Original Research Article

Study of prevalence of hypertension and its various risk factor in type 2 diabetes mellitus patients

Narendra M. Uma[1]*, Mahendra C. Parmar[1], Siddarth Shah[1], Sonal M. Dindod[2]

[1]Department of Medicine, Medical College and Sir Sayajirao General Hospital, Vadodara, Gujarat, India
[2]Department of Community Medicine, Gujarat Medical Education and Research Society Medical College, Medical College of Gotri, Vadodara, Gujarat, India

*Correspondence:
Dr. Narendra M. Uma,
E-mail: umanarendra25@gmail.com

ABSTRACT

Background: Surgical diabetes is syndrome of hyperglycemia and disturbance of carbohydrate, fat and protein metabolism associated with absolute or relative deficiency of insulin secretions. Diabetes mellitus and hypertension considered as a major medical and public health issues worldwide, and both are important risk factors for both macrovascular and microvascular diseases like coronary artery disease, heart failure and cerebrovascular diseases.
Methods: This cross-sectional study was conducted among 175 patients coming to Govt. medical college and SSG hospital, Vadodara from 2014 to 2015 having diabetes mellitus were studied and evaluated for hypertension and its various risk factor like age, obesity.
Results: one hundred and twenty-nine (127) out of 175 subjects had hypertension, thus giving a prevalence rate of 73.7% of which 64 males (49.6%) were hypertensive compared with 65 (50.3%) females. Mean age of patients having hypertension with Diabetes Mellitus (case) is 59.87 compare to DM without hypertension (control) was 56.21. Mean BMI in diabetes cases with hypertension was 30.93 while without hypertension was 23.47 suggest obese are more prone to develop hypertension. Waist hip ratio DM with hypertension was 0.96 while was 0.81 in DM without hypertension.
Conclusion: Hypertension and its associated risk factor like obesity, dyslipidemia are important risk factor for development of complication in diabetes patients so early detection and intervention measures should be undertaken for aggressive control of blood pressure control , obesity and it will likely to offer the greatest promise for reducing the incidence of complications and its associated mortality.

Keywords: Body mass index, Diabetes mellitus, Hypertension, Obesity, Waist -hip ratio, Prevalence

INTRODUCTION

Diabetes is a significant health problem. Globally the prevalence of diabetes for all age-groups worldwide was 2.8% in 2000 and was estimated to be 4.4% in 2030.[1] Type 2 DM account about 90-95% of all cases of DM. High blood sugar increases the risk of both macrovascular diseases (CAD , cerebrovascular disease or "stroke," and peripheral vascular disease) and microvascular diseases(retinopathy, nephropathy, and neuropathy) . Over the past decade, diabetes prevalence has risen faster in low-and middle-income countries than in high-income countries.[2] Risk factors for development of diabetes mellitus are age, genetic, urbanization, epidemiological transition, obesity and physical inactivity. One of important risk factor for high prevalence of diabetes among Asian -Indian is genetic predisposition. Certain unique clinical and biochemical characteristic of this ethic group called as Asian Indian

phenotype or South Asian phenotype. This term refers to a combination of characteristics that predisposes South Asians (SA) to the development of insulin resistance, Type 2 Diabetes Mellitus, and cardiovascular disease. It has also been shown that type 2 diabetes occurs at younger ages and at lower levels of BMI in SA compared with Caucasians.[3,4] Abnormality in Asian Indian phenotype are:

- Central obesity: despite low body mass index Indians has high waist circumference and waist to hip ratio.
- Low level of protective adiponectin levels and increased adipose tissue metabolites
- High levels of highly sensitive C reactive proteins levels
- Familial aggregation.

