Original Research Paper

Prevalence of Coronary Risk Factors in Patients with Type II Diabetes

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Abstract

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Context: Patients with diabetes have more number of coronary risk factors. Early identification of these risk factors is essential to prevent morbidity and mortality among them. *Aims:* To study prevalence of coronary risk factors in patients with type II diabetes. *Settings and design:* hospital based cross sectional study carried out at Department of Physiology Gandhi Medical College, Bhopal. *Methods and material:* 60 patients of type II diabetes were included as per criteria of World Health Organization (1999). All patients were examined for presence of coronary risk factors like age, BMI, waist circumference, waist hip ratio, smoking, physical activity, hypertension, and dyslipidemia. *Statistical analysis:* The data was presented as mean and standard deviation and proportions. *Results:* Prevalence of overweight and obesity was equal among both the sexes. Higher waist circumference prevalence was more in males but central obesity was equal in both the sexes. Prevalence of smoking or tobacco use was very high in males. Overall physical inactivity prevalence was more in females. Prevalence of hypertension as well as that of dyslipidemia was also more in females. As the BMI increased, as the waist circumference increased, and as the duration of disease increased, the prevalence of coronary risk factors increased. *Conclusion:* Prevalence of coronary risk factors was very high in the present study.

Keywords: Smoking; Hypertension; Dyslipidemia; Diabetes; Risk Factors; BMI; Waist Circumference.

Introduction

Diabetes represents a spectrum of metabolic disorder which has become a major health challenge, world-wide. Diabetes is characterized by a metabolic disorder of multiple etiologies characterized by chronic hyperglycemia with disturbances of carbohydrate, fat and protein metabolism resulting from defects of insulin secretion, insulin action or both (WHO 1999). Often the hyperglycemia sufficient to cause pathological and functional changes is present for a long time before the diagnosis is made [1].

Diabetes prevalence has tremendously increased. International diabetic federation estimated about 246 million diabetics worldwide in the year 2007 with the prevalence rates of 6% among the adults 0f 20-79 age groups. As per World health organization (WHO), globally around 180 million population was having diabetes. This is estimated to be double by 2030. As per WHO estimates nearly 1.1 million died due to diabetes in 2005 [2].

WHO predicts that developing countries will bear the brunt of this epidemic in the 21st century, with 80% of all new cases of diabetes expected to appear in the developing countries by 2025. In India it has been estimated that the number of people living with diabetes will escalate from 40.6 million in 2006 to 79.4 millions by 2030. Diabetes in Indian population is reported to be almost 10 years earlier than in the Western countries [3].

Type 2 diabetes mellitus constitutes about 85-95% of all the diabetes in developed countries accounting for an even higher percentage in developing countries. The unprecedented economic development and rapid urbanization in Asian countries

particularly India has led to shift in health problem from communicable to non-communicable disease. [4]

It may seem strange that developing world which is often associated with hunger and inadequate nutrition for children, is now experiencing an epidemic of type 2 diabetes, a disease related to wealth and unhealthy life style. This can be explained on the basis of high degree of urbanization in the countries like India that have made people adapt the life style from the industrial countries. It is also a fact that some people genetically have a higher risk of developing diabetes and combined with great changes in lifestyle this risk has turned to reality for the people in these countries. The risk factors peculiar for developing diabetes among Indians include high familial aggregation, central obesity, insulin resistance and urbanization leading to lifestyle changes. Sedentary life is one of the most significant factors associated with diabetes in this population [5].

Patients with diabetes have more number of coronary risk factors. Early identification of these risk factors is essential to prevent morbidity and mortality among them. Hence present study was carried out to study prevalence of coronary risk factors in patients with type II diabetes.

Methods

Present study was hospital based cross sectional study carried out at Department of Physiology, Gandhi Medical College, Bhopal over a period of one year from April 2016 to March 2017.

During the study period it was possible to study a total of 60 patients of type II diabetes in the age group of 40-50 years. All the cases were proved cases of diabetes mellitus type-II as per criteria of World Health Organization (1999) [1].

