



Ain Shams University  
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# **The relationship between Carotid Intima Media Thickness (CMT) and abdominal waist circumference in Metabolic Syndrome compared to BMI**

Thesis

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

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## **ABBREVIATIONS**

<b>2HPP</b> .....	Two-hour postprandial
<b>AACE</b> .....	American Association of Clinical Endocrinologists
<b>ACTH</b> .....	Adrenocorticotrophic hormone
<b>ADA</b> .....	American Diabetes Association
<b>AFCAPS/TexCAPS</b> ...	Air Force/Texas Coronary Athero- sclerosis Prevention Study
<b>AHA</b> .....	American Heart Association
<b>Alpha-MSH</b> ..	Alph-melanocyte stimulating hormone
<b>ALT</b> .....	Alanine aminotransferase
<b>AST</b> .....	Aspartate aminotransferase
<b>ATP III</b> .....	Adult Treatment Panel III
<b>BF%</b> .....	Body Fat Percentage
<b>BMI</b> .....	Body Mass Index
<b>CCA</b> .....	Common Carotid Artery
<b>CHD</b> .....	Coronary heart disease
<b>CHF</b> .....	Congestive Heart Failure
<b>CIMT</b> .....	Carotid Intima Media Thickness
<b>CVD</b> .....	Cardiovascular disease

**EGIR** ..... European Group for Study of Insulin Resistance

**GGT**..... Gamma-glutamyl transpeptidase

**Hs-CRP** ..... High sensitive-C Reactive Protein

**ICA** ..... Internal Carotid Artery

**ICAM**..... Intercellular adhesion molecule

**IDF**..... International Diabetes Foundation

**IFG**..... Impaired fasting glucose

**IGT** ..... Impaired Glucose Tolerance

**IL-1** ..... Interleukin 1

**IL-6** ..... Interleukin-6

**IRS** ..... Insulin resistance syndrome

**M235T** ..... Methionine for Threonine at position 235

**MC4R** ..... Melanocortin 4 receptor

**NCEP**..... National Cholesterol Education Program

**NHANES** ..... National Health and Nutrition Examination  
Survey

**NHLBI**..... National Heart, Lung and Blood institute

**NIH** ..... National institutes of Health

**OGTT** ..... Oral glucose tolerance test

**PAI-1** ..... Plasminogen activator inhibitor-1

**POMC .....** Pro-opiomelanocortin

**RWT .....** Relative wall thickness

**TNF-alpha....** Tumor necrosis factor alpha

**VCAM .....** Vascular cell adhesion molecule

**WC.....** Waist Circumference

**WHO .....** World Health Organization

**WHR.....** Waist Hip Ratio

## **INTRODUCTION**

Metabolic syndrome is a cluster of cardiovascular risk factors such as central obesity, increase body weight, hypertension, dyslipidemias and glucose intolerance. It has been shown to be a predictor of type 2 diabetes, coronary heart disease (CHD) and mortality (*Galal et al., 2009*).

The presence of the metabolic syndrome was identified if three or more of the following categorical risk factors were present: abdominal obesity (waist circumference > 102 cm for men and > 88 cm for women); triglycerides > 150 mg/dl; high density lipoprotein cholesterol < 40 mg/dl for men and < 50 mg/dl for women; blood pressure > 130/85 mm Hg; and fasting glucose > 110 mg/dl or > 6.1 mmol/L (*ATP III, NCEP, 2009*).

The National Cholesterol Education Program (NCEP) Adult Treatment Panel III proposed their widely used clinical definition for metabolic syndrome in 2001 (*ATP III, NCEP, 2009*).

The measuring of waist circumference is also recommended. At any BMI, a higher waist circumference identifies an increased metabolic risk because it takes into account the distribution of adipose tissue. Although the relationship is a continuum, a cut-point of abnormal waist circumference is greater than 102 cm (> 40 inches) for men and