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Medicine

To Study the Correlation between Serum Ferritin and Type II Diabetes Patient Attended M.Y. Hospital, Indore

Dr. Umesh Kumar Chandra[1], Dr. Minakshi Dangi[2*]

[1]Resident, Department of Medicine, MGM Medical College, Indore, Madhya Pradesh, India
[2]Senior Resident, Department of Medicine, MGM Medical College, Indore, Madhya Pradesh, India

***Corresponding author:** Dr. Minakshi Dangi
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Abstract **Original Research Article**

Background: This study correlates between Serum Ferritin & Type II Diabetes patients enrolled 100 patients of type 2 DM and 100 healthy individual who are attended OPD for routine health checkup. ***Method:*** This prospective study was conducted in the Department of Medicine, Mahatma Gandhi Memorial Medical College and Maharaja Yashwant Rao Hospital, Indore, from April 2015 to Sept 2016. We enrolled 100 patients of type 2 DM and 100 healthy individual who are attended OPD for routine health checkup. All patients or their relatives provided valid informed written consent for participation. ***Result:*** Max. No. of control FBS level in range between 91-100 mg/dl 32 control FBS level in 80-90mg/dl,21% FBS level in between101-110 mg/dl. The max no. of cases 72% was serum ferritin level is >204 ng/ml. In cases mean level of serum ferritin level is 277±130 ng/ml. 12% cases having in high normal level. ***Conclusion:*** In conclusion our study shows that there is significant correlation between increased serum ferritin in type II diabetes compared to individuals with normal blood sugars. Hyperferritinemia may be one of the causes for development of insulin resistance before overt diabetes from a causal perspective; there are at least two possible interpretations of our findings. Elevated iron stores, reflected in elevated plasma ferritin levels, may increase baseline glucose levels and induce other metabolic abnormalities that ultimately result in diabetes.
Keywords: Serum Ferritin, Type II Diabetes, FBS & PPBS.
Study Designed: Prospective Study.

INTRODUCTION

Diabetes Mellitus is assuming epidemic proportions worldwide. Approximately one-fifth of the world diabetics are in India (WHO) and the incidence of the disease is increasing day by day [1]. Globally, an estimated 422 million adults were living with diabetes in 2014, compared to 108 million in 1980. The global prevalence (age-standardized) of diabetes has nearly doubled since 1980, rising from 4.7% to 8.5% in the adult population. This reflects an increase in associated risk factors such as being overweight or obese. Over the past decade, diabetes prevalence has risen faster in low- and middle-income countries than in high-income countries. Diabetes caused 1.5 million deaths in 2012. Higher-than-optimal blood glucose caused an additional 2.2 million deaths, by increasing the risks of cardiovascular and other diseases. Forty-three percent of these 3.7 million deaths occur before the age of 70 years. The percentage of deaths attributable to high blood glucose or diabetes that occurs prior to age 70 is higher in low- and middle-income countries than in high-income countries.

In INDIA 2008, an estimated 347 million people in the world had diabetes and the prevalence is growing, particularly in low- and middle-income countries. India had 69.2 million people living with diabetes (8.7%) as per the 2015 data. Of these, it remained undiagnosed in more than 36 million people.

MATERIALS & METHODS

This prospective study was conducted in the Department of Medicine, Mahatma Gandhi Memorial Medical College and Maharaja Yashwant Rao Hospital, Indore, from April 2015 to Sept 2016. We enrolled 100 patients of type 2 DM and 100 healthy individual who are attended OPD for routine health checkup. All patients or their relatives provided valid informed written consent for participation.

Inclusion Criteria

- Patientswith type 2 DM and willing to give consent.
- The control group consisted of 100 age and sex matched healthy indivisuals who are attended

hospital for routine checkup with no history of any medical disorder. They had fasting blood sugar levels of less than 110 mg/dl and haemoglobin levels of more than 12 g/dl.

Exclusion Criteria

- Patients with a history of ketoacidosis and other diabetic complications will be excluded from the study.
- Our criteria for the diagnosis of anaemia were based on clinical examination and a haemoglobin level of less than 12 g/dl.
- Subjects with hepatic or renal dysfunction (>1.5-fold elevation of alanine aminotransferase, aspartate aminotransferase, or serum creatinine >115 mol/L)
- Subjects with anemia, blood transfusion, and the recent use of iron, who smokers, consuming alcohol, and having acute and chronic inflammation. This study was approved by the ethics committee of the MGM & MYH Indore.
- One standard questionnaire will be completed for each subject, which included their personal data, drug usage, disease history and physical examination. Weight and height will be measured by a standard device and body mass index (BMI) was calculated based on weight / (height)2 formula.
- Results were analyzed with SPSS software and t-test was used for quantitative variables, Chi-square test for qualitative variables and Pearson's regression for correlation between variables
- **Serum ferritin:** The anti-ferritin antibody (rabbit) coated on the latex particles are agglutinated when mixed with samples containing ferritin. The agglutination causes an absorbance change dependent on the ferritin in the sample; this can be inter-plotted using a calibration curve prepared from calibrators of different concentrations[2]

RESULTS

TABLE No. 01 showing Max. no of cases 86% having FBS level in range between 101-110 mg/dl and only 5 pt having FBS level ≥ 120mg/dl.