Inclusion Criteria

1. Type II diabetic patients

2. Age of 40-50 years

3. Willing to participate in the present study

Exclusion Criteria

1. Age less than 40 years and more than 50 years

2. No willing to participate in the present study

Criteria for Diagnosis of Diabetes Mellitus [1]

• Symptoms of diabetes plus random blood glucose concentration ≥ 11.1 mmol/L (200 mg/dl) or

• Fasting plasma glucose ≥ 7 mmol/L (126 mg/dl) or

• Two hour plasma glucose ≥ 11.1 mmol/L (200 mg/dl) during an oral glucose tolerance test.

Approval has been taken from the ethical committee of the Institute.

All procedures were carried out in agreement with the treating physician.

All patients data was collected in the pre designed, pre tested, semi structured study questionnaire finalized for the present study after taking consent from the patients selected.

Anthropometric measurements were recorded in accordance to guidelines given by WHO [6].

BMI more than 25 kg/m^2 was taken as one of the coronary risk factor. WHR > 0.95 for men and > 0.85 for women was considered as central obesity [8].

Total Physical activity was classified using Singh R. B. et al guidelines [9].

WHO guidelines were used to measure and classify blood pressure [10].

The data was entered in the Microsoft Excel worksheet and analyzed using mean values and two standard deviations. Proportions were also used to analyze the data.

Results

Table 1 shows relevant baseline anthropometric data of type-II diabetic patients. In both the age groups, males were more than females. Prevalence of overweight and obesity (BMI > 25 kg/m^2) was equal among both the sexes. Higher waist circumference prevalence was more in males but central obesity was equal in both the sexes.

Table 2 shows age wise prevalence of coronary risk factors in type-II diabetic patients. Prevalence of smoking or tobacco use was very high in males. Overall physical inactivity prevalence was more in females. Prevalence of hypertension as well as that of dyslipidemia was also more in females as compared to males.

Table 3 shows prevalence of coronary risk factors in study population according to BMI categories. It

Table 1: Relevant baseline anthropometric data of type-II diabetic patients (n=60)

Variables		Men (n=38) Mean ± SD	No. (%)	Women (n=22) Mean ± SD	No. (%)	Overall (n=60) Mean ± SD
Age (Years)	40-45 (n=30)	42.66 ± 1.65	21 (70)	42.11 ± 1.45	9 (30)	42.5 ± 1.5 (50)
	45-50 (n=30)	48.23 ± 1.52	17 (57)	48.15 ± 1.34	13 (43)	48.2 ± 1.42 (50)
BMI (Kg/M²)	< 25 (n=30)	23.5 ± 1.09	23 (77)	22.88 ± 0.80	7 (23)	23.4 ± 1.05 (50)
	> 25 (n=30)	28.24 ± 2.011	15 (50)	28.22 ± 2.41	15 (50)	28.29 ± 2.18 (50)
Waist Circumference (cm)	Men (< 90) Women (< 80) (n=11)	83.0 ± 1.8	9 (82)	75.0 ± 0.0	2 (18)	81.54 ± 3.61 (18)
	Men (> 90) Women (> 80) (n=49)	93.31 ± 4.49	29 (59)	95.7 ± 7.9	20 (41)	94.28 ± 6.17 (82)
Waist Hip Ratio	Men (< 0.9) Women (< 0.8) (n=21)	0.84 ± 0.03	18 (86)	0.77 ± 0.01	3 (14)	0.83 ± 0.04 (35)
	Men (> 0.9) Women (> 0.8) (n=39)	0.98 ± 0.04	20 (51)	0.94 ± 0.10	19 (49)	0.96 ± 0.08 (65)

(numbers in parenthesis are percents)

Table 2: Age wise prevalence of coronary risk factors in type-II diabetic patients

Risk Factor	Age Categories (Years)			
	Men		Women	
	40-45 (n=21)	45-50 (n=17)	40-45 (n=09)	45-50 (n=13)
Smoking / Tobacco	14(67)	11(65)	2(22)	6(46)
Physical Inactivity	8(38)	12(70)	4(44)	12(92)
Obesity				
- Generalized	7(33)	8(47)	5(55)	10(77)
- Abdominal	15(71)	14(82	8(88)	12(92)
Hypertension	9(43)	13(76)	5(55)	11(85)
Dyslipidemia	8(38)	11(65)	5(55)	9(69)

(Numbers in parenthesis are percents)

