EUROPEAN ACADEMIC RESEARCH
Vol. IV, Issue 4/ July 2016

Impact Factor: 3.4546 (UIF)
DRJI Value: 5.9 (B+)

ISSN 2286-4822
www.euacademic.org

Assessment of Iron Profile in Patients with Diabetes Mellitus Type 2 (DMT2)

ANWAR ALZUBAIR ALBASHEER
Department of Hematology
Faculty of Medical laboratory Sciences Al-Neelain University
Khartoum, Sudan
NASR ELDEEN ALI MOHAMMED GAUFRI[1]
Department of Hematology
Faculty of Medical laboratory Sciences Al-Neelain University
Khartoum, Sudan

Abstract:

Background: *Iron overload is one of a risk factor for diabetes type 2, the correlation between iron profile and diabetes was first documented in pathologic conditions such as hereditary hemochromatosis but high levels of dietary iron also report diabetes risk.*

Objectives: *This study aimed to assess the Iron Profile (S. iron, S. ferritin and TIBC) In Sudanese Diabetes mellitus Type 2 (DMT2) patients.*

Method: *This prospective case control study was conducted in JabelAwliaa Teaching Hospital, Khartoum, Sudan in September 2015.Atotal of 50 patients included in this study were known diagnostic by type 2 diabetes mellitus and other 50 normal healthy control group as control group. Venous blood of all subjects was collected in plain container for iron profiles were measured by using biochemistry analyzer (MINDRAY auto analyzer BS 380) made in (China).Data was analyzed by using SPSS Version 19.*

Result: *A total of 100 participants were enrolled in this study. (50)Sudanese patients diagnosed with diabetes mellitus type 2; 24*

[1] Corresponding author: nasralimohammed@yahoo.com

(48%) of the patients were males and 26 (52%) were females; their mean age ranged between 40-65 years. other (50) normal healthy as control group were similar with patients group. The statistical analysis showed that Serum ferritin was significantly higher the(M±SD 42.05±14.22 with p value 0.04) .the study showed that the TIBC was significantly lower in T2DM patients compared with control was significantly higher((M±SD 277.07±72.01 µg/dl with p value 0.02) .While the serum iron in present study showed that there is no significant different in patient when compared with control group (M±SD 114.4.2±40.20 µg/dl with p value 0.05) .

Conclusion: *This study concluded that the serum ferritin was significantly higher and TIBC was significantly lower in Sudanese DMT2 patients.*

Key words: Iron Profile, Patients with Diabetes Mellitus Type 2 (DMT2)

INTRODUCTION:

Iron is a transitional metal and micronutrient which is essential for several physiological functions in the body. Iron is also a potent pro-oxidant known to catalyze the formation of reactive oxygen species [1].

According to some scientists, systemic iron overload contribute to abnormal glucose metabolism leading to T2DM by insulin deficiency as a result of oxidative stress on pancreatic beta cells leading to cell death and decrease insulin secretion or insulin resistance caused directly by iron overload and hepatic dysfunction [2, 3]. On the other hand, it is increasingly being recognized by few researchers that serum iron influence glucose metabolism even in absence of significant iron overload or even in a state of iron deficiency. Excessive iron stores have been suggested to be associated with higher risk of metabolic disorders including hypertension, metabolic syndrome, and cardiovascular disease [4]. In addition, high iron stores have been proposed to contribute to the development of type 2

diabetes by causing pancreatic beta cells damage and insulin resistance through heightening the level of oxidative stress [5].

Ferritin, a key protein regulating iron homeostasis, is a widely used parameter to evaluate iron homeostasis in the body [6]. Based on the observation that type 2 diabetes is commonly complicated in patients with hereditary hemochromatosis, which is characterized by extremely high levels of circulating ferritin [1], several clinical studies have investigated the association of increased serum ferritin levels with an increased risk of future type 2 diabetes , However, the results were inconsistent between different populations [7].

In the background of this inconsistence between studies, three meta-analyses on the positive association between the elevated serum ferritin levels and the risk of type 2 diabetes have been recently released [8]. However, they mostly included studies conducted in Western populations. Among them, only one meta-analysis included studies conducted in Asian populations [9]. Although all of those studies in Asian populations have reported the consistent positive association between elevated serum ferritin levels and the risk of type 2 diabetes, they were designed in a cross-sectional nature [10]–[11], through which the temporal relationship between exposure and outcome cannot be assessed [12].