Asian Indian have strong familial aggregation of diabetes with high prevalence among first degree relatives. Epidemiological transition includes improved nutrition, better hygiene, control of many communicable diseases, improved access to quality health care resulted in longevity that lead to rapid rise in diabetes. Adults with diabetes historically have a two to three-times higher rate of cardiovascular disease (CVD) than adults without diabetes.[5,6] Hypertension and diabetes has the common predisposing risk factors and the end organs they affect. Hypertension is an independent risk factor for vascular morbidity and mortality in diabetes mellitus apart from its direct effect from hyperglycemia. Hypertension affect coronary, cerebral and renal vasculature and increase risk of stroke by seven times, congestive cardiac failure by four times coronary artery disease by two times than normotensive individuals.[7,8]

So, controlling blood pressure in patients with Diabetes Mellitus type II reduces risk of stroke, coronary artery disease and progression of renal disease as age advances.

METHODS

It was an observational case control study conducted in the department of Medicine, Government Medical College and SSG hospital, Vadodara after getting approval of institutional ethics committee. study was carried out in year 2014-2015. Patients with type 2 DM were selected from medical wards and diabetic clinic of SSG hospital based defined inclusion and exclusion criteria of study.

Inclusion criteria were patient of age more than 40 yrs, recently or previously diagnosed as type 2 DM through FBS, PP2BS on diet and/or oral hypoglycemic agents. Patients having diabetes mellitus secondary to pancreatitis, PCOD, glucocorticoid therapy, comatose patients, type 1 dm and patients not willing to participate in the study were excluded. Sample size was 175. For carrying out our study, Authors had a semi structured questionnaire base Performa was made. After obtaining written informed consent, each patient, enrolled

in the study had asked in detail history regarding the complaints pertaining to DM and its complication, all previous medical records of the patients had checked for the duration of DM, past and present medications, glycemic control, previous admissions, and presence of any known complication of DM. Before collecting the blood samples, patients were examined for Detailed anthropometric characteristics including height, weight, body mass index and waist hip ratio were measured. Blood pressure was measured and classified as per the Joint National Committee (JNC) 7 guidelines. Blood had drawn for routine checkup for hemogram, FBS, PP2BS, blood urea, serum creatinine and serum cholesterol. Urine routine and microscopic exam had been done, all the patients had been subjected for ECG and renal ultrasonography. The software used for data analysis was Epi Info-7 a free software for statistics developed by CDC-Centers for Disease Control and Prevention. Student's t test was used to compare the mean of the continuous variables. Chi-square test was used to compare proportions.

Study area

The study was carried out at the Department of Medicine, Government Medical College and SSG hospital, Vadodara.

Study design

This was a Hospital-based cross-sectional descriptive study.

Study population

Patients with type 2 DM were selected from medical wards and diabetic clinic of SSG hospital based on defined inclusion and exclusion criteria

Inclusion criteria

- Patient of age more than 40 yrs,
- Recently or previously diagnosed as type 2 DM through FBS, PP2BS
- On diet and /or oral hypoglycemic agents.

Exclusion criteria

- Patients having Diabetes Mellitus secondary to Pancreatitis
- PCOD
- Glucocorticoid therapy
- Comatose patients
- Type 1 DM
- Patients not willing to participate in the study were excluded.

Sample size was 175.