Table 3: Prevalence of coronary risk factors in study population according to BMI categories

Risk Factors	Patients	BMI Categories (Kg/M²)		
		18-24.9	25-29.9	30-34.9
	Men	23	11	04
	Women	7	12	03
Smoking / Tobacco	Men	13(56)	10(91)	04(100)
	Women	2(28)	4(33)	2(66)
Physical Inactivity	Men	10(43)	6(54)	4(100)
	Women	3(43)	10(83)	3(100)
Abdominal Obesity	Men	14(61)	12(100)	4(100)
	Women	5(71)	11(100)	3(100)
Hypertension	Men	8(34)	10(91)	4(100)
	Women	3(43)	10(83)	3(100)
Dyslipidemia	Men	5(22)	10(91)	4(100)
	Women	2(28)	9(75)	3(100)

(numbers in parenthesis are percents)

Table 4: Prevalence of coronary risk factors in study population according to waist size categories

Risk Factors	Patients	Waist Size Categories (Cm)			
		70-79	80-89	90-99	≥ 100
	Men	-	09	23	06
	Women	02	03	11	06
Smoking / Tobacco	Men	-	2(22)	22(95)	4(66)
	Women	-	1(33)	4(36)	2(33)
Physical Inactivity	Men	-	1(11)	15(65)	3(50)
	Women	-	2(66)	8(72)	6(100)
Generalized Obesity	Men	-	-	11(48)	4(67)
	Women	-	-	9(82)	6(100)
Hypertension	Men	-	1(11)	16(59)	5(83)
	Women	-	1(33)	9(82)	6(100)
Dyslipidemia	Men	-	-	15(65)	4(66)
	Women	-	-	8(73)	6(100)

(numbers in parenthesis are percents)

Table 5: Prevalence of coronary risk factors in type-ii diabetic patients in relation to duration of disease

Risk Factor	Duration of Disease (Years)					
	Men			Women		
	1-4 yr (n=15)	4-7 yr (n=08)	7-10 yr (n=15)	1-4 yr (n=07)	4-7 yr (n=06)	7-10 yr (n=09)
Smoking/ Tobacco	5(33)	6(75)	15(100)	2(28)	1(17)	5(55)
Physical Inactivity	1(7)	8(100)	14(93)	2(28)	5(83)	9(100)
Obesity						
- Generalized	3(20)	5(62)	8(53)	3(43)	4(67)	8(89)
- Abdominal	7(47)	8(100)	14(93)	6(86)	5(83)	9(100)
Hypertension	1(7)	7(87)	14(93)	2(28)	5(83)	9(100)
Dyslipidemia	1(7)	7(87)	11(73)	2(28)	5(83)	7(77)

(numbers in parenthesis are percents)

was found that as the BMI increased, the prevalence of coronary risk factors like dyslipidemia, hypertension, abdominal obesity, and physical inactivity increased in both males and females.

Table 4 shows prevalence of coronary risk factors in study population according to waist size categories. It was found that as the waist circumference increased, the prevalence of coronary risk factors like dyslipidemia, hypertension, generalized obesity, and physical inactivity increased in both males and females.

Table 5 shows prevalence of coronary risk factors in type-ii diabetic patients in relation to duration of disease. It was found that as the duration of disease increased, the prevalence of coronary risk factors like dyslipidemia, hypertension, generalized obesity, abdominal obesity, physical inactivity increased in both males and females.

Discussion

The duration of diabetes in 60% of the subjects was ≤ 7 years and in remaining 40% was more than 7 years. Positive family history of diabetes mellitus, hypertension & obesity was found in 78%, 45% & 51% of study-population respectively. Majority (63%) of study population were on oral anti-diabetics treatment and 37% were on combined (oral + insulin) therapy. 65% diagnosed cases of hypertension were on antihypertensive treatment (b-Blockers). None of the subjects were having any endocrinal disorder other than diabetes, musculoskeletal disorder and/orthopaedic impairment. Study of cardiovascular risk factor distribution revealed that the major risk factors in subjects with metabolic syndrome were obesity, hypertension dyslipidemia. Physical inactivity was

also found in appreciable number of cases. The more risk factors one has, greater is the chance of developing coronary heart disease. Also greater the level of each risk factors greater the risk. Increasing age is an non modifiable risk factor over 83% of people who die of coronary heart disease are 65 years or older. At older ages incidence of heart attack is more in women as compared to men.

