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Original article

Characterization and prevalence of metabolic syndrome among overweight and obese young Palestinian students at An-Najah National University

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ABSTRACT

Objectives: Metabolic Syndrome "MetS" is characterized by the presence of several factors that play a major role in the development of cardiovascular diseases and diabetes mellitus. This study was conducted to establish the prevalence of MetS and its individual components among the overweight and obese students at An-Najah National University (ANU) using IDF and modified NCEP ATP III definition and to identify conditions associated with it.

Materials and methods: A cross-sectional study was conducted in 2016. Data were collected in two stages: first stage included anthropometric and blood pressure measurements for 850 participants. Second stage included a self-administered questionnaire and biochemical analysis for only overweight or obese (154) participants.

Results: The prevalence of overweight and obesity was 26.2%, with significant increase among males (36.4%) compared with females (19.1%). The prevalence of MetS among obese and overweight was (28.6%) according to IDF with no significant increase compared to NCEP ATP criteria (24%). Reduced HDL-cholesterol was the most prevalent component (74.7%) in obese and overweight participants followed by central obesity (72.1%), raised blood pressure (29.9%), elevated fasting blood sugar (24%), and lastly increased triglycerides (18.2%). No significant differences were found between males and females according to both criteria. Moreover, no significant associations with geographic locality, house-hold income, smoking, physical activity, or family history were determined.

Conclusions: The prevalence of MetS among overweight and obese young adult Palestinians was high and demands immediate intervention, given the potential for these adults to develop chronic diseases.

1. Introduction

Metabolic syndrome (MetS) is a multifactorial disease that has been defined as a collection of the most life-threatening metabolic abnormalities that participate in the pathogenesis of cardiovascular diseases and type 2 diabetes mellitus [1]. These abnormalities include central obesity, hypertension, impaired glucose tolerance, and dyslipidemia [2].

Metabolic syndrome is now recognized as a risk factor for many of disorders and systemic diseases [3]. Generally speaking, people with MetS are at increased risk of cardiovascular events [4]. The risk for developing coronary heart disease and stroke maybe threefold higher in people with the syndrome [5]. Moreover, the Macro- and Microvascular complications of Type 2 DM are associated with the aggregation of metabolic syndrome components [6]. The syndrome is also established as a risk factor for primary liver cancer (hepatocellular carcinoma) and a possible one for intrahepatic cholangiocarcinoma [7].

The diagnostic criteria for metabolic syndrome have been the subject of intense debate with groups such as the World Health Organization (WHO), the National Cholesterol Education Program - Third Adult Treatment Panel (modified NCEP ATP III) and the International Diabetes Federation (IDF). It incorporates the key features of hyperglycemia/insulin resistance, central obesity, dyslipidemia and hypertension [13]. So far the diagnostic

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definitions for MetS have been proposed and recommended for adults are modified NCEP ATP III and IDF definitions [1,14].

There are many environmental and genetic influences on body weight and composition that can influence metabolic disorder development [9]. Unhealthy diet and sedentary lifestyle are major contributors to the disorder development [10], as they constitute risks for obesity, which is one of the most alarming health issues worldwide, especially as its prevalence is increasing [11]. According to a cross-sectional survey that was conducted to establish a baseline data on the situation of obesity and overweight among Palestinian adults (18–64 years), obesity was more prevalent in females (31.5%) than males (17.5%), while overweight was more prevalent in males (40.3%) than females (35.5%) [12].

The number of people with metabolic syndrome increases with age, and could vary depending on gender [8], and it is preventable at an early age [15]. Few studies had been conducted in Palestine to determine the prevalence of MetS among adults [10,15] and no studies among young adults. Therefore, this study aimed to characterize and establish the prevalence of metabolic syndrome among adults in West Bank represented by students at An-Najah National University (ANU).

2. Materials and methods

2.1. Study setting

The study was conducted at ANU which is located in the city of Nablus in the north part of Palestine Territories (West Bank) in 2015. The students were from all across the West Bank governorates [16].

2.2. Study design

Across-sectional study that aimed to determine the prevalence of MetS and its components using IDF and modified NCEP ATP III criteria among young Palestinian adults (18–24 years) had been conducted.

