



**Relation between visceral obesity, Carotid
Intima-Media Thickness and adenovirus 36
among female Adolescents**

A Thesis

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Dr. Walaa saad

Dedication

اهداء

To my mother , my husband , my lovely Son and my little sweetly Daughter, Their presence in my life gaining to me The power and cheering up to wake me up Every morning and continue in life.

“Wishing God bless them for me”.

اهداء الى امى الغاليه وزوجى العزيز واولادى.
الى روح ابنى فى الجنه ان شاء الله.

Dr. Walaa Saad

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

"قَالُوا سُبْحَانَكَ لَا عِلْمَ
لَنَا إِلَّا مَا عَلَّمْتَنَا إِنَّكَ أَنْتَ
الْعَلِيمُ الْحَكِيمُ"

سورة البقرة

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List of abbreviations

Abbreviation	Name
4AAP	4-aminoantipyrine
ADP	Adenosine diphosphate
adv36	Human adenovirus36
AMH	Anti-Mullerian hormone
ApoE	Apolipoprotein E
ARD	Acute respiratory disease
ATP	Adenosine triphosphate
BMI	Body mass index
BP	Blood pressure
CCR7	C-chemokine receptor 7
CCT	Ciliocytophthoria
CHD	Coronary heart disease
CHER	Cholesterol esterase
CHOD	Cholesterol oxidase
c-IMT	Carotid intima-media thickness
CM	Chylomicron
CPE	Cytopathic effect
CRF	Cardiovascular risk factors
CT	Computed tomography
CVD	Cardiovascular disease
DCs	Dendritic cells
DHEA	Dehydroepiandrosterone
DHEAS	Dehydroepiandrosterone sulfate
DL	Dyslipidemia
DM	Diabetes mellitus
E4-ORF1	Early 4 open reading frame 1
ELISA	Enzyme-Linked Immunosorbent Assay
ER	Endoplasmic reticulum

FSH	Follicle-stimulating hormone
GK	Glycerol kinase
Glut4 & Glut1	Glucose transporters
GnRH	Gonadotropin releasing hormone
H₂O₂	Hydrogen peroxide
HDL	High-density lipoproteins
HDLc	HDL Cholesterol
HOMA	Homeostasis model assessment for insulin resistance
HPG	Hypothalamic-pituitary-gonadal
HR	Heart rate
HSKM	Human Skeletal Muscle
HT	Hypertension
HTN	Hypertension
ICAM-1	Intercellular adhesion molecule1
IL-6	Interleukin-6
ILC2s	Innate lymphoid cells
IRS	Insulin Receptor Substrate
LDL	Low density lipoprotein
LH	Luteinizing hormone
LVH	Left ventricular hyper-trophy
MCP-1	Macrophage receptor 1
MetS	Metabolic syndrome
MRI	Magnetic resonance imaging
NAFLD	Nonalcoholic fatty liver disease
NF-B	Nuclear factor-B
OWO	Overweight/obesity
PEGME	Polyethylene-glycol-methyl ether
PI3K	Phosphoinositide 3-kinase
PPARγ	Peroxisome proliferator activated receptor-γ

PVS	Polyvinyl sulfonic acid
SF	Skin fold thickness
SFA	Subcutaneous fat area
T2D	Type 2 diabetes
TNF-α	Tumor necrosis factor-α
VFA	Visceral fat area
VLDL	Very low-density lipoprotein
WC	Waist circumference
WHR	Waist to hip ratio
WHTR	Waist to height ratio

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Carotid Intima-Media Thickness in visceral obese Egyptian female adolescents with adenovirus 36 infection

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Abstract

Background: Increased carotid intima-media thickness (cIMT), a marker of early-onset atherosclerosis, has been observed in obese adolescents. Recently the viral infection increased interest in obesity-related studies, especially adenovirus 36.

Aim: To investigate the relationship between cIMT, visceral obesity and adenovirus 36 infection in female adolescents. **Study Design:** A cross-sectional study included 90 females aged 12-15 years. It was conducted at the "Medical Excellence Research Center (MERC)" of the "National Research Centre" (Approval No.15089), during the period between September 2016 and November 2017. Anthropometric assessment was done. Visceral obesity was measured by abdominal ultrasound. cIMT for both carotid arteries were measured by high-resolution echo-Doppler. Qualitative Human adenovirus 36 antibody was assessed using ELISA.

Results: Girls with visceral obesity had higher frequency of increased cIMT at left (96.2% versus 75%) and right carotid artery (84.6% versus 73.4%), and adenovirus 36 sero-positive antibodies than among those without visceral obesity $p < 0.01$. Visceral obesity; among total sample; had significant positive correlations with BMI, waist and hip circumference. While it had insignificant correlations with age, cIMT at both right and left carotid arteries and adenovirus 36.

Conclusions: The frequency of increased cIMT at left carotid artery was higher among girls with visceral obesity than among those without visceral obesity. Visceral obesity, cIMT at right & left carotid arteries, and Adenovirus-36 had insignificant correlations with each others.

Keywords: carotid intima-media thickness - Visceral obesity – adenovirus 36.