Data collection

Participants who gave informed consent had their socio-demographic data collected via a structured questionnaire. had asked in detail history regarding the complaints pertaining to DM and its complication, all previous medical records of the patients had checked for the duration of DM, past and present medications, glycaemic control, previous admissions, and presence of any known complication of DM. Physical examination included anthropometric measurements. Authors measured the weight of each participant to the nearest 0.1kg with a standard weighing scale and height to the nearest 0.5cm with a stadiometer and all were according to standard guidelines and procedures. Body mass index (BMI) was calculated as the ratio of the weight (kg) to the square of the height (meters). Waist circumference was measured at the level of the iliac crest using a flexible non-elastic tape rule and recorded to the nearest 0.1cm. Blood pressure was measured in a sitting position from the non-dominant arm with a mercury sphygmomanometer of appropriate cuff size. Each participant's blood pressure was measured twice, first after 10 minutes of rest and the second, 5 minutes later; and the average was taken. In cases of difference of more than 10mmHg between the first and second measurement, a third measurement was taken 5 minutes later and the average of the three represents the participant's blood pressure. Systolic blood pressure (SBP) and diastolic blood pressure (DBP) were the first and fifth Korotkoff sounds respectively. Outcome definitions: Primary outcomes were hypertension and diabetes mellitus defined as follows: hypertension was defined according to the 7th report of the Joint National Committee on prevention, detection, evaluation and treatment of high blood pressures (JNC VII) thus: <120/80 mmHg (normal), 120-139/80-89 mmHg (pre-hypertension), 140-159/90-99 mmHg (stage I hypertension) and >160/100 mmHg (stage II hypertension) or previously diagnosed hypertension on medication (14). Diabetes was defined according to the American Diabetic Association (ADA) 2016 guidelines as: the presence of osmotic symptoms and random blood sugar above 11.1 mmol/L or previously diagnosed diabetes mellitus on medication (15). Secondary outcomes were: body mass index classified as overweight (BMI 25.0-29.9 kg/m2), obesity (BMI ≥ 30.0 kg/m2) (16) and abdominal obesity, defined as waist circumference >94 cm for males and >80 cm for women (13). Blood had drawn for routine check-up for Hemogram, fasting blood sugar, Post prandial Sugar, Blood Urea, Serum Creatinine and Serum Cholesterol. Urine routine and microscopic exam had been done; all the patients had been subjected for ECG and renal ultrasonography.

Data analysis

Data was checked for completeness and validity was ensured by double entry and random checks for errors and outliers. The software used for data analysis was Epi Info-7 a free software for statistics developed by CDC-Centre's for Disease Control and Prevention.

RESULTS

In the present study 175 subjects were taken with the age range of 41-70 years. Mean age of study group was 59.87 years and mean duration of Diabetes was 7.5 years. In the present study, we found that prevalence of Hypertension among Diabetes Mellitus patients is 73.7%. Among all the diabetic patients 75.29% male and 72.2% female detected to have Hypertension clinically. 50.4% were female and 49.6% were male.

Table 1: Age and sex distribution of study population.

Age group	Hypertension present			No hypertensive		
	Male	Female	Total	Male	Female	Total
41-50	10 (7.75%)	19 (14.7%)	29 (22.48%)	8 (17.3%)	8 (17.3%)	16 (34.7%)
51-60	25 (19.4%)	18 (13.9%)	43 (33.3%)	5 (10.8%)	5 (10.8%)	10 (21.74%)
61-70	20 (15.5%)	20 (15.5%)	40 (31.3%)	7 (15.2%)	10 (21.7%)	17 (36.9%)
>70	9 (7%)	8 (6.2%)	17 (13.79%)	1 (2.1%)	2 (4.3%)	3 (6.5%)
Total	64 (49.61%)	65(50.3%)	129(100%)	21(45.6%)	25(54.3%)	46(100%)

Table 2: Presence of hypertension and duration of diabetes mellitus in study population.

Mean	Hypertensive	No hypertensive
Age (years)	59.87	56.21
Duration of Diabetes (years)	7.51	5.18%

In the present study, we found that prevalence of Hypertension among Diabetes Mellitus patients is (73.7%). Almost similar in both sexes. Among all the diabetic patients 75.29% male and 72.2% female detected to have Hypertension clinically. There were 50.4% were females and 49.6% were males. Table 1 shows Majority (33.3%) patients having Hypertension and Diabetes

Mellitus were in 51-60 years age group. The Mean Body Mass Index of the study participants is, and mean Waist Hip ratio of male is and female is. As shown in Table 4, 50.4% patients were in overweight category and 38.8% were in Obese category. Mean Age of the persons having hypertension with diabetes mellitus was 59.87% and mean duration of Diabetes was 7.51%. Table 3 shows 73.8% patients have Hypertension among study population. Out of which 64 (49.61%) were Male and 65 (50.39%) Female were having Hypertension.

