

Serum Ferritin Status of Patients with Type 2 DM Attending OPD of BIRDEM General Hospital

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ABSTRACT

Background: In recent times much is talked about of serum ferritin, an acute phase reactant a marker of iron stores in the body and its association with diabetes mellitus. Studies implicate that increased body iron stores and subclinical hemochromatosis has been associated with the development of glucose intolerance, type 2 diabetes and its micro as well as macrovascular complications.

Material & Methods: This study was carried out to examine and to observe for any relationship between serum ferritin with Type 2 diabetes mellitus. Our study populations were included 163. Among them 81 type 2 diabetes patients as a case (M=49,F=32, mean 44.68 age in years)and 82 normal healthy individual as a control (M=35, F=47 , mean 34.71 in years).

Results: Majority were healthy outpatients who had come for regular checkup and were matched with controls. Serum ferritin and FBS were estimated and other investigations. Results showed that although Serum ferritin was in the normal range value it was increased in type 2 diabetes patients than in controls and was statistically significant, we did get a positive correlation with duration of diabetes. It can be concluded that there were positive associations between serum ferritin and FBG, age, sex among study groups.

Conclusion: In conclusion our study shows that there is significant correlation between increased serum ferritin in diabetes compared to individuals with normal blood sugars in this part and hyper ferritinemia may be one of the causes for development of insulin resistance before overt diabetes.

Keywords: Diabetes mellitus, Ferritin, FBS.

Introduction

Diabetes is a major public health concern both in developing and developed countries worldwide. Metabolic syndrome is also on an increasing trend. The metabolic syndrome is closely linked to insulin resistance and studies too tried to associate with iron overload. Increased serum ferritin, reflecting body iron overload, is often associated with measures of insulin resistance, such as elevated blood glucose and insulin levels¹⁻⁶. The relationship between T2DM and iron metabolism has gained interest in both research and clinical practice⁷. Several studies

indicate that increased body iron stores and subclinical haemochromatosis have been associated with the development of glucose intolerance and type2 diabetes⁸. Several studies have shown that moderate increases in iron stores below the levels found in patients with hereditary haemochromatosis (HH) were associated with significant elevations in blood glucose and insulin levels⁹. Increased serum ferritin, reflecting body iron overload, is often associated with measures of insulin resistance⁸.

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We aimed to evaluate the association between serum ferritin concentration and the complications and nature of diabetes mellitus (DM). We examined association of ferritin concentration, fasting and glucose levels in 81 patients with type 2 diabetes mellitus and 82 healthy controls.

We undertook this study to know serum ferritin levels in diabetes and to determine whether it just an association or it contributes to development of insulin resistance. In conclusion, this study showed an independent positive association between serum ferritin concentration and markers of glucose homeostasis.

Methods

The study was designed as a case control study. The study was conducted over a period of six months. The total study populations were 163. Among them 81 type 2 diabetes patients who were treated on an outpatient basis in BIRDEM General Hospital were included in the study as a case and 82 healthy outpatients who had come for regular checkup as matched with controls. Age and sex matched normal healthy controls were selected for study.

Inclusion criteria

Case : Type 2 diabetes mellitus patient was a group between 20 to 50 years of aged.

Control: Healthy control was another group between 20 to 50 years of aged.

Exclusion criteria

- Anemia of any cause
- Serious infections
- Chronic kidney disease
- Chronic liver disease
- On corticosteroid therapy.

Data collection

A detailed proforma was filled up for each patient which included age, sex, past history of coronary artery disease, cerebrovascular accident, history of

hypertension. The age of onset and duration of diabetes was recorded. Also recorded was treatment history of patient whether on oral hypoglycemic agents, insulin or diet control alone. Laboratory parameters including Serum ferritin, fasting blood sugar for all patients and other investigations done where ever required.

Serum ferritin was done by Enzyme-Immunoassay (EIA) for the quantitative determination. For this ferritin estimation in human serum store at 2°C to 8°C. (Ref white, D.Kramer, D., Johndon, G., Dick. F and Hamilton, H. Am. J. Clin. Path. 72-346;1986). Serum fasting glucose were estimated by glucose oxidase (GOD) enzymatic method (Ref Kaplan L.A. Glucose Kaplan A *et al.* Clin Chem The C.V Mosby Co. St Lois Toronto. Princeton 1984; 1032-1036.) Blood sample was collected from patients after an overnight (8-12hr) fasting. Statistical analysis was done using SPSS software.

Results

The age of our study were between 20 to 50 in years in case of both diabetic patients and healthy individual. The mean age group of patients with diabetes was 44.68 years and that of the controls is 34.71 years. The duration of diabetes was between 5 to 10 years. Diabetic patients were on oral hypoglycemic agents.