OBJECTIVES:

The purpose of this study was to evaluate the iron profile (S. iron, S. ferritin and TIBC) in Sudanese patients with diabetes mellitus type 2 admitted to Jabel Awliaa Teaching hospital, Khartoum, Sudan.

MATERIALS AND METHODS:

Total 100 subjects were enrolled in this study, 50 were known patients diagnosed by diabetes mellitus type 2 as patients

group admitted to Jabel Awliaa Teaching hospital During September 2015. Other 50 normal healthy individuals as the control group were enrolled to participate in this study; 2.5 mL blood sample was collected from each subject into plain containers during the period of steady state. The serum was separated and stored at −20°C until the processing of iron profile was done, which measured using (MINDRAY auto analyzer BS 380) was made in (china).

Statistical Analysis:

Data of this study was collected by structured interview questionnaire and analyzed using statistical package for social sciences (SPSS) version 19.

Ethical considerations:

This study was approved by the faculty of medical laboratory sciences, Alneelain University ethical committee, and informed consent was also obtained from each participant before samples were collection.

RESULTS:

A total of 100 participants were enrolled in this study. (50)Sudanese patients diagnosed with diabetes mellitus type 2; 24 (48%) of the patients were males and 26 (52%) were females; their mean age ranged between 40-65 years. other (50) normal healthy as control group were similar with patients group. The statistical analysis showed that Serum ferritin was significantly higher the(M±SD 42.05±14.22 with p value 0.04) .the study showed that the TIBC was significantly lower in T2DM patients compared with control was significantly higher((M±SD 277.07±72.01 µg/dl with p value 0.02) .While the serum iron in present study showed that there is no significant different in patient when compared with control group (M±SD 114.4.2±40.20 µg/dl with p value 0.05) . Table .1

Table .1 Association of iron profile in patient with DMT2 compared with normal control group.

Parameters	Mean +SD Patients	Mean + SD Control	P. value
S. iron	114.4.2±40.20	102.52± 23.64	0.05
S. ferritin	42.05±14.22	147.64± 68.69	0.04
TIBC	277.07±72.01	212.12± 22.65	0.02

CONCLUSION:

The current study showed a significant correlation between iron profile (S. ferritin and TIBC) and type 2 diabetic mellitus while no correlation in serum iron.

DISCUSSION:

Recent studies shows increase in iron stores (ferritin) predicts the risk of developing type 2 diabetes, while decrease in iron level is protective. Damage caused by iron also triggers the events of chronic diabetes complication, in coronary artery responses and endothelial dysfunction ([13]). Tissue iron excess will increase the production of free radicals which in turn amplifies the steps involved in inflammatory lesion ([14]).

Absorption of non-heme iron by intestine is tightly regulated in keeping with the body requirements. When body iron stores are normal, iron absorption is minimal. Absorption of heme iron does not depend on body iron content. In the steady state, the circulating iron is bound to frettin and is taken up by a high-affinity specific transferrin receptor from the blood. The transferrin-receptor complex is internalized through endocytosis and is released into a cellular compartment which is nonacidic. Here it can be used in the synthesis of essential cellular components ([15]). Insulin rapidly stimulates iron uptake by fat cells and redistributing transferrin receptors to the cell surface from an intracellular membrane compartment, In study done by Salonen et al, serum ferritin had significant positive correlation with plasma glucose,

and serum apolipoprotein B concentration and inversely correlated to serum HDL2 cholesterol levels, all of which are components of insulin resistant syndrome ([16]).

In a study by Nan Hee Kim et al, the serum ferritin had a positive correlation with fasting plasma glucose, BMI, and fasting C Peptide level, an indicator of Hyperinsulinemia ([17]).and this is agree with our study.

The analysis of result revealed that normal serum iron, high serum ferritin was the most common among diabetes mellitus type 2 patients and in agreement with study done by Nan Hee Kim et al, Salonen et al ([18]).

