

Study of Hypertension and Anthropometrics Measurement in Type 2 Diabetes Mellitus

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Abstract

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Introduction: Type 2 DM has a strong genetic component. The disease is polygenic and multifactorial. Among the identical twins the concordance rate is 90%. In first-degree relatives with type 2 DM the risk of developing diabetes is 40%. Epidemiological studies indicate that type 2 DM appears to result from a collection of multiple genetic defects or polymorphisms, each contributing its own predisposing risk and modified by environmental factors. **Methodology:** All the patients underwent similar laboratory investigations, a 12 lead electrocardiogram was done for the patients in the study. All the 80 patients were then divided into two groups. The control group, in which included patients with type 2 diabetes mellitus diagnosed according to the criteria approved by the American Diabetic Association: Symptoms of diabetes plus casual plasma glucose concentration 200mg/dl (11.1mmol/L). Casual is defined as any time of day without regard to time since last meal. **Results:** In the study it was found that 22 patients [55%] in the study group had high blood pressure recording at the time of presentation as compared to only 12 patients [12%] in control group. **Conclusion:** It was seen that IHD and diabetes was commonly seen in the fourth to the sixth decade of life.

Keywords: Hypertension; Anthropometrics Measurement; Type 2 Diabetes Mellitus.

Introduction

Type 2 DM is commonest type of DM but the pathogenesis is not well known. There is no incidence that autoimmune mechanisms are involved. Insulin resistance and abnormal insulin secretion are important factors for the development of type 2 DM. Most of the studies demonstrate that insulin resistance precedes insulin secretory defects and diabetes develops only if insulin secretion is inadequate [1].

Type 2 DM has a strong genetic component. The disease is polygenic and multifactorial. Among the identical twins the concordance rate is 90%. In first-degree relatives with type 2 DM the risk of developing diabetes is 40%. Epidemiological studies indicate that type 2 DM appears to result from a collection of multiple genetic defects or polymorphisms, each contributing its own predisposing risk and modified

by environmental factors [2].

Pathological changes in pancreas are variable. The important morphologic changes in diabetes are related to its late systemic complications, because they are major causes of morbidity and mortality. There is extreme variability among patients in the time of onset of complications, severity and organs involved. In most of the patients regardless of the type of diabetes, when the disease is present over 15 years morphological changes appear in arteries (atherosclerosis), basement membrane of small vessels (microangiopathy), kidney (diabetic nephropathy), retina (retinopathy), nerves (neuropathy) and other tissues [3].

Diabetes has been well established as an independent risk factor for the development of CAD, conferring a doubling of the risk independent from other known risk factors for this disease. CVD amounts for upto 80% of deaths in patients with

approximately 75% of these deaths occurring as a result of IHD [3].

Dyslipidemia [Increased lipoprotein (a) LDL and reduced HDL], Diabetes and obesity (Increased BMI & waist hip ratio) are major risk factors for CVD. A major contributing factor to the high morbidity and mortality rates in DM is the premature development and accelerated progression of macro vascular atherothrombotic disease particularly in type 2 DM which comprises approximately 90% of all diabetes subjects [3].

Causes of accelerated atherogenesis in DM are unclear but the consequences in term of cardiovascular mortality and morbidity are profound. Therefore, DM not only increases the risk of CAD but also increases the case fatality rate, ensuing that majority of patients die of cardiovascular causes often before 50 years of age. The problem is compounded by autonomic neuropathy, which may delay presentation or lead to inappropriate triage decision due to altered pain perception [4].

The various risk factors implicated in the pathogenesis of increased mortality due to macrovascular complications CAD in particular, are hyperglycemia, hyperinsulinemia, dyslipidemia, oxidative stress, procoagulant states, hypertension, obesity, autonomic neuropathy, albuminuria, alcohol, smoking, gender & duration of diabetes [5,6].

Hypertension is found to be associated with metabolic abnormalities in the form of abnormal glucose metabolism, insulin resistance and dyslipidemia (- TG, HDL - C) [7]. Insulin resistance is common in obesity and type 2 DM. Therefore, type 2 DM and hypertension are commonly associated conditions both of which carry an increased risk of cardiovascular disease [8]. The prevalence of hypertension in type 2 DM is higher than in general population, especially in younger patients. At the age of 45 years, around 40% of patients with type 2 DM are hypertensive, the proportion increasing to 60% by the age of 75 years [9]. Hypertension, therefore increases the already high risk of CVD associated with type 2 DM. Results of HOT and UKPDS trials showed that aggressive control of blood pressure provides greater protection from death due to cardiovascular causes in diabetics [9,10].

Methodology

Inclusion Criteria

1. All the patients with type 2 DM were included in

the study irrespective of their on going treatment

2. Patients with diabetes who presented with a acute coronary syndrome like presentation were included in the IHD group. The following crieteron were used to label the diabetic patients to have acute coronary syndrome.

Exclusion Criteria

1. Patients with previous history of myocardial infraction.
2. Patients presenting with a LBBB pattern on the electrocardiogram.
3. Patients with a previous history of stoke or patients suffering with end stage renal disease
4. Patients with other complication of diabetes such as ketosis, gangrene etc

A total of 80 patients were included in the study based on the inclusion criteria as mention above. The data was collected in a predesigned proforma by questionnaire method, physical examination and lab investigation. The data included:

- Duration of diabetes mellitus
- Duration of hypertension and the blood pressure on presentation
- BMI and Wasit Hip ratio
- HbA1c, FBS and PPBS
- Fasting Lipid profile

All the patients underwent similar laboratory investigations, a 12 lead electrocardiogram was done for the patients in the study. All the 80 patients were then divided into two groups .

