Myeloperoxidase marker in pre-pubertal and pubertal obese adolescents and its relation with insulin resistance and lipid profile

Thesis

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Faculty of Postgraduate Childhood Studies

Submitted by

Eman Abd-El Aziz Mohamed Medany
M.B.BCH. 2004, M.SC Pediatrics 2011
Faculty of medicine, Ain shams University

Under Supervision of

Dr. Rehab Abdel-Kader Mahmoud
Professor of Pediatrics
Faculty of postgraduate childhood studies
Ain Shams University

Dr. Hanaa Hamdy Ahmed
Professor and Head of Hormones Department
National Research Centre

Dr. Sahar Abd El Aziz Khairy
Professor of Pediatrics
National Nutrition Institute

Dr. Inas Refaei EL- Alameey
Assistant Professor of Health Department
National Research Centre

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Dedication

TO

My mother may God mercy her, I would like to thank her for giving me strength throughout her life and after her death And I thank my family (father, sister, husband, aunt and my son *Abd ELrahman*) who are really behind me And special thanks to Professor *Sahar Hassanein*

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List of Abbreviations

Abbr.		Full-term
ACS	:	Acute coronary syndrome
ACTH	:	Adrenocorticotropic hormone.
AgRP	:	Agouti- related peptide.
AN	:	Acanthosis nigricans
AO	:	Abdominal obesity
ARC	:	Arcuate nucleus.
BBB	:	Blood-brain barrier.
BIA	:	Bioelectric impedance assay
BMI	:	Body mass index
CAD	:	Coronary artery disease
CART	:	Cocaine- and amphetamine-regulated transcript
CI	:	Confidence interval.
CRP	:	C- reactive protein
CT	:	Computed tomography
CVD	:	Cadiovascular diseases.
Cys 153	:	Cysteine 153.
DA	:	Diagnostic accuracy.
DBP	:	Diastolic blood pressure
DEXA	:	Dual – Energy X- ray absorptiometry
DM	:	Diabetes mellitus
FBG	:	Fasting blood glucose.
FDA	:	Food and Drug Administration
GH	:	Growth hormone.
HDL	:	High density lipoprotein
HOCL	:	Hypochlorous acid
HOMA	:	Homeostatic model assessment
HOMA-IR	:	Homeostatic model assessment- insulin resistance
IDF	:	International Diabetes Federation
IGF - BP3	:	Insulin like growth factor binding protein-3
IGF- 1	:	Insulin like growth factor-1.
IR	:	Insulin resistance.

LBM	**:**	Lean body mass.
LDL	**:**	Low density lipoprotein.
Mc4r	**:**	Melanocortin 4 receptor.
MPO	**:**	Myeloperoxidase.
MRI	**:**	Magnetic resonance imaging
MS	**:**	Metabolic syndrome.
MSH	**:**	Melanocyte stimulating hormone
NETS	**:**	Neutrophil extracellular traps
NHANES	**:**	National Health and Nutrition Examination Survey
NO	**:**	Nitric oxide
NPV	**:**	Negative Predictive value.
NPY	**:**	Neuropeptide Y.
OB-R	**:**	Leptin receptor
OGTT	**:**	Oral glucose tolerance test
PCOS	**:**	Polycystic ovary syndrome
POMC	**:**	Pro- opiomelanocortin
PPV	**:**	Positive Predictive value.
PVN	**:**	Para-ventricular nucleus
QOL	**:**	Quality of life
ROS	**:**	Reactive oxygen species
SBP	**:**	Systolic blood pressure
SCFE	**:**	Slipped capital femoral epiphysis.
SE	**:**	Standard error.
SFT	**:**	Skin fold thickness
T2DM	**:**	Type 2 diabetes mellitus
TG	**:**	Triglyceride
TSH	**:**	Thyroid–stimulating hormone
VLDL	**:**	Very low density lipoprotein
W/H ratio	**:**	Waist hip ratio
WC	**:**	Waist circumference
WHO	**:**	World Health Organization
α-MSH	**:**	α- melanocyte stimulating hormone.

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Abstract

Background: Childhood obesity is a condition characterized by the excessive accumulation and storage of fat in the body which negatively affects a child's health. It predisposes to insulin resistance and type 2 diabetes, hypertension, hyperlipidemia, liver, renal and cardiovascular diseases**.** Obese youth are more likely to have risk factors such as high cholesterol and blood pressure. ***Aim:*** To assess the serum MPO levels in obese pre-pubertal children and obese pubertal adolescents and to seek for the correlation between MPO serum level with lipid profile, insulin resistance and criteria of metabolic syndrome. ***Subjects and Methods*****:** divided into two groups of subjects were enrolled in the current study, case (obese) group: fifty children subdivided into 25 prepubertal obese and 25 pubertal obese and control group (normal): twenty five healthy- non obese children divided into 13 pre-pubertal and 12 pubertal group. Subjects with age and sex matched served as control. All participants were subjected to full medical history, anthropometric measurements, clinical examination, blood pressure and laboratory investigations for measuring MPO, lipid panel, CRP, fasting insulin and fasting glucose serum levels. ***Results:*** Obese groups experienced significant elevation in BMI, W/H ratio, blood pressure, cholesterol, TG, LDL, fasting insulin and IR levels. However, HDL showed significant reduction in obese groups versus the non **-**obese control group. MPO revealed significant enhancement in obese pre-pubertal and pubertal groups relative to the non obese control group. MPO positively correlated with W/H ratio, insulin and insulin resistance. According to the receiver-operating characteristics (ROC) curve, MPO seemed to be a good predictor for obesity in pre- pubertal and pubertal individuals as the ROC curve showed cut-off points ranged from 480.0 for pubertal adolescents and 490.0 for prepubertal children. ***Conclusion:*** MPO could be considered as a good marker for insulin resistance and metabolic syndrome associated with obesity in pre-pubertal and pubertal populations.

Keywords: Obesity, Metabolic syndrome, Myeloperoxidase, Prepubertal children, Pubertal adolescents.

Introduction

Obesity is the most prevalent nutritional disorder among children and adolescents. It represents the most serious public health worldwide problem of the present century. In the United States about 21-24% of American children and adolescents are overweight and another 16-18% is obese ***(Ogden et al., 2012).*** As the prevalence of obesity increased, so did the prevalence of the comorbidities associated with obesity as insulin resistance and type 2 diabetes, hypertension, hyperlipidemia, liver, renal disease and reproductive dysfunction. Also increases the risk of adult-onset obesity and cardiovascular disease. For these, it is important that health care providers diagnose overweight and obese children so that counseling and treatment can be provided ***(GBD et al., 2015).***

Childhood obesity was defined according to the international obesity taskforce ***(Cole et al., 2000)*** and based on body mass index (BMI) according to criteria from the World Health Organization (***WHO, 2007***).

Lipid profile is a blood test done to assess the status of fat metabolism in the body and is important in heart diseases. Cholesterol- protein package is called a lipoprotein. Lipoproteins are compounds containing fat and proteins and