



Assessment of C-peptide levels in Diabetes mellitus patients and their association with obesity

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Abstract

Background: *Diabetes mellitus is a chronic metabolic and endocrine disorder resulting from defects in insulin secretion, insulin action or both. The determination of c-peptide provides an assessment of endogenous secretory reserves in patients with diabetes mellitus and is considered a more reliable indicator of insulin secretion than insulin itself.*

Objective: *To estimate the C-peptide levels in type 2 diabetics; to assess the endogenous insulin secretory function and to find their association with obesity.*

Material and Method: *The present study was conducted on 100 adult patients of type 2 Diabetes mellitus presenting in OPD and emergency after taking informed consent and approval from hospital ethical committee. Venous blood sample were withdrawn in the fasting state and C-peptide levels were estimated.*

Results: *Out of 100 patients, 49% patients had fasting C-peptide levels between 1-2 ng/ml. Only 7% patients had <0.6ng/ml. The mean fasting-peptide level of the study was 1.348 ± 0.796 .*

Conclusion: *Raised levels of C-peptide seen in diabetic patients as the resistance to insulin increases hence it can be used as a screening tool.*

Keywords: *Diabetes Mellitus, C-peptide, Insulin.*

Introduction

Diabetes mellitus characterized by chronic hyperglycemia with disturbances of carbohydrate, fat and protein metabolism.^[1] It is a major cause of mortality and morbidity worldwide. The incidence of this disorder is increasing worldwide.^[2] Human insulin and C-peptide are synthesized as a single polypeptide chain known as proinsulin in the pancreatic islet by the beta cells.^[3] The great interest in C-peptide is due to the limitations of the use of serum insulin as a measure of insulin secretion because insulin after its secretion into the portal

vein passes through the liver where approximately 50% of the delivered insulin is extracted.^[4] The measurement of C-peptide, which is co-secreted with insulin from beta cells of pancreas, thus provides a better index of endogenous insulin production and pancreatic beta cell function than insulin measurement.^[5] Keeping this perspective in mind, this study was conducted to assess the C-peptide level and its association with obesity in a randomized sample of patients with type 2 diabetes.

Material and Method

The present study was conducted on 100 adult patients of known type 2 diabetes mellitus presenting in outpatient department and emergency room after taking informed consent and approval from hospital ethical committee. Patient already taking oral hypoglycaemic agents were asked to stop the drugs for 3 days. The patients were asked to come in the fasting state. After taking weight and height for calculation of BMI, venous blood samples were withdrawn in the fasting state and fasting blood glucose levels and C-peptide levels were estimated. Patient with DM-1, acute infections, renal failure, and pregnancy were excluded from the study. For estimation of C-peptide chemiluminescence immunoassay was used.

Results

Out of 100 patients with type 2 diabetes mellitus in the present study, a maximum of 38 patients were between the age groups of 50-59 years, followed by 36 patients in the age group of 40-49 years. 16 patients out of 100 study patients were in the age group of 30-39 years. 10 were in the age group of 60-69 years. Mean age group in present study was 49.01±9.121. Table. 1 shows age wise distribution of cases.

Table. 1 Age wise distribution of subjects

Age Groups	Number of Patients
30-39	16
40-49	36
50-59	38
60-69	10

Table. 2 Sex wise distribution of subjects

Sex	Frequency
Male	58%
Female	42%

table. 2 shows that out of 100 patients of type 2 diabetes, 42% patients were females, while 58% were males. The male: female ratio in the present study with type 2 diabetes mellitus was 1.38:1.

Table. 3 Fasting C-Peptide Levels in DM-2

Fasting C-Peptide Level ng/ml	Number of Patients
<0.1	3
0.1-0.5	4
0.6-0.9	27

1-2	49
≥2	17
Total	100

Table. 3 shows the levels of fasting C-peptide in the present study. Out of 100 patients, 49% patients had fasting C-peptide levels between 1–2 ng/ml, 27% patients had fasting C-peptide levels between 0.6-0.9 ng/ml and 17% patients had >2 ng/ml. Only 7% patients had <0.6 ng/ml. The mean fasting C-peptide level of the study was 1.348 ± 0.796.

Table. 4 Fasting Blood Sugar Levels in DM-2

FBS Level in mg/dl	Number of Patients
<200	26%
200-250	56%
>250	18%
	100

Table. 4 shows that out of 100 patients in the present study with type 2 diabetes, 56% patients had fasting plasma glucose level between 200-250 mg/dl, 25% patients had < 200 mg/dl and 18% patients had ≥ 250 mg/dl. So the study shows that majority of the patients (42) patients had fasting plasma glucose levels between 200-250 mg/dl. The mean plasma glucose level of the study was 223.10 ± 29.93.

Table 5 Association of C-peptide with Obesity

BMI	Fasting C- peptide					Total
	<0.1	0.1-0.5	0.6-0.9	1-2	≥2	
<25	3	4	20	29	2	58
≥25	0	0	7	20	15	42
Total	3	4	27	49	17	100

Table. 5 shows that as the BMI value of the patient increases, the fasting C-peptide level also increases. Also shows that BMI values and the levels of fasting C-peptide are highly associated. As the BMI increases the fasting c- peptide levels increases, though not in a linear fashion.

Discussion

The age group of the study patients range from 30-70 years. The age group with maximum number of patients was 50-60 years. The mean age of the study group is 49.01 ± 9.121. Bilal Bin abdullah et al in their study showed that most of the diabetes was in the age group of 50–60 years.^[6] Similarly Khatib et al also in their study showed that most of the diabetes was in the age group of 50–60 years.^[7]

In present study population, most of the patients were males (58%) compared to female (42%). Thus indicating prevalence of type 2 DM is much more in male as compared to female. Yadav N K et al had 70% of study population males and 30% females.^[8] Previously several studies in India (Ajagnakar and Sathi et al, Vaishnava et al, and Shankar et al) have reported the similar incidence of diabetes. Based on BMI, 42% of the studied patients were obese as per American Diabetic Association, Clinical Practice Recommendation 20/02/12. The number of non obese patients was 56%. In our study we observe that the fasting C-peptide levels were higher in the obese patients than in the non obese patients. Hence this study suggests that obese patients are hyperinsulinemic. Majority of patients have adequate insulin reserve as shown by C-peptide levels. Similar results were observed by Abdullah B et al in their study. C. Snehalatha, A. Ramachandran et al conducted a study analysing the insulin secretion in Asian Indians also observed lesser insulin levels in non obese compared to obese.^[9]

Conclusion

we can conclude that duration of diabetes and insulin reserve travels in opposite direction which is shown by beta cell function deterioration with duration of diabetes .this is also supported by reduce level of c- peptide with increase in duration of diabetes. Our study shows resistance to insulin is seen in obese patients which is quite evident from raised C-peptide level. So from these observations we suggest increased use of C-peptide level assessment as a tool for screening and guiding treatment in diabetic patients.

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