Table-01: Distribution of fbs level (case) [n=100]

FBS Level	No. of cases	Percentage
90-100	9	9%
101-110	86	86%
111-120	5	5%
Total	100	100%

TABLE No. 02 showing Max. no. of control FBS level in range between 91-100 mg/dl 32 control FBS level in 80-90mg/dl,21% FBS level in between101-110 mg/dl.

Table-02: Distribution of fbs level (control) [n=100]

FBS Level	No. of Cases	Percentage
80-90	32	32%
91-100	47	47%
101-110	21	21%
Total	100	100%

TABLE No. 03 showing max no. 54% of cases having PPBS level in good control 27% cases having moderatly control &19% having poorly controlled PPBS.

Table-03: Distribution of ppbs (case) [n=100]

PPBS Level	No. of cases	Percentage
≤140	54	54%
141-180	27	37%
≥180	19	26%
Total	100	100%

Table no. 04 mean FBS level for case 105.54± 4.5 and for controls 96.5±3.1 p<0.001 PPBS level for case and controls 140.86±17,140.86±112.19 ,p value <0.001

Table-04: Characteristic of cases and controls

Parameter	Cases	Controls	P value
FBS	105.54±4.59(mg/dl)	96.5±31(mg/dl)	<0.001
PPBS	140.86±17(mg/dl)	112.19±9(mg/dl)	<0.001

Table no. 05 showing the max no. of cases 72% was serum ferritin level is >204 ng/ml. In cases mean level of serum ferritin level is 277±130 ng/ml. 12% cases having in high normal level.

Table-05: Distribution of serum ferritin (case) [n=100]

Ferritin Level	No. of cases	Percentage
<4	0	0
4-54	05	12%
55-104	07	07%
105-154	04	04%
155-204	12	12%
>204	72	27%
Total	100	100%

TABLE no.06 showing ferritin level in contole.max no.of indivisual ferritin level in between 50-100 level in mean ferritin level is 83±31.when we apply unpaired t test between case and control p≤0.00 these show significant correlation.

Table-06: Distribution serum ferritin (control) [n=100]

Ferritin Level	No. of cases	Percentage
<04	00	00%
04-204	98	98%
>204	02	02%
Total	100	100%

DISCUSSION

A total number of 200 subjects (case and controls) were selected for the study. The subjects were divided into 2 groups. The group 1 included 100 cases of Type 2 Diabetes Mellitus (DM) and group 2 included 100 age, sex, matched non diabetic normal individuals.

Data evaluation was done using SPSS software. The results were expressed as Mean (standard deviation). The P value was used to compare the different groups. The P value of <0.05 was considered significant.

The mean and standard deviation of both clinical and biochemical characteristics of the two groups were calculated. The clinical parameters include the age and BMI. The biochemical parameter included Fasting Plasma Glucose (FPG), Post prandial Plasma Glucose (PPPG), Hemoglobin (Hb), and serum ferritin and lipid profile. The mean ferritin level is significantly higher in group 1 (277 ng/ml ± 130) as compare to group 2 (29.59ng/ml±2.9) with p value of <.005. There is significant association found between ferritin and in FBS, PPBS there is no significant association found between BMI/HDL/LDL/TC.

Serum ferritin levels is significantly elevated in diabetics compared to control subjects recorded in the present study which is supported by similar findings from previous studies Ford ES, Cogswell ME, Sharifi F, Sazandeh SH, Sharifi F, Zadeh HJ, Nasab NM, Amirmoghadami H [3-5]. The exact mechanism through which elevated ferritin promotes the development of type 2 diabetes is uncertain. Elevated iron stores may induce diabetes through a variety of mechanisms, including oxidative damage to pancreatic beta cells, impairment of hepatic insulin extraction by the liver, and interference with insulin's ability to suppress hepatic glucose production. Iron deposition and iron induced oxidative stress contribute to the pathogenesis of type 2 diabetes (T2D) through β-cells apoptosis, hepatic dysfunction, and insulin resistance. The pancreatic beta cells are particularly susceptible to oxidative damage because of their weak antioxidant defense .Serum ferritin levels increases as the duration of diabetes increases as in Sumesh *et al*. [6]. Our study correlated well with Sushma *et al*. [7] and other studies. Jiang R, Moczulski DK [8, 9]. No correlation was found with BMI, lipid profile. Serum Ferritin can be considered as routine diabetic biomarker and measures should be taken to decrease iron load in diabetic patients to improve glycaemic control and to prevent development of CVD because increased iron storage causes organ damage in a prospective study in Finnish men, Salonen *et al.* [9].

CONCLUSION

In conclusion our study shows that there is significant correlation between increased serum ferritin in type II diabetes compared to individuals with normal blood sugars. Hyperferritinemia may be one of the causes for development of insulin resistance before overt diabetes from a causal perspective; there are at least two possible interpretations of our findings. Elevated iron stores, reflected in elevated plasma ferritin levels, may increase baseline glucose levels and induce other metabolic abnormalities that ultimately result in diabetes.

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