Table 1: Serum ferritin levels in the study population

Groups	Serum ferritin (Mean ± SD)	t	p
Cases	110.7±65.75	2.65	0.01*
control	74.07±29.09		

Table 1 shows the comparison of serum ferritin in case and controls, there is statistical significant increase in diabetics with $p < 0.01$.

Table 2: Shows serum ferritin and FBS among case and control

sex		N	Mean	Std. Deviation	Std Error Mean	t	P
female	Age (yr)	Case control	32 35	43.50 34.57	7.675 7.531	1.357 1.273	4.803 .000
	Ferritin (ng/dl)	Case control	32 35	163.0469 139.8671	137.03658 235.39349	24.22487 39.78876	.487 .628
	FBG (mmol/l)	Case control	32 35	9.1944 4.0000	7.05515 .77308	1.24719 .13067	4.330 .000
male	Age (yr)	Case control	49 47	45.45 34.81	5.899 8.179	.843 1.193	7.333 .000

Table 2. shows the association of serum ferritin and FBS in diabetic patient compare to healthy persons, there is statistical significant increase of serum ferritin in diabetics with $p < 0.01$.

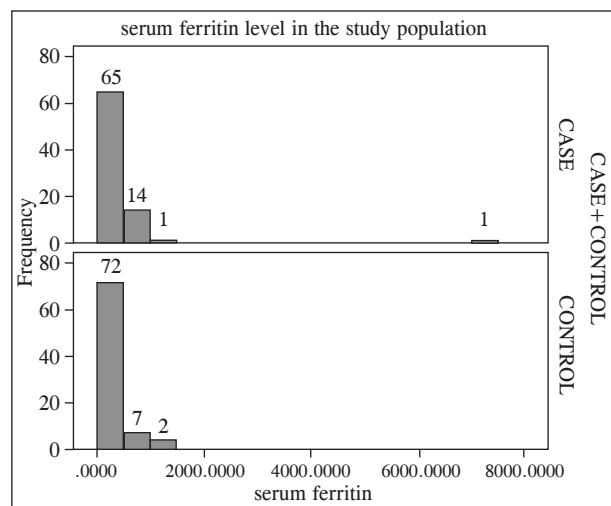


Fig 1: Shows that there was increase in serum ferritin levels in type 2 DM compared to control study.

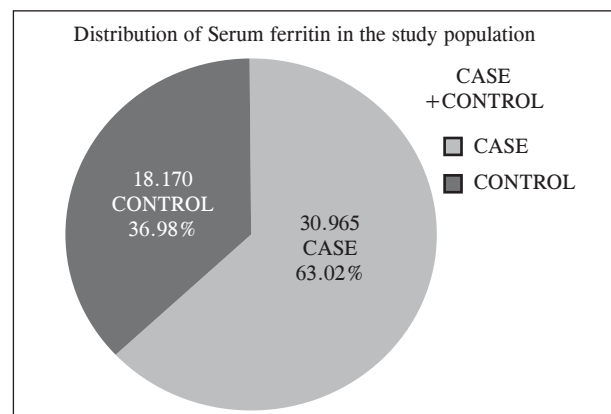


Fig II: Pie diagram shows Serum ferritin level in patients with diabetes mellitus compare to healthy control persons.

Discussion

Serum ferritin, a reflector of body iron stores was increased in diabetic patients compared to controls and this association was of statistical significance and shown in all these studies¹⁻⁶. The mechanism for the association between ferritin and type 2 diabetes is not established, but iron deposition in the liver may cause insulin resistance by interfering with the ability of insulin to suppress hepatic glucose production^{10,11}. Iron is auto-oxidized to form highly reactive, lipid-soluble iron-oxygen complexes. These free radicals are powerful pro-oxidants, which can change membrane properties and result in tissue damage^{12,13}. Oxidative stress can also lead to hyperglycemia through disturbed glucose metabolism¹³. In addition, iron accumulation in hepatocytes may interfere with the insulin-extracting capacity of the liver^{11,13}, and affect insulin synthesis and secretion in the pancreas. This possibly reflects that it may be an emerging risk factor among already existing and established etiologies, risk factors of the disease. Iron excess probably contributes insulin resistance and subsequently to decreased insulin secretion¹³. Serum ferritin levels increased as the duration of diabetes increased as in Sumeshraj *et al.*¹ and other similar studies^{6,11}. Our study correlated well with Raj S *et al.*¹ study and all other studies^{1,3,6,11}. No correlation was found with BMI, age, sex, dyslipidemias and HbA_{1c} as in few studies¹.

Conclusion

In conclusion our study shows that there is significant correlation between increased serum

ferritin in diabetes compared to individuals with normal blood sugars in this part and hyperferritinemia may be one of the causes for development of insulin resistance before overt diabetes. We recommend large studies to confirm whether these findings have implications for increasing our understanding of the etiology of type 2 diabetes and merit further study in future that help to clarify causality and advance in this area of research.

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Conflict of interest: none

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