Table 3: Sex distribution of hypertension in diabetes mellitus patients.

Sex	Hypertensive	No hypertensive	Total	P value
Male	64	21	85	>0.05
Female	65	25	90	>0.05
Total	129 (73.71%)	46 (26.29 %)	175	

Table 4: BMI in Hypertensive patients of study population.

BMI	Hypertensive			Non-hypertensive		
	Male	Female	Total	Male	Female	Total
<18.5	0	0	0	0	0	0
18.5-24.9	10 (7.75 %)	4 (3.1%)	14 (10.85 %)	1 (2.1%)	3 (6.5%)	4 (8.6%)
25-29.9	31 (24%)	34 (26.36 %)	65 (50.4 %)	17 (36.95%)	13 (28.26%)	
≥30	24 (18.60%)	26 (20.16 %)	50 (38.76%)	5 (10.9%)	7 (15.1%)	
Total	64 (49.60 %)	65 (50.39 %)	129 (100%)	21 (45.65%)	25(54.35%)	

As shown in Table 4 50.4% patients were in overweight category and 38.8% were in Obese category.

Table 5: Waist Hip ratio in Diabetic patients.

Waist hip ratio	Male	Female	Total
<0.85	23	28	51
0.85-0.9	18	22	40
0.9-0.95	12	11	23
0.96-1	26	15	41
>1	6	14	20
Total	85	90	175

As shown in Table-5, 51.7 % Male have waist Hip ratio was more than Đ.9 and 68.8% Female have Waist Hip ratio >0.85.

Table 6: BMI in Diabetic patients.

BMI	Male	Female	Total
<18.5	0	0	0
18.5-24.9	10 (7.75 %)	4 (3.1%)	14 (10.85 %)
25-29.9	31 (24%)	34 (26.36 %)	65 (50.4 %)
≥30	24 (18.60%)	26 (20.16 %)	50 (38.76%)
Total	64 (49.60 %)	65 (50.39 %)	129 (100%)

DISCUSSION

In the present study, Authors found that prevalence of Hypertension among Diabetes Mellitus patients is 73.7%.

In a study conducted by Venugopal K, prevalence of Hypertension was observed 25.6% , Priya et al. Observed Hypertension in 42.7% patients and Ramchandran et al found 38 % patients were Hypertensive.[9-11] There were 33.3% patients having Hypertension and Diabetes Mellitus were in 51-60 years age group following 31 % in 60-70 years age group. In a study by Ahsana Shah Age group of 40–60 shows prevalence percentage of 56.12%.[12] In the present study, Authors found that prevalence of Hypertension among Diabetes Mellitus patients is almost similar in both sexes. Studies by Gupta R et al and Guang Hui Dong et al, found Males have higher prevalence of Hypertension.

Study population shows 50.4% patients were in overweight category and 38.8% were in obese category. In a study conducted by Savita et al, 54% of the people with Hypertension and/or diabetes had high BMI as compared to 79% with high Waist Hip Ratio. In a study done by Kaur P et al, 10 it was noticed that W/H ratio had the highest relative risk with diabetes mellitus as compared to BMI and waist circumference. Similar findings were observed in study by Sushma K.[13-15]

CONCLUSION

Hypertension is a significant and controllable risk factor for Diabetes patients , but many people do not know that she/he has HTN because HTN is largely a symptomless condition. This study, therefore, helps health care professionals and health care system to identify the

prevalence rate of HTN among T2DM patients and its socio-demographic factors among the study participants for better management and risk minimization. Prevention of diabetes will require measure to promote physical activity and reduces obesityin adults. however large scale epidemiological studies are required to assess the burden of the problem in the population and needs for further corrective steps .

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