بسم الله الرحمن الرحيم

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تم رفع هذه الرسالة بواسطة / سامية زكى يوسف

بقسم التوثيق الإلكتروني بمركز الشبكات وتكنولوجيا المعلومات دون أدنى مسئولية عن محتوى هذه الرسالة.

ملاحظات: لا يوجد

Study of the Relationship between Insulin Resistance, Iron Status Markers and Body Weight in a Sample of Egyptian Population

Thesis

Submitted for Partial Fulfillment of
Master Degree in ***Internal Medicine***

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2022

سورة البقرة الآية: ٣٢

Acknowledgments

First and foremost, I feel always indebted to ***Allah*** *the Most Beneficent and Merciful.*

I wish to express my deep appreciation and sincere gratitude to ***Prof. Dr. Magda Shoukry Hussein****, Professor of Internal Medicine and Endocrinology, Ain Shams University, for her close supervision, valuable instructions, continuous help, patience, advices and guidance. She has generously devoted much of her time and effort for planning and supervision of this study. It was a great honor to me to work under her direct supervision.*

I wish to express my great thanks and gratitude to ***Ass. Prof. Dr. Ahmed Mohamed Bahaa ElDin****, Assistant Professor of Internal Medicine and Endocrinology, Ain Shams University, for his kind supervision, indispensable advice and great help in this work.*

I wish to express my great thanks and gratitude to ***Dr. Amr Mahmoud Mohamed****, Lecturer of Internal Medicine and Endocrinology, Ain Shams University, for his kind supervision, indispensable advice and great help in this work.*

Last and not least, I want to thank all my family, my colleagues, for their valuable help and support

Finally I would present all my appreciations to my patients without them, this work could not have been completed.

Shaimaa Shaaban Hashem

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List of Abbreviations

Abb.	Full term
ADA.	American diabetes association
ASCVD.	Atherosclerotic cardiovascular disease
BMI.	Body mass index
DKA.	Diabetic ketoacidosis
DM	Diabetes mellitus
FPG	Fasting plasma glucose
2hpp	2hour post prandial
GDM.	Gestational diabetes mellitus
GLT.	Glucose load test
HDL.	High density lipoprotein
LDL	Low density lipoprotein
TG	Triglycerides
TIBC	Total iron binding capacity
T.SAT	Transferrin saturation
HOMA-IR	Homeostasis model assessment
WAT	White adipose tissue
BAT	Brown adipose tissue
IR	Insulin resistance
IAAs	Insulin auto antibodies
IADPSG	International Association of Diabetes and Pregnancy Study Groups
ICAs.	Islet cell antibodies
ICD	International classification of diseases

List of Abbreviations cont...

Abb.	Full term
IDDM.	Insulin dependent diabetes mellitus
LADA.	Latent autoimmune diabetes in adults
MODY.	Maturity onset diabetes in young
NHANES.	National Health and Nutrition Examination Survey
NICE.	National Institute for Clinical Excellence
NIDDM.	Non Insulin dependent diabetes mellitus
NIH.	National Institutes of Health

INTRODUCTION

Iron homeostasis is affected by obesity and obesity-related insulin resistance in a many-facetted fashion. On one hand, iron deficiency and anemia are frequent findings in subjects with progressed stages of obesity. On the other hand, hyperferritinemia with normal or mildly elevated transferrin saturation is observed in approximately one-third of patients with metabolic syndrome (MetS) or nonalcoholic fatty liver disease (NAFLD) ***(Elmar Aignar et al., 2014).***

This constellation has been named the "dysmetabolic iron overload syndrome (DIOS)". Both elevated body iron stores and iron deficiency are detrimental to health and to the course of obesity-related conditions. Iron deficiency and anemia may impair mitochondrial and cellular energy and further increase inactivity and fatigue of obese subjects.

Obesity-associated inflammation is tightly linked to iron deficiency and involves impaired duodenal iron absorption associated with low expression of duodenal ferroportin (FPN) along with elevated hepcidin concentrations ***(Elmar aignar et al., 2014).***

Obesity, the most common cause of insulin resistance, is associated with a decreased number of receptors and with post receptor failure to activate tyrosine kinase. Although adiposity and insulin resistance are related, they are not necessarily synonymous, and each may make independent and different contributions to

increasing the risk of cardiovascular disease. Moreover, in obesity, inflammation, with increased accumulation and inflammatory polarization of immune cells, takes place in various tissues, including adipose tissue, skeletal muscle, liver, gut, pancreatic islet, and brain, and may contribute to obesity-linked metabolic dysfunctions, leading to insulin resistance and type 2 diabetes ***(Olatunbosun et al., 2020).***

Leptin and ghrelin are two hormones that have a major influence on energy balance. Leptin is a long-term regulator of energy balance, suppressing food intake and thereby inducing weight loss, while ghrelin is a fast-acting hormone, seemingly playing a role in meal initiation. Obese individuals tend to be leptin resistant; their circulating levels of the anorexigenic hormone leptin are increased, but the levels of the or oxygenic hormone ghrelin are decreased ***(Cui et al., 2017).***

Iron overload is a risk factor for diabetes. The link between iron and diabetes was first recognized in pathologic condit hemochromatosis and thalassemia, but high levels of dietary iron also impart diabetes risk. Iron plays a direct and causal role in diabetes pathogenesis mediated both by beta cell failure and insulin resistance. Iron also regulate metabolism in most tissue involved in fuel homeostasis, with adipocyte in particular serving an iron sensing role***(Simcox andMcClain, 2013).***

Aim of the Work

The aim of this study is to investigate the relationship between insulin Resistance, iron Status Markers and body Weight in a sample of Egyptian population.

DIABETES MELLITUS

Diabetes mellitus (DM) is a group of metabolic disorders characterized by a chronic hyperglycemic condition resulting from defects in insulin secretion, insulin action or both ***(De León and Stanley, 2016).***

The number of people with diabetes has risen from 108 million in 1980 to 422 million in 2014. The global prevalence of diabetes among adults over 18 years of age has risen from 4.7% in 1980 to 8.5% in 2014 ***(Balakumar et al., 2016).***

There are two main types of diabetes mellitus. Type 1 diabetes is insulin dependent diabetes mellitus (IDDM), and is caused by lack of insulin secretion by beta cells of the pancreas. Type 2 diabetes, also called non-insulin dependent diabetes mellitus (NIDDM), is caused by decreased sensitivity of target tissues to insulin which is later followed by decreased secretion of insulin ***(Diaz-Valencia et al., 2015).***

Classification of Diabetes Mellitus:

Diabetes is a heterogeneous complex metabolic disorder characterized by elevated blood glucose concentration secondary to either resistance to the action of insulin, insufficient insulin secretion, or both ***(Herreraet al., 2018).***

The major clinical manifestation of the diabetic state is hyperglycemia. However, insulin deficiency and/or insulin