4% of the cases were sedentary worker.(Table1) 21.5% of the cases have a monthly income of ≥ Rs.19575, 27.0%, 9.5%, 17.0%, and 19.0%, have their monthly income of Rs.9788 - Rs.19754, Rs.7323 – Rs.9787, Rs.4894 – Rs.7233 and Rs.2936 – Rs.4892. 36.5% of the participants belong to the Upper lower Kuppuswamy's Socio-economic class (IV), 28.5% and 31.5% belongs to the Class III and Class II of the Kuppuswamy's Socio-economic class. 20% of the cases ever consumed alcohol, of which 10%, 35%, 30%, and 25% consumed alcohol for the duration of ≤5years, 5 to 10 years, 11 to 19 years and ≥20 years respectively. 38.5% of the cases were hypertensive and 61.5% had normal blood pressure. From the hypertensive group 38.5%, majority 88.3% were on antihypertensive another 11.7%, were not on antihypertensive medication. The mean systolic arterial blood pressure among the male diabetics was 131.87mmHg, SD ± 14.89 mmHg and 129.56mmHg, SD ± 9.9 mmHg among the female cases (p = 0.307). The mean diastolic arterial pressure for male and female cases were 83.8 mmHg, SD ± 10.06 mmHg and 81.14 mmHg, SD ± 9.9 mmHg respectively (p = 0.150). (Table2). The mean body weight of the male and female type 2 diabetes cases were 60.59Kg, SD ± 11.07Kg and 52.44 ± 9.35 Kg respectively (P= 0.000). There was a significant (P= 0.000) difference in mean heights among male and female cases. A statistically significant differences in the waist circumference (p<0.002) and waist hip ratio (P <0.006) between male

and female were observed. (Table3) There was a statistically significant difference in physical activities among the sex group. (p= <0.001 at DF= 2). (Table4.)

Discussion

The present study was undertaken with the objective to identify the risk factors profile of Type 2 Diabetes Mellitus cases attending the diabetes clinics of AGMC & G. B. Pant Hospital, Agartala, Tripura during the period of November 2011 to December 2013. The association between age and the prevalence of diabetes mellitus was higher in the Indian population. Asian Indian develops diabetes at a younger age about 10 – 15 years earlier than the Caucasian population.[18] In this present study, 59% of the cases were in the age group of 40-59 years of age. The present observation is comparable to the observations from the CUPS-19[19] where incidence of diabetes at follow-up increased with age at baseline: age: 20-29 years: (10.3%); 30-39 years: (20.7%), 40-49 years: (25.2%) and ≥ 50 years: (23.4%) respectively. A study based on a set of 5 years age and sex specific estimates of diabetes prevalence from rural and urban areas of various countries, found that for developing countries the 45-64 years old age group consist the largest number of people with diabetes.[20] Study in Belgaum [21] observed that the majority of the diabetics were in the 35- 49years age group. Study in Assam, [22] north eastern India, among adult participants of age 20 years and above reported, prevalence of diabetes showed increasing trend with age; 30-39 years of age:(9%),40-49years:(25%),50-59years:(21%) and ≥60 years: (34%) respectively lower compare to present study. Higher observations compare to present study were reported from Kolar[23] where most of the diabetic patients (54.8%) were in the age group of 30-45 years. A study in Pudduchery[24] reported (58.4%) of diabetics to be in the age group of 50-59 years and a study from Orissa[25]reported that majority of the diabetics were in the age group of 46 – 50 years age, higher for the age specific group compare to the present study. Study in Peshwar[26] reported that (66%) of the diabetic patients belongs to the age group of > 40-60 years of age. A study from Belgrade[27] reported that (41%) male and (36.4%) female diabetics are in the age group of 45- 54 years. In the study the range of the previous observations reported by various authors and this could be due to the different genetic susceptibility as reported by the Authors.[18]The mean age of the cases in present study was 50.02 years ± 11.60 years almost similar to the observation reported from a study in Gujarat.[9] Study among the Zuni Indians found that the prevalence of newly diagnosed diabetes was similar among the male and the female [28] National Urban Diabetes Survey[29] observed no gender differences in the prevalence or incidence of diabetes. The prevalence among the male was 13.9% and female was 13.8% and remained similar at aged standardization. Study from Rawalpindi[30] reported that 15.41% of the males and 12.31% of females to have diabetes mellitus. A study from Kolkata[31] reported that (15.6%) of the diabetics were illiterate and a study from Puducherry[32] reported that (10%) of the diabetic patients were illiterate, comparable to the present study observation of (12.5%). A study in Kolkata observed that 20.9% male were unemployed and most of the females (93.8%)[31] to be house wife compare able to present study. Genetic susceptibility is one of the most important non-modifiable risk factor for type 2 diabetes mellitus, several prospective and cross sectional studies have reported that family history among first degree relatives conferred an increased risk of type 2 diabetes and the risk was greater when both parents were affected. [25] In the present study 38% had positive family history. This observation was compare able to study observation reported from Goa (37%),[33] from a study in Karnataka[34] which observed that 42.1% and 40.9% of diabetics had paternal and maternal history of diabetes and the CUPS-19[19] that observed 20.7% and 35.7% proportion developing diabetes with one and both parents being diabetic. Danish twin study[35] reported 26%. The variation in the observation could be due to the genetic variation coupled with the different levels of exposure to the environmental or modifiable risk factors. Various studies reported a 'U' shaped relationship between alcohol consumption and the risk of type 2 diabetes mellitus[36-37]present study aims to describe the proportion of type 2 diabetes cases consuming alcohol as one of the risk factor for type 2 diabetes mellitus and observed that 20% ever consumed. Dietary pattern and the excess of calorie were implicated to be the one of the important modifiable risk factor for type 2 diabetes mellitus. Prospective studies showed consumption of rice was strongly related to the risk of type 2 diabetes mellitus.[36, 37] It is comparable with the present study. CUPS-19[19] reported mean systolic blood pressure of 127mmHg ± 19 mmHg and mean diastolic blood pressure of 81 mmHg ± 11mmHg compare able to present study. Studies from different places reported different observations, an almost similar observation on overweight by BMI compare able to present study observation were reported from a study in Hazratbal, Kashmir[38] where 36.82% of diabetics were overweight. A study by David E Laaksonen et al[39] found men engaged in > 3 h/ week of moderate or vigorous leisure time physical activity were (48%) less likely to develop metabolic syndrome then sedentary men after adjustment for major confounders especially in high risk men. It is comparable with present study. A Study in Goa[40] observed that Upper middle Socio- economic Class had the highest prevalence (17.7%) and lowest prevalence was observed in the Upper Lower Class IV (7.4%), comparable to Socio economic Class II in present study.