2.3. Target population

Students of ANU aged 18–24 years old were recruited to participate in the study. Data were collected over six weeks in March and April, 2015. Participants were excluded if they had participated in the pilot study, have hypo- or hyper-thyroidism, Cushing syndrome, epileptic, or taking regular medications other than anti-diabetic or lipidemic medication, and students who study in Physical Education College since they practice sports more often than students from other colleges, and thus, they are less prone to overweight and obesity [18].

2.4. Sample size and sampling technique

The total number of the participants (19619 in total; 7894 males and 11725 females). Based on previous studies, the prevalence of overweight and obesity among Palestinians in the age group 18–24 years was found to be about (34%) [13]. A 2 stages stratified random sampling technique was used to select the participants in which the sample size was calculated [19] for males (331) and females (336) after which obese and overweight participants were chosen. In the first stage, the participants were divided into 2 administrative groups "males (352) and females (498)". Each participant was given a consent form, and those who approved their participation in the study were chosen randomly and were evaluated for weight, height, waist circumference, and blood pressure. In the second stage: the overweight and obese participants (154 participants) were invited to have blood samples and to fill a questionnaire.

2.5. Data collection

2.5.1. Anthropometric and blood pressure measurements

Weight, height, waist and circumference were measured with the participants wearing light clothing and no shoes [19]. Height was determined to the nearest 0.1 cm and body weight was determined to the nearest 0.1 kg and measured using calibrated electronic digital scale (EB9872, China). Waist Circumference (WC) was measured to the nearest centimeter using nonstretchable tailors measuring tape at the midpoint between the bottom of the rib cage and above the top of the iliac crest during minimal respiration [1]. Body Mass Index was calculated from weight (kg) divided by the squared height (m^2) [17]. Two blood pressure measurements were taken with the subject seated and the arm at heart level, after at least 5 minutes of rest, using standardized mercury sphygmomanometer (TXJ-10, China) with appropriate arm cuff length [18]. The mean of those two determinations was used to express the individual's systolic and diastolic blood pressures.

2.5.2. Venous blood collection and biochemical analysis

Participants who signed the consent and met the inclusion criteria were asked to fast for 12–14 h prior to blood sampling. Venous blood (5–10 ml) was collected from fasting individuals into an EDTA tube by applying WHO guidelines [18] to minimize the possible risks such as bruises, hematomas, and dizziness. Plasma was separated by centrifugation at 3500–4000 rpm for 10 min and was kept at 4C until analysis. The separated plasma was placed in a new tube and analyzed for blood glucose, triglycerides, and HDL. Blood tests were done at An-Najah National University Hospital Laboratory using "Roche Chemistry Analyzer Cobas C 501, using alfa test kits (Alfa Wassermann B.V. Netherland)".

2.5.3. Definition of metabolic syndrome

The definition of MetS according to modified NCEP ATP III demands the presence of 3 out of 5 of the following: Increased waist circumference (>102 cm [>40 in] for men, >88 cm [>35 in] for women), elevated triglycerides (≥150 mg/dl), low HDL cholesterol (<40 mg/dl in men, <50 mg/dl in women), hypertension (≥130/ ≥ 85 mmHg), and impaired fasting glucose (≥100 mg/dl) [14]. On the other hand, IDF defines MetS as the presence of central obesity (defined as waist circumference ≥94 cm for men and ≥ 80 cm for women) plus two of the following: Raised triglycerides ≥150 mg/dL or receiving treatment for this, reduced HDL cholesterol <40 mg/dL in males and <50 mg/dL in females or specific treatment for this, raised blood pressure systolic BP ≥ 130 or diastolic BP ≥ 85 mm Hg or treatment of previously diagnosed hypertension, and raised fasting plasma glucose (FPG) ≥ 100 mg/dL [1].

2.5.4. Questionnaire

A self-administrated questionnaire included personal, demographic, socioeconomic, lifestyle and family history questions, was used [10].

2.5.5. Data analysis

Statistical Product and Service Solutions (SPSS) (version 22, IBM Corporation) was used for data entry and analysis. Participants' characteristics were described using means, standard deviations, and percentages wherever appropriate. The Pearson Chi-square was used to compare the categorical variables. A p-value of less than or equal 0.05 was considered statistically significant.

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