Cardiovascular Health Status and Metabolic Syndrome in Adults Living in a Transition European Country: Findings from a Population-Based Study

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Background and Purpose: There are only a few published studies on the relationship between cardiovascular health (CVH) status as proposed by the American Heart Association and the metabolic syndrome (MetS) in persons with cardiovascular disease (CVD). The aim of this study was to assess the prevalence of CVH and MetS and their correlation in the adult population of the Republic of Srpska, Bosnia and Herzegovina, in order to evaluate which set of cardiovascular risk factors (low or medium CVH status and MetS), or the combination of both, is a better predictor for the occurrence of CVD. *Methods:* We included 3601 adults (aged ≥25 years) from the Republic of Srpska National Health Survey 2010. CVH status was evaluated according to the American Heart Association criteria, whereas MetS was defined using the criteria of the National Cholesterol Education Program's Adult Treatment Panel III. *Results:* The prevalence of low or medium CVH status and MetS is significantly higher in participants who had experienced CVD than in those free of CVD. Our study showed that predictors for CVD occurrence were presence of MetS (odds ratio 3.61, 95% confidence intervals 2.14-6.07) and presence of both sets of cardiovascular risk factors in the same person (odds ratio 4.23, 95% confidence intervals 1.50-11.93). *Conclusion:* Our results suggest that presence of both sets of cardiovascular risk factors (low or medium CVH status and MetS) is the strongest predictor of CVD. Identification of individuals with cardiovascular risk factors may provide opportunities to intervene earlier and can help reduce the risk of developing CVD. **Key Words:** Cardiovascular disease—cardiovascular disease risk factors—cardiovascular health status—epidemiology—metabolic syndrome.

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Introduction

Cardiovascular disease (CVD) is the largest single contributor to global mortality. According to the World Health Organization (WHO), 17.5 million people die each year from CVD, representing 31% of all deaths worldwide.[1,2] About 80% of all CVD deaths are due to heart attacks and strokes.[1]

Despite decrease in CVD mortality rates in many developed countries in the last few decades,[3] CVD remains the most important cause of death in developing countries and over three quarters of all CVD deaths occurs there.[3,4]

CVD also causes disability. If no action is taken to improve cardiovascular health (CVH) and current trends continue, WHO estimates that 25% more healthy life years (disability-adjusted life year) will be lost to CVD globally by 2020.[1]

CVD is the leading cause of death and disability in the Republic of Srpska (RS),[5] 1 of 2 constitutional entities of Bosnia and Herzegovina (BH), a middle income Southeastern European country. The most up-to-date data on CVD in Europe show that BH with age-adjusted CVD mortality rates of 474.7 per 100,000 males and 385.4 per 100,000 females is among countries with middle rates.[3]

It is well known that CVD is related to the prevalence of classical cardiovascular risk factors, especially to lifestyle factors such as the use of tobacco, unhealthy diet, physical inactivity, and stress,[6] and that having more than 1 risk factor tends to increase the risk of CVD disease.[7-9]

Exact assessment of specific cardiovascular risk factors in each country is required to reduce the burden of CVD.

There are at least 2 well-defined sets of cardiovascular risk factors. The first set, the metabolic syndrome (MetS), is the cluster of abdominal obesity, increased glucose level, abnormal lipids, and elevated blood pressure (BP). The presence of MetS is associated with an increased risk of CVD and diabetes mellitus type 2.[8-10] The second set of cardiovascular risk factors which includes a number of health behaviors (smoking, body mass index [BMI], physical activity, and diet) and health factors (BP, total cholesterol [TC], and fasting blood glucose [FBG]) was coined by the American Heart Association.[11] A recently performed meta-analysis suggests that ideal CVH metrics are inversely associated with risk of cardiovascular mortality, coronary heart disease, and stroke.[12]

The aim of this study was to assess the prevalence of both abovementioned sets of cardiovascular risk factors and their correlation in the adult population of the RS with and without CVD (ischemic heart disease and stroke) to determine which set of risk factors, or the combination of both, is associated with the occurrence of CVD.

Methods

Study Design and Participants

This cross-sectional study utilized data collected in the 2010 National Health Survey in RS, BH. The methods have already been described in detail elsewhere.[13]

In brief, 4673 adults aged 18 years or older have been identified in the randomly selected households, out of which 4170 were interviewed yielding a response rate of 89.2%. For the purpose of the present study we used the sample of participants aged 25 years or older (n = 3601). All participants were interviewed and underwent physical examinations (anthropometric and BP measurements, as well as blood tests) at home by a trained staff.

Information on demographic (age, sex, marital status and type of settlement), socioeconomic (education and employment status), and lifestyle characteristics (smoking, physical activity, and diet) was collected using standardized questionnaire.

Self-perceived health status was measured by a single question on an individual's perception of his or her own health (poor, average, and good), whereas self-reported diagnosis of CVD (stroke or ischemic heart disease) was recorded if the respondent had ever been told by a doctor of a diagnosis of CVD.

All participants gave written informed consent prior to inclusion in the survey. The study was approved by the Ethics Committee of the Public Health Institute of RS.

Assessment of Cardiovascular Health Status

CVH status of all participants was evaluated according to the American Heart Association criteria.[11] Seven CVH metrics were classified into "ideal," "intermediate," or "poor" as the following: (1) smoking: ideal (never or quit >1 year), intermediate (former, quit ≤1 year) and poor (current); (2) BMI: ideal (<25 kg/m^2), intermediate (25-29.9 kg/m^2), and poor (≥30 kg/m^2); (3) physical activity: ideal (active), intermediate (moderately active), and poor (inactive); (4) healthy diet score (HDS): ideal (≥26 points), intermediate (HDS 21-25 points), and poor (HDS <21 points); (5) TC: ideal (<200 mg/dL, untreated), intermediate (200-239 mg/dL or treated to goal), and poor (≥240 mg/dL); (6) BP: ideal (SBP <120 mm Hg and DBP <80 mm Hg, untreated), intermediate (SBP 120-139 mm Hg or DBP 80-89 mm Hg, or treated to goal), and poor (SBP ≥140 mm Hg or DBP ≥90 mm Hg); and (7) FBG: ideal (<100 mg/dL, untreated), intermediate (100-125 mg/dL or treated to goal), and poor (≥126 mg/dL). To examine the overall effects of these health metrics, we created CVH score (CVHS). Each of the 7 CVH metric was given a point score of 0, 1, or 2 to represent poor, intermediate, or ideal CVH, respectively. Based on the sum of all 7 CVH metrics an overall CVHS was calculated ranging from 0 (all CVH metrics at poor levels) to 14 (all CVH metrics at ideal levels), and then categorized into low (0-4), medium (5-9), or high (10-14) CVH.

Assessment of Metabolic Syndrome

MetS was defined using the criteria of the National Cholesterol Education Program's Adult Treatment Panel III.[14] Participants with 3 or more of the following criteria were defined as having the MetS: (1) abdominal obesity given as