Conclusion

The younger age is also affected and a remarkable percentage of the cases had a positive family history of diabetes among the close relatives. Dietary habits are an important risk factor for type 2 diabetes, majority of the cases in the study were non vegetarian and preferred sweet foods, oily foods and fried foods which were a incriminated for the development of type 2 diabetes. 27.5% of the cases were sedentary, thus expose to modifiable or lifestyle risk factor of diabetes. Obesity one of the most important risk factor for type diabetes was present among 37% of the cases using the BMI. Waist hip ratio observation revealed that more than 90% of the cases were having abdominal or central obesity. Thus it can be concluded that obesity was an important risk factor for type 2 diabetes among the cases. Finally creating awareness on healthy life style practices, nature of the disease, risk factors and call for high risk screening will help in reducing and or delaying the development of diabetes among the susceptible population, thus reducing the morbidity and burden of type 2 diabetes mellitus in the community.

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Legend Table

Table1: Socio demographic profile of the Type 2 diabetes mellitus patients.

Variables	Number (n)	Percentage (%)
Age (Years)		
20-29	9	4.5
30-39	26	13.0
39-49	60	30.0
49-59	58	29.0
60-69	32	16.0
70-79	15	7.5
Sex		
Male	100	50.0
Female	100	50.0
Religion		
Hindu	189	94.5
Muslim	10	5.0
Christian	01	0.5
Literacy		
Illiterate	25	12.5
Primary School certificate	59	29.5
Middle school Certificate	41	20.5
High school certificate	26	13.0
Intermediate or Post high school diploma	21	10.5
Graduate/ postgraduate	28	14.0
Professional/ Honours	00	00
Illiterate	25	12.5
Occupation		
Professional	2	1.0
Semi Professional	4	2.0
Clerical, Shop owner, farmer	30	15.0
Skilled Worker	43	21.5
Semi Skilled Worker	19	9.5
Unskilled worker	15	7.5
Unemployed	87	43.5
Family history of DM2		

Absent	101	50.5
Present	76	38.0
Not known	23	11.5
Smoking habits		
Non smoker	126	63.0
Ever smokers		
Current smoker	39	19.5
Ex Smoker	35	17.56
Physical activity		
Sedentary	55	27.5
Moderate	137	68.5
Heavy	8	4.0

Table 2: Distribution Blood Pressure among type 2 DM patients

Mean systolic arterial blood pressure (mmHg)		SD	t- test	P value
Male	131.87	16.95	1.024	0.307
Female	129.56	14.89		
Mean Diastolic arterial blood pressure (mmHg)				
Male	83.8	10.06	1.444	0.150
Female	81.14	9.9		

Table 3. Anthropometric measurement of type 2 diabetic patients.

Characteristics	**Male**	**Female**	**t-test**	**P value**
Body weight(Kg)	**(n=100)** 60.59±11.07	**(n=100)** 52.44±9.35	5.62	0.000
Body heights(Cm)	159.08±16.36	147.20±5.05	6.94	0.000
Waist Circumferences(Cm)	86.33±8.43	90±8.8	-3.198	0.002
Hip Circumferences(Cm)	89.89±7.35	96.07±9.27	-5.219	0.000
Waist Hip Ratio	0.95±0.05	0.94±0.05	2.766	0.006

Table 4: Physical activity and sex of type 2 diabetes mellitus patients.

Sex of Participants	Level of Physical activity			χ^2	P value
	Sedentary (n)	Moderate (n)	Heavy (n)		
Male	38	56	6	14.580	0.001
Female	17	81	2		
Total	55	137	8		