REFERENCES:

1. Rajpathak SN, Crandall JP, Wylie-Rosett J, Kabat GC, Rohan TE, et al. (2009) The role of iron in type 2 diabetes in humans. BiochimBiophysActa 1790: 671–681. doi: 10.1016/j.bbagen.2008.04.005
2. JM Fernandez-Real, A Lopez-Bermejo, W Ricart; Diabetes, **2002**, 51, 2348–2354.
3. A Senghor; N Bharathya; JS Kumar; William E, Balasubramanium.; Int J Bio Med Res ,**2012**, 3(2) ,1609-1611.
4. Ma J, Stampfer MJ (2002) Body iron stores and coronary heart disease. ClinChem 48: 601–603.
5. Opara EC (2004) Role of oxidative stress in the etiology of type 2 diabetes and the effect of antioxidant supplementation on glycemic control. J Investig Med 52: 19–23. doi: 10.2310/6650.2004.12362
6. Jiang R, Manson JE, Meigs JB, Ma J, Rifai N, et al. (2004) Body iron stores in relation to risk of type 2 diabetes in apparently healthy women. JAMA 291: 711–717. doi: 10.1001/jama.291.6.711

7. Montonen J, Boeing H, Steffen A, Lehmann R, Fritsche A, et al. (2012) Body iron stores and risk of type 2 diabetes: results from the European Prospective Investigation into Cancer and Nutrition (EPIC)-Potsdam study. Diabetologia 55: 2613–2621. doi: 10.1007/s00125-012-2633-y
8. Zhao Z, Li S, Liu G, Yan F, Ma X, et al. (2012) Body iron stores and heme-iron intake in relation to risk of type 2 diabetes: a systematic review and meta-analysis. PLoS One 7: e41641. doi: 10.1371/journal.pone.0041641
9. Kunutsor SK, Apekey TA, Walley J, Kain K (2013) Ferritin levels and risk of type 2 diabetes mellitus: an updated systematic review and meta-analysis of prospective evidence. Diabetes Metab Res Rev 29: 308–318. doi: 10.1002/dmrr.2394
10. Shi Z, Hu X, Yuan B, Pan X, Meyer HE, et al. (2006) Association between serum ferritin, hemoglobin, iron intake, and diabetes in adults in Jiangsu, China. Diabetes Care 29: 1878–1883. doi: 10.2337/dc06-0327
11. Sun L, Franco OH, Hu FB, Cai L, Yu Z, et al. (2008) Ferritin concentrations, metabolic syndrome, and type 2 diabetes in middle-aged and elderly Chinese. J ClinEndocrinolMetab 93: 4690–4696. doi: 10.1210/jc.2008-1159
12. Carlson MD, Morrison RS (2009) Study design, precision, and validity in observational studies. J Palliat Med 12: 77–82. doi: 10.1089/jpm.2008.9690
13. Nan Hee Kim et al, Jung Heon Oh, Kyung Mook Choi, Young Hyen Kim and SeiHyuBaik. Serum Ferritin in healthy subjects and type 2 Diabetes patients. Younsei Medical Journal 2000; 41: 387 – 392.
14. Jonathan E Shaw and Donald J Chisholm. Epidemiology and prevention of type 2 diabetes and the metabolic syndrome. Journal of Clinical Endocrinology and Metabolism 2003; 179(7): 379 - 383.

15. James B Meigs, Peter Wilson, Caroline Fox, David M Nathan and Lisa M Sullivan. Body mass index, metabolic syndrome, and risk of Type 2 Diabetes or Cardiovascular Disease. Journal of Clinical Endocrinology and Metabolism 2006; 91: 2906 – 2912.
16. Lo Ohlson, B larrhson, Svardsudd, Welin H Erikson, Bjorn torp and G Tiblin. The influence of body fat distribution on the incidence of diabetes mellitus. 13 years of follow up of the participants in the study of the men born in 1930. Diabetes Care 1985; 34: 1055 – 1058.
17. J.M Fernandar Real, WiferdoRicart, Arroyo, Cabriro. Serum ferritin as a component of insulin resistance syndrome. Diabetes care 1998; 21(1): 62 – 68.
18. Nan Hee Kim, Jung eon ho, Kyung Mook Choi, Sei Hyun Baik, Sang Jin Kim. Serum ferritin in healthy subjects and Type 2 diabetes patients. Yonsei Medical Journal 2000; 41(3): 387 – 392.