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Metabolic syndrome in rural Bangladesh: Comparison of newly proposed IDF, modified ATP III and WHO criteria and their agreements

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Metabolic syndrome;
International Diabetes Federation;
Adult Treatment Panel III;
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Bangladesh;
Rural population

Summary

Background: The prevalence of metabolic syndrome (MS) differs in different ethnic populations by using different definitions although the applicability of suitable definition for diagnosis of MS yet remains unanswered.
Aim: The aim the study was to determine the prevalence of metabolic syndrome (MS) in Bangladeshi rural population following the new International Diabetes Federation (IDF), modified ATP III and the World Health Organization (WHO) definition, and the concordance of these three criteria's for identifying metabolic syndrome was assessed.
Subjects and methods: The study involved 3981 subjects aged ≥20 years from the rural areas of Bangladesh. Fasting blood glucose (FBG) (n = 3981) and oral glucose tolerance test (OGTT) (n = 3954) were done. Blood lipids (T-chol, triglyceride, HDL-chol) from (n = 3921) were assessed and anthropometry blood pressure were measured from all the subjects.
Results: The prevalence of metabolic syndrome was found to be 20.7%, 11.2% and 8.6% following modified ATP III, IDF and by the WHO definitions, respectively. Using all the three definitions the prevalence was higher in women in all age groups. ATP III and IDF criteria showed good agreement (κ 0.65) compared to ATP III with WHO (κ 0.45) and IDF with WHO (κ 0.20) criteria.
Conclusion: Metabolic syndrome appeared to be highly prevalent in Bangladeshi population. Highest prevalence was observed following ATP III definition. The foremost

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rationale explanation for the higher rate of MS following ATP III seems to be predominant focus on the modified waist circumference for the Asian subjects. However, metabolic syndrome prevalence following WHO criteria in those with impaired glucose regulation is comparable with ATP III definition. Follow-up study is needed to examine the significance of MS following all definitions for the assessment of risk for diabetes and or cardiovascular disease (CVD).

Introduction

The metabolic syndrome is defined as a clustering of key cardiovascular risk factors, namely, abdominal obesity, dyslipedemia, hyperglycemia and hypertension in a single individual [1]. Gerald Reaven introduced the concept of the syndrome in 1988 [2]. Afterwards this constellation of cardiovascular disease (CVD) risk factors has been given a number of names, such as Syndrome X, dysmetabolic syndrome, insulin resistance syndrome and deadly quartet [3,4]. However, till today its' clinical and epidemiological investigation has long been hindered by the absence of internationally accepted criteria for its diagnosis.

To overcome this problem, in 1998, Alberti and Zimmet proposed for the first time a more unified descriptive ''definition'' or clinical criteria for the metabolic syndrome for the World Health Organization (WHO) [5]. In 1999, The European Group for the Study of Insulin Resistance (EGIR) also proposed a similar definition [6]. Both criteria's included insulin resistance, which is not routinely available in clinical practice. Besides, the WHO criterion has not been consistently used because of the requirement to measure serum insulin and urinary microalbumin. In 2001, the Third Report of the National Cholesterol Education Program (NCEP) the Adult Treatment Panel III (ATP III) has proposed a definition using only simple clinical measurements of waist circumference (WC), fasting plasma glucose (PG), triglyceride (TG) and high density lipoprotein cholesterol (HDL-C) levels as well as blood pressure (BP) [7]. The ATP III criteria is more practical and found to be a better predictor of coronary heart disease (CHD) risk in the US population [8]. Unlike WHO criteria [5] microalbuminurea is not required for ATP III criteria. Recently the ATP III definitions for MS were renewed in which the new cut-off waist circumference for the Asia and Pacific Region and new cut-off for fasting glucose was introduced [9].

Recently, International Diabetes Federation (IDF) in 2005 proposed a new world wide definition of the metabolic syndrome [10]. The main focus of this definition is central obesity defined by waist circumference and also considered its specific cut-off value for different ethnic populations as a core component of MS. As evidences suggested major ethnic differences in terms of central obesity and its distribution among Asians metabolic syndrome (MS) at lower degree of obesity [11].

Even though definitions of MS were modified or new definition was introduced, data on the cross-cultural applicability of different definitions in different population is scarce. Moreover, data on the agreement between the definitions of MS (WHO, IDF and ATP III) in different population is even more scare, which make the estimation of MS difficult to compare in different population as well as its suitability.

Prevalence of IFG, IGT and T2D is escalating at an alarming rate in South-Asia especially in India and Bangladesh [12,13]. To the best of our knowledge, population-based epidemiological study on the prevalence of metabolic syndrome in Bangladesh is unknown. Thus we have examined MS prevalence in Bangladeshi population following all three (WHO, IDF and ATP III) definitions and its concordance.

Methods

Study area and population

The study area and population was selected from a rural community 35 miles north of Dhaka city called ''Chandra.'' Ten villages were randomly selected from five areas with a population of approximately 20,000 aged $\geq$20 years. All individuals were given an identification number including a household number. Among those, 5000 subjects were selected following a simple random procedure. We performed a cross-sectional survey among those populations in 2004.

Methods

The details of the study population were described in elsewhere [14]. In brief randomly selected 5000 population (both males and females and aged $\geq$20 years) were invited to participate in the study. Of these 3981 (80% response rate) subjects agreed to participate and were investigated for fasting blood glucose (FBG) and oral glucose tolerance test