In the subjects aged more than forty-five years irrespective of gender, greater prevalence of coronary risk factors was observed. The main risk factors identified in the age group 40-45 years were abdominal obesity (77%) & smoking (53%). In patients aged 45-50 years the important risk factors were abdominal obesity (87%), hypertension (80%) and physical inactivity (80%). The present study showed that physical inactivity of any-type work related or leisure-time influences health adversely.

The prevalence of cardiovascular risk factors was found to be very high in subjects having BMI > 25 kg/m2 and waist size category > 90 cm. In Framingham study Hubert HB et al. [11], Garrison RJ et al. [12] reported that for both the sexes obesity was found to be an independent coronary risk factor. They defined obesity as weight exceeding 20% more than the desirable body mass index.

Ming W et al. [13] studied the relationship between low cardio respiratory fitness and mortality in normal weight, over weight and obese men. A total of 25714 adult men (43.8±10.1 years) participated in their study. They found that obese men were 2-3 times more likely to develop cardiovascular disease. This risk increased to 3.1 for males having both obesity and hypertension. Half of males in their study were found to have improper physical fitness.

The association between BMI, waist size category and cardiovascular parameters was examined and significant positive correlation of BMI was observed with fasting serum glucose, total cholesterol triglyceride, LDL cholesterol and cardiovascular exercise parameters, resting pulse, blood pressure. Serum glucose was positively correlated with waist size.

The present study found that as the waist size increased, the prevalence of coronary risk factors increased. Similar findings were given by Gupta R et al. [14]

Krauss RM et al. [15] studied the impact of obesity, cardiovascular disease and reported that obese subjects on an average have higher blood pressure, total cholesterol, triglyceride, fasting glucose and plasma insulin level and lower HDL cholesterol level than lean persons. The findings of present study

corroborates with the above finding.

It is now generally accepted that excess visceral fat is associated with insulin resistance. Metabolic risk factors for coronary vascular disease metabolic syndrome are a clinical concept that facilitates the identification of patients who have metabolic derangements, making them more prone to arteriosclerosis and thus a risk for adverse cardiovascular events.

A steep increase in prevalence of hypertension was observed at waist circumference more than 90 cm. In addition to this, 69% subjects in this category had history of tobacco use and physical inactivity.

None of the coronary risk factor was found to present in waist circumference category less than 80 cm. Central obesity is the key feature of coronary risk factors reflecting the fact that the coronary risk factors prevalence is driven by the strong relationship between waist size and increasing adiposity. Sharma P et al. [16] suggested that inflammation or oxidative stress may be important underlying etiology of metabolic syndrome, which are reported to be associated with metabolic syndrome. Several reports suggested that for any given BMI, Indian tends to have increased waist circumference. The finding of the present study identified abdominal obesity in 66% type-II diabetic patient having BMI less than 25 kg/m². McKeigue PM et al. [4] reported that Indian have excess body fat, abdominal and trunk obesity.

The observations revealed that greater the duration of disease more was the prevalence of cardiovascular risk factors. Dryberg et al. [17] reported an association between autonomic dysfunction and duration of disease. Curtis BM et al. [18] studied altered autonomic tone as a cardiovascular risk factor and associated autonomic nervous system with sudden cardiac death.

The present study compared the prevalence of cardiovascular risk factors and came out with the finding that prevalence of cardiovascular risk factors was more among diabetic subjects. Nurcan Arat et al. [19] conducted a study in 61 patients with angiographically normal coronary arteries. They divided the patients in two groups according to presence (32) or absence (29) of metabolic syndrome. The patients with metabolic syndrome exhibited hypertension (44%); increase blood glucose (37%), hypertriglyceridemia (31%) a low HDL cholesterol level (30%) and these proportions were found to be significantly higher as compared to the patients in the non metabolic syndrome group.

Conclusion

Prevalence of coronary risk factors was very high in the present study. There is a need to educate young diabetic patients to avoid smoking, do more exercise, and take good nutritious diet to prevent coronary risk factors and thereby prevent future morbidity and mortality.

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