

Study of Serum Ferritin in Type 2 DM Patients: A Cross-sectional StudyReetu Rani¹, Santosh Kumar², Sudha Kumari³, P. P. Gupta⁴¹Tutor, Department of Biochemistry, Darbhanga Medical College, Laheriasarai, Bihar.²Assistant Professor, Department of Biochemistry, Darbhanga Medical College, Laheriasarai, Bihar.³Associate Professor, Department of Biochemistry, Darbhanga Medical College, Laheriasarai, Bihar.⁴Professor and HOD, Department of Biochemistry, Darbhanga Medical College, Laheriasarai, Bihar.

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Conflict of interest: Nil

Abstract

Background: A metabolic disease called diabetes mellitus affects how different trace elements are metabolized. Present study has been carried out to determine association between serum ferritin and type 2 diabetes mellitus. Aim of this study to analyze level of serum ferritin in type 2 diabetes mellitus patients in comparison with healthy controls.

Methods: The present cross-sectional study was carried at Clinical Laboratory of Department of Biochemistry, Darbhanga Medical College, Laheriasarai, and Bihar from February 2025 to May 2025. There were 100 cases having minimum 5 years history of type 2 diabetes mellitus. There were 100 healthy controls in this study. ELISA (Enzyme-Linked Immunosorbent Assay) method was used for estimation of Glucose. Nephelometry method was used for estimation of Ferritin and HbA1c.

Results: In comparison to healthy controls; Serum ferritin level was found high in Type 2 DM patients.

Conclusion: High level of serum ferritin was found in patients of type 2 diabetes mellitus patients who have poor glycaemic control.

Keywords: Type 2 diabetes mellitus, Serum ferritin, HbA1c.

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Introduction

Prevalence of Type 2 diabetes mellitus (DM2) has continue to increase in recent decades.[1–5] It is an important health problem worldwide affecting about 8 percent of population.[6] Serum ferritin is storage form of Iron. It is globular protein. Ferrous form of Iron enters into cells in condition of oxidative stress and changes into Ferric form which is linked to ferritin and protect the cells from free radicals.[7] Oxidative stress is linked with impairment in glucose tolerance and insulin resistance.[8–10] Higher levels of Ferritin and Iron inside cells can produce Insulin resistance and malfunction of Beta cells of Pancreas. Hyperinsulinemia because of Insulin resistance may be responsible for high level of Ferritin. Derangement in metabolism of Iron may produce resistance to insulin, hyperinsulinemia, dyslipidemia and obesity.[11,12]

Materials and Methods

The present cross sectional study was carried at Clinical Laboratory, Department of Biochemistry, Darbhanga Medical College, Laheriasarai, and Bihar from February 2025 to May 2025. All cases

and controls included in study have age more than 40 years. The duration of study was four months. There were 100 cases having minimum 5 years history of type 2 diabetes mellitus. Patients having acute infections, chronic systemic diseases, cancer, thyroid disorders, history of smoking and alcohol were excluded from study.

Pregnant women and lactating mothers were not included. Patients on Insulin were excluded. There were 100 healthy controls in this study.

All participants were instructed to continue their usual physical activities and routine diet. All cases were instructed to take their oral hypoglycemic drugs as per advice of physician.

Criteria for the diagnosis of diabetes mellitus [13]

- Fasting Blood Sugar >126 mg/dL. Fasting is defined as no caloric intake for at least 8h.*
- 2 hour Post Prandial Blood Sugar > 200 mg/dL

Laboratory samples

1. Two ml of venous blood was collected in fluoride vacutainer for estimation of glucose.
2. Four ml of venous blood was collected in plain vacutainer for estimation of Ferritin.
3. Four ml of venous blood was collected in EDTA vacutainer for estimation of HbA1c.
4. Collection of Blood was done in morning in fasting condition.
5. Samples were analyzed within two hours of collection.

6. ELISA (Enzyme-Linked Immunosorbent Assay) method was used for estimation of glucose.
7. Nephelometry method was used for estimation of Ferritin and HbA1c.

Statistical analysis was done by using SPSS software version for performing student 't' test. Probability <0.05 considered as significant.

Result

In the present study, 64 patients were males and 36 were females as illustrated in the Table 1.

Table 1: Age of patients of diabetes mellitus

Age in years	No. of male (%)	No. of female (%)
41-50yrs	13 (20.31%)	8 (22.22%)
51-60yrs	32 (50.0%)	19 (52.77%)
61-70yrs	19 (29.68%)	9 (25.0%)
Total	64 (100%)	36 (100%)

FBS (158.67±20.78), PPBS (176.19±19.84) and ferritin (202.31±17.27 in male and 105.09±10.66 in female) levels were significantly increased in type 2 diabetes mellitus patients compared with controls.

Table 2: Serum ferritin and HbA1c level in Healthy controls and patients of diabetes mellitus

Name of Parameter	Controls (Mean±SD) (N=100)	Diabetes Mellitus Patients (Mean±SD) (N=100)
FBS (mg/dl)	89.32±9.21	158.67±20.78*
PPBS (mg/dl)	108.96±10.54	176.19±19.84*
Ferritin (ng/ml)	In Male: 141.57±14.65 In Female: 79.13±7.42	In Male: 202.31±17.27* In Female: 105.09±10.66*
HbA1c (%)	4.89±0.78	7.86±2.03*

Discussion

Chronic disorders like diabetes mellitus and hypertension leads to mortality in present era. Conclusive evidences are available which clearly indicates derangement in trace elements metabolism in diabetes mellitus. Correlation exists between serum ferritin, FBS, HbA1c and Serum Insulin.[12] Serum ferritin, a reflector of body iron stores was significantly higher in diabetic patients increased as duration of diabetes increased.

This possibly reflects the subclinical hemochromatosis developing in a long standing diabetic patient. [14] Increased body iron stores are possibly associated with occurrence of glucose intolerance, type-2 diabetes and gestational diabetes.[15,16] Poorly controlled patients have hyperferritinemia and there is association between serum ferritin level and diabetic retinopathy.[17] We found that high level of serum ferritin (p<0.05) is seen in patients of diabetes mellitus who have poor glycemic control which matches with other studies.[17,18] In diabetic subjects, a positive correlation between increased serum ferritin and poor glycemic control, reflected by higher HbA1c, has been suggested.[18]

Conclusion

From the present study it may concluded that high level of serum ferritin is found in patients of type 2 diabetes mellitus who have poor glycemic control which may have role in prognosis and pathogenesis of diabetes mellitus. For better understanding effect of serum ferritin in diabetes mellitus, further clinical studies are needed which should enroll large number of patients and should use higher advanced methods.

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