شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم

HANAA ALY

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جامعة عين شمس

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قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
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HANAA ALY

Association between abdominal wall fat index (AFI) on ultrasonography with carotid intima media thickness (CIMT) and lipid profile

Thesis

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In radiodiagnosis

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List of Abbreviations

ADP .....Air Displacement Plethysmography

AFI .....Abdominal Wall Fat Index

AT.....Adipose Tissue

BIA .....Bioelectrical Impedance Analysis

BIF .....Carotid Bifurcation

BMI.....Body Mass Index

CCA .....Common Carotid Artery

CIMT .....Carotid Intima Media Thickness

CT.....Computed Tomography

CVD .....Cardiovascular Disease

CVS .....Cardiovascular System

DEXA.....dual-energy X-Ray Absorptiometry

EMR .....Eastern Mediterranean Region

HDL .....High Density Lipoprotein

IARC.....Agency for Research on Cancer

IDF .....International Diabetes Federation

LDL.....Low Density Lipoprotein

LT.....Lean Tissue

MRI .....Magnetic Resonance Imaging

MS .....Metabolic Syndrome

OA .....Osteoarthritis

OSA .....Obstructive Sleep Apnea

Pmax .....Maximum Thickness of Preperitoneal Fat

QoL.....Quality of Life

Smin.....Subcutaneous Fat

T2DM .....Type 2 Diabetes Mellitus

List of Abbreviations

TG .....Triglyceride

WC.....Waist Circumference

WHO .....World Health Organization

WHR .....Waist to Hip Ratio

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Abstract

*Background***:** Many international organizations have recognized obesity as a chronic disease, with significant contribution to the global mortality and morbidity. Besides, obese patients are at higher risk of death than non-obese individuals. Obesity is a major driver for disability, early retirement, and psychological disorders as well. Abdominal wall fat index (AFI) is a widely utilized sonographic measure for regional fat accumulation; it is calculated as a ratio of the highest to lowest preperitoneal and subcutaneous fat thicknesses, respectively. Carotid intima media thickness (CIMT) is a well-established marker for early atherosclerosis. In this study we investigated the relationship between abdominal wall fat index (AFI) and carotid intima thickness (CIMT) with lipid profile among overweight and obese patients. *Aim of the study:* Investigating the relationship between abdominal wall fat index (AFI) and carotid intima media thickness (CIMT) as measured by ultrasonography with lipid profile among overweight and obese patients. *Patients and Methods*: We conducted a cross-sectional study on 60 adult participants ranging from 22 to 66 years old of both genders. The patients were divided into three groups according to the AFI value into: group I (AFI <0.7), group II (AFI <1.4), and group III (AFI ≥1.4). AFI and CIMT measured using ultrasonography and lipid profile was obtained. *Results*: Participants in group III (mean =53.7±11.0 years old) were significantly older than other studied groups; and were more likely to be hypertensive and diabetic. There was a statistically significant difference between studied groups regarding body mass index (BMI; p=0.001), the highest level was among group III (mean BMI =34.1±5.8 Kg/m^2). There were positive correlations between lipid profile parameters and the AFI. Furthermore, there was a statistically significant difference between groups regarding CIMT (p=0.001). CIMT was the highest among group III (mean of 1.4±0.3mm), followed by group II (mean of 1.2±0.3mm), and group I (mean of 0.7±0.3mm).CIMT was positively correlated with AFI (r=0.747, p=0.001). BMI was highest among group III (mean of 34.1±5.8), followed by group II (mean of 30.3±4.0), and group I (mean of 25.0±2.2) BMI was positively correlated with AFI (p=0.001). *Conclusions***:** AFI has a significant positive correlation with CIMT and preperitoneal fat thickness. AFI can be a useful marker in evaluating and predicting disorders of metabolism, circulation and atherosclerosis.

