

Obesity and Cardiovascular Risk Factors in Adolescents

**Thesis submitted for partial fulfillment of
Master Degree in Pediatrics**

By

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Dedication

*I dedicate this work to my
parents my wife and my
daughters ((Jana & Judi))*

Acknowledgment

First and foremost, I thank Allah, the most merciful.

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List of Abbreviations

BIA	Bioelectric impedance assay
BMI	Body mass index
BP	Blood pressure
CDC	Centers for Disease Control
CHD	Chronic heart disease
CI	Confidence interval
CIMT	Carotid intima media thickness
CO	Cardiac output
CRP	C-Reactive protein
CVD	Cardiovascular disease
CVS	Cardiovascular system
DEXA	Dual-energy x-ray absorptiometry
DBP	Diastolic blood pressure
DM	Diabetes mellitus
FBS	Fasting blood sugar
GFR	Glomerular filtration rate
HDL	High density lipoprotein
HRV	Heart rate variability
IGF-I	Insulin-like growth factor-I
IL	Interleukin
IMT	Intima-media thickness
IOTF	The International Obesity Task Force
IVS	Inter ventricular septal diameter
IVSd	Inter ventricular septal diameter during diastole.
IVSs	Inter ventricular septal diameter during systole.
LDL	Low density lipoprotein
LVEF	Left ventricle ejection fraction
LVFS	Left ventricle fraction shortening

List of abbreviations

LVID	Left ventricular internal diameter
LVIDd	Left ventricle internal dimension during diastole.
LVIDs	Left ventricle internal dimension during systole
LVM	Left ventricle mass
LVMi	Left ventricle mass index
LVPW	Left ventricular posterior wall diameter
LVPWd	left ventricle posterior wall thickness during diastole
LVPWs	Left ventricle posterior wall thickness during systole.
MCR	Melanocortin receptor
MS	Metabolic syndrome
NAFLD	Nonalcoholic fatty liver disease
PAF	Population attributable fraction
PCOS	Polycystic ovary syndrome
SVR	Systemic vascular resistance
SBP	Systolic blood pressure
TNF	Tumor necrosis factor
Triglyc.	Triglyceride
WHO	World health organization

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Introduction

Introduction

Obesity is becoming a global epidemic; a dramatic increase in overweight among children and adolescents during the past two decades has been documented. Using the international definitions at least 10% of school age children are overweight or obese worldwide, and this is highest in the Americas (32%), then Europe (20%), and the Middle East (16%). The prevalence of obesity in Egypt according to (WHO) in male 22% and in female 45.5 %.(Lobstein et al, 2004) (Burke, 2006) (WHO, 2008)

Increasing prevalence of obesity among children and adolescents has serious implications for their health because it is associated with comorbidities during childhood, as well as increased risk of chronic disease and decreased life expectancy in adult life. Among the diseases for which risk is increased are hypertension, dyslipidemia, the metabolic syndrome, insulin resistance, diabetes, polycystic ovary syndrome, sleep apnea, asthma, endocrine abnormalities, orthopedic disorders, and psychological problems. (Christine et al, 2008)

Cardiovascular disease (CVD) is the leading cause of mortality in the United States and is becoming increasingly important as a cause of mortality worldwide. Obesity is associated with an increase in cardiovascular risk factors in childhood, and it is associated with hypertension, impaired vascular function, dyslipidaemia, atheroma, the metabolic syndrome, systemic inflammation and oxidative stress and left ventricular hypertrophy. (Heart Disease and Stroke Statistics, 2004) (Burke, 2006)

Hypertension occurs more commonly in obese persons at every age. Childhood obesity is the leading cause of pediatric hypertension. Genetic, metabolic, and hormonal factors such as insulin resistance, increased serum aldosterone levels, salt sensitivity, and possibly elevated leptin levels are linked to the hypertension of obesity. (Phyllis et al, 2005)

Increased left ventricular mass is a strong independent predictor of coronary heart disease, stroke, and sudden death in adults.

Left ventricular hypertrophy has also been related to overweight in children. It has been shown that lean body mass, fat mass, and systolic blood pressure were independently associated with left ventricular mass in children and adolescents. Moreover, in children and adolescents with essential hypertension, elevated BMI was associated with severe left ventricular hypertrophy. **(Stephen et al, 2005)**

Increased left ventricular mass (LVM) in obese children and adolescents has been described to be strongly associated with increased values of systolic blood pressure and lean body mass, suggesting that left ventricular hypertrophy (LVH) often reported in obese children and adolescents might represent a compensatory response to increased cardiac workload . **(Chinali et al, 2006)**

Obesity in childhood increases the risk of atherosclerotic disease and death in adulthood. High-resolution B-mode ultrasound measurements of carotid intima-media thickness (IMT) and stiffness are markers of early, preclinical atherosclerosis. Recent evidence suggests an increased arterial stiffness in children with severe obesity. **(Wunsch et al, 2006)(Yang et al, 2007)**

Obesity which is the most common cause of insulin resistance in children is also associated with dyslipidemia (increase total cholesterol and triglycerides), type 2 Diabetes, long term vascular complications, and the metabolic syndrome. **(Stephen et al, 2005)**

So childhood obesity does predispose to endothelial dysfunction, carotid intimal medial thickening, and the development of early aortic and coronary arterial fatty streaks and fibrous plaques. Whether childhood obesity, like adult obesity, increases the risks of myocardial infarction, stroke, and certain malignancies is currently unproved. **(Freedman et al, 2004)**

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Aim of the work

Aim of The work

The study aims at studying impact of obesity on carotid intima- media thickness and left ventricle mass and function.

Hypothesis

1. Obesity is associated with increase intima- media thickness as a measure of sub clinical atherosclerosis.
2. Obesity is associated with increase left ventricular mass.

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Objectives

Study Objectives

1. To study the relationship between obesity and blood pressure, left ventricular mass and function in adolescents.
2. To evaluate intima media thickness at common carotid artery in obese adolescents as a measure of sub clinical atherosclerosis.
3. To evaluate lipid profile and (body fat %) and its relationship to other cardio vascular risk factors.