The control group, in which included patients with type 2 diabetes mellitus diagnosed according to the criteria approved by the American Diabetic Association:

- Symptoms of diabetes plus casual plasma glucose concentration ≥ 200 mg/dl (11.1mmol/L). Casual is defined as any time of day without regard to time since last meal.
- FPG > 126 mg/dl (7.0 mmol/L). Fasting is defined as no caloric intake for atleast 8 hours.
- 2 hour post load glucose ≥ 200 mg/dl (11.1 mmol/L) during an OGTT

The test should be performed as described by WHO using glucose load containing the equivalent of 75g anhydrous glucose dissolved in water.

Results

There were 6 patients [15%] below the age of 40 years. In the age group of 40-60 years there were 25 patients [52.5%]. Above 60 years there were 9 patients [22.5%]. Thus the highest incidence of the ischemic heart disease was in the age group of 41-60 years of age, i.e.,

25 patients.

Contingency Coefficient = 0.325; P < 0.024 Significant

In the study group there were 32 patients [80%], who were diagnosed to have hypertension previous to the present admission, as compared to only 15 patients [37.5%] in control group.

Table 1: Age distribution

AGECD * GROUP Crosstabulation			Group		Total
			DM w IHD	DM wt IHD	
AGECD	Below 40	Count	6	2	8
		% within Group	15.0%	5.0%	10.0%
	41-50	Count	10	6	16
		% within GROUP	25.0%	15.0%	20.0%
	51-60	Count	15	10	25
		% within GROUP	37.5%	25.0%	31.3%
	60+	Count	9	22	31
		% within GROUP	22.5%	55.0%	38.8%
TOTAL	Count	40	40	80	
	% within GROUP	100.0%	100.0%	100.0%	

Table 2: Previous history of hypertension and its association

Hypertension * Group			Group		Total
			DM w IHD	DM wt IHD	
Hypertension	No	Count	8	25	33
		% within GROUP	20.0%	62.5%	41.3%
	Yes	Count	32	15	47
		% within GROUP	80.0%	37.5%	58.8%
Total	Count	40	40	80	
	% within GROUP	100.0%	100.0%	100.0%	

Table 3: Blood pressure on admission and its association

BP * GROUP Crosstabulation			GROUP		Total
			DM w IHD	DM wt IHD	
BP	Hypertensive	Count	22	12	34
		% within GROUP	55.0%	30.0%	42.5%
	Normal	Count	18	28	46
		% within GROUP	45.0%	70.0%	57.5%
Total	Count	40	40	80	
	Within GROUP	100.0%	100.0%	100.0%	

Table 4: Body mass index and its association

BMICD * GROUP Crosstabulation			Group		Total
			DM w IHD	DM wt IHD	
BMICD	Under wt	Count	1	4	5
		% within GROUP	2.5%	10.0%	6.3%
Total	Normal	Count	14	25	39
		% within Group	35.0%	62.5%	48.8%
	Over wt	Count	19	10	29
		% within Group	47.5%	25.0%	36.3%
	Obese	Count	6	1	7
		% within GROUP	15.0%	2.5%	8.8%
Total	Count	40	40	80	
	% within GROUP	100.0%	100.0%	100.0%	

Contingency Coefficient = 0.396; P < 0.001 Significant

In the study it was found that 22 patients [55%] in the study group had high blood pressure recording at the time of presentation as compared to only 12 patients [12%] in control group.

Contingency Coefficient = 0.245; P < 0.024 Significant

In the study 19 patients [47.5%] were overweight and another 6 patients [15%] were obese as compared to 10 patients [25%] and 1 patient [2.5%] respectively in the control group.

Contingency Coefficient = 0.351; P < 0.010 Significant

Discussion

This is a descriptive study done prospective in 80 patients with type 2 diabetes mellitus who presented to our hospital. These patients were divided into two groups, the control group who had only type 2 diabetes and the study group in which patients had diabetes mellitus and ischemic heart disease.

The aim of the study was to compare the medical history, anthropometric measurements and laboratory values between the two groups, that is, patients with diabetes mellitus with ischemic heart disease (study group) and those only with type 2 diabetes mellitus (control group).

- The prevalence of IHD was higher in the male population as compared to the female population.
- It was seen that IHD and diabetes was commonly seen in the fourth to the sixth decade of life.
- Patients who had a longer duration of diabetes (more than 10 year) were at a higher risk of developing IHD.
- Hypertension was a major factor in the IHD group, these patients also had a hypertensive blood pressure response on admission
- There was a higher prevalence of IHD in the patients with a poor control of diabetes (shown by a HbA1c of more than 8%). It was also seen that the patients with IHD had a higher value of fasting blood sugar level on presentation.
- The anthropometric measurements were also on the higher side in the IHD group with diabetes mellitus, suggesting that overweight and obesity were risk factors for the development of IHD
- Dyslipidemia also was more common in the IHD group, suggesting that an aggressive treatment of dyslipidemia initially may be beneficial in the

long run.

Thus our study showed that there is a definite increase in the incidence of IHD in diabetics with respect to the duration of diabetes mellitus, a past history of hypertension, poor control of diabetes and a deranged lipid profile.

It is mandatory that an early, timely and aggressive management is necessary in these patients. The patients must be counseled about diet, compliance and drugs/insulin for the strict control of their glycemic state. Last but not the least, dyslipidemia must be aggressively and treated early. Thus one must look into the other aspects mentioned above when treating a diabetic.

Conclusion

- The prevalence of IHD was higher in the male population as compared to the female population.
- Hypertension was a major factor in the IHD group, these patients also had a hypertensive blood pressure response on admission

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