Keywords: *abdominal wall fat index; Carotid intima media thickness; Obesity.*

INTRODUCTION

Excess visceral adiposity has been associated with cardio-metabolic abnormalities in the general population, often independently of the quantity of total or subcutaneous fat ***(Lee et al., 2016).***

Obesity is a complex, multifactorial, and largely preventable disease, affecting, along with overweight, over a third of the world's population today ***(Hruby et al., 2015).***

Several studies investigating obesity and its unfavorable effects on health suggest that body fat and especially its distribution in the abdominal region are important determinants of cardio-metabolic risk ***(Segula et al., 2014).***

In particular measuring regional fat layers by accurate imaging techniques may confer incremental information on cardio-metabolic risk as compared to standard anthropometric indices such as BMI and waist circumference ***(Fox et al, 2007).***

The visceral adipose tissue has been shown to contribute to insulin resistance, coronary artery disease, and carotid atherosclerosis ***(Koyashaki et al., 2001).***

Recently showed that visceral fat accumulation contributes to the development of coronary artery disease in non-obese as well as obese subjects and we proposed the term "visceral fat syndrome", in reference to the highly

atherogenic state associated with a cluster of risk factors based on visceral fat accumulation in the general population ***(Nakamura et al, 1994).***

Visceral adiposity plays a more important role in developing obesity-related disorders than overall adiposity, suggesting the obesity-related disorders than overall adiposity, suggesting the particular role of intra-abdominal or visceral fat in metabolic and cardiovascular disease ***(Mahabdi et al, 2009).***

However, ultrasonography can be used to estimate the ratio of the thicknesses of the pre-peritoneal fat layer (extending from the anterior surface of the liver to the linea alba) and subcutaneous fat in the abdomen, which is termed the abdominal wall fat index. This index was comparable with visceral adipose tissue to subcutaneous adipose tissue ratios obtained with CT analysis (visceral adiposity) and it was positively correlated with serum triglyceride levels and inversely correlated with high-density lipoprotein. These results suggest that the abdominal fat index measured by ultrasonography may predict visceral fat deposition and ultimately predict metabolic disorders involving lipid and glucose metabolism ***(Shuster et al., 2012).***

Balci et al, (2010) measured visceral adipose tissue by CT, which is both expensive and exposes patients to radiation.

Furthermore, Ultrasonography was demonstrated to be more accurate than anthropometric measurements for measuring intra-abdominal fat ***(Shabeshari et al., 2013).***

Although computed tomography (CT) and magnetic resonance imaging are excellent tools for quantifying fat tissue areas, the use of these techniques is limited by exposure to ionizing radiation in CT and high costs and limited availability of both CT and magnetic resonance imaging. With the use of a strict protocol, sonography is reliable, reproducible, safe, and convenient method for assessing the amount of intra-abdominal adipose tissue ***(Koda et al., 2007).***

Ito et al. (2004) reported that excess accumulation of fat mass, especially in the upper body, was related to dyslipidemia in normal-weight Japanese individuals. Moreover, intra-abdominal adiposity has been found to be associated with glucose intolerance, elevated triglyceride, low HDL cholesterol levels, and hypertension in both clinical ***(Boyko et al, 1996)*** and population based prospective cohort studies ***(Hayashi et al., 2004).***

Aim of the Work

The objective of this study is to examine whether or not common carotid intima-media thickness (IMT), which is a precursor to preclinical atherosclerosis, is associated with total body fatness or the accumulation of fat mass in the abdominal region and lipid profile.

Chapter (1): Obesity

Definition:

Obesity is abnormal or excessive fat accumulation that presents a risk to health. A crude population measure of obesity is the body mass index (BMI), a person's weight (in kilograms) divided by the square of his or her height (in meters). A person with a BMI of 30 or more is generally considered obese ***(WHO, 2015).***

Prevalence of obesity:

Obesity has been observed throughout human history. Many early depictions of the human form in art and sculpture appear obese. Worldwide obesity has nearly tripled since 1975. In the 20th century obesity became common, so that in 1997 the World Health Organization (WHO) formally recognized obesity as a global epidemic. In June 2013, the American Medical Association classified obesity as a disease with much controversy ***(Hruby et al., 2015).***

In 2016, More than 1.9 billion adults (18 years and older) were overweight and over 650 million of these were obese with the percentage of 39% and 13% respectively. Mean BMI has risen in both men and women since 1975 to 2016 from 21.8% to 24.5. Most of the world's population lives in countries where overweight and obesity kills more people than underweight. 41 million children under the age of 5 were overweight or obese in 2016. Over 340 million children and adolescents aged 5-19 were overweight or obese in 2016 ***(WHO, 2018).***