



ORIGINAL ARTICLE

Composition of Metabolic Syndrome Among Korean Adults in a Lifestyle Modification Intervention

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Abstract

Objectives: The aim of this study was to examine the composition of metabolic syndrome (MetS) components among middle-aged and older Koreans.

Methods: A total of 263 participants (age 40 + years) in a lifestyle modification intervention program who met the MetS definition of National Cholesterol Education Program (NCEP) – Adult Treatment Panel (ATP) III criteria were included in the study. The frequent patterns and clustering of MetS components were investigated. Clustering of changes in individual components, through a lifestyle modification intervention, was also identified. All characteristics were stratified by and compared between sexes.

Results: Approximately 80% of the participants had three of five MetS risk factors at baseline. The prevalence of each risk differed by sex. MetS composition patterns that do not include low high-density lipoprotein (HDL) cholesterol were more noticeable in men because of the low prevalence of low HDL cholesterol. In women, with higher prevalence of low HDL cholesterol, more patterns that include low HDL cholesterol were observed. The most common combination was “elevated blood pressure + abdominal obesity + impaired fasting glucose” in both sexes. Clustering of MetS risks was also found with most of the frequent combinations of MetS components. Through the lifestyle intervention, the greatest change was observed in HDL cholesterol among men and blood pressure among women. Triglycerides and HDL cholesterol were likely to be improved with blood pressure in men and abdominal obesity in women.

Conclusion: Differences in the prevalent patterns of MetS compositions were observed prior to and after the intervention, along with during-intervention changes. It is recommended that intervention strategies and guidelines for MetS management consider the MetS composition patterns for effectiveness.

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1. Introduction

Metabolic syndrome (MetS) refers to a cluster of underlying, major, and emerging risk factors associated with increased incidence and mortality of cardiovascular diseases. The prevalence of MetS has been increasing globally, although its characteristics vary widely by demographic and environmental factors [1]. It also carries a high socioeconomic burden owing to the higher prevalence of comorbidities [2]. Because the rapid increase of MetS cases in Western countries has been a serious public health concern in the past decade, the epidemic of MetS has been considered an important public health problem in most Asian countries, with increasing prevalence [3,4]. Asians are more likely to have a high risk of type 2 diabetes and cardiovascular diseases at lower body weight or smaller waist circumference than Caucasians [5,6].

The prevalence of MetS has been increasing in Korea. The age-standardized prevalence of MetS was 31.3% in 2007, from 24.9% in 1998, and this figure is expected to increase significantly [3]. The percentage of Korean adults older than 30 years who were reported to have MetS is approximately 30% [7]. Among the five parameters of MetS, it is estimated that 73.7% of Koreans have at least one of them at an abnormal level. Over a 10-year period, the prevalence of low HDL cholesterol in Koreans increased the most, by 13.8%. This was followed by the prevalence of abdominal obesity (by 8.7%) and hypertriglyceridemia (by 4.9%).

Given the definitions of MetS, most etiological studies and intervention programs dealt with their data by considering MetS as a whole rather than exploring the contributions or effects of its individual components [8]. However, there were several previous studies conducted to identify the central features of MetS such as associations and clustering of components in MetS using the exploratory factor analysis.

From two to four factors were usually found with strong intercorrelations among the components of MetS, which were hyperinsulinemia loaded with one or more MetS components such as obesity, hyperglycemia, or dyslipidemia [9]. There were several trials whose aim was to identify a major factor that had a central role among MetS components. Insulin resistance has been known as a primary cause of MetS [10,11], but the results have not been consistent and are still controversial. Different patterns of clustering were found especially with different ethnic groups. A few Korean studies also attempted to identify the dominant components among MetS risk factors. It has been reported that insulin resistance is not the only contributor to MetS. Among Koreans, it was shown to have a strong intercorrelation with other MetS components [9,12]. However, grouping of contributing factors to MetS might differ by the variables entered in the analysis, and the analyses were limited to small sections of an urban district of Seoul.

The aim of this study was to examine the composition of MetS components from randomly selected nationwide samples in a lifestyle intervention program for Korean middle-aged and older adults. Changes and the remaining risk factors in MetS components after the intervention and clustering of changes were investigated as well to provide any suggestions to help develop the intervention guidelines for MetS management. All characteristics were stratified by and compared between sexes.

2. Material and methods

2.1. Study data

A total of 263 Korean participants aged 40 years and older in a lifestyle modification intervention program for MetS at Korea Association of Health Promotion (KAHP) in 2011 are included in the study. The participants were diagnosed with MetS at one of the 16 regional branch health facilities of KAHP based on a definition of the National Cholesterol Education Program (NCEP) - Adult Treatment Panel (ATP) III criteria for MetS with the Asia Pacific standard for abdominal obesity [13]. That is, middle-aged and older adults are diagnosed to have MetS if they meet three or more of the following five criteria: (1) elevated blood pressure: systolic blood pressure ≥ 130 mmHg and diastolic blood pressure ≥ 85 mmHg; (2) abdominal obesity: waist circumference > 90 cm for men or > 80 cm for women; (3) impaired fasting glucose: fasting glucose ≥ 100 mg/dL; (4) elevated triglyceride: triglyceride ≥ 150 mg/dL; and (5) low high-density lipoprotein (HDL) cholesterol level: HDL cholesterol < 40 mg/dL for men or < 50 mg/dL for women. Intervention participants were not in treatment or on medication for MetS-related health conditions such as hypertension, dyslipidemia, and diabetes, and they signed consent forms for participating in the study.

This theory-based 12-week multicomponent intervention consisted of individual health counseling, health education classes, and a booklet and newsletters for self-management. One-on-one health counseling was provided every week by trained dietitians working at the health facilities where the participants had been screened. The participants set behavioral goals and strategies for their healthy lifestyle including dietary behaviors, physical activity, smoking, alcohol drinking, and stress management. Five clinical and anthropometric outcomes for MetS were measured by trained research assistants among the participants at baseline and after the intervention (12 weeks from the baseline). The study protocol was approved by the Institutional Review Board of the KAHP (IRB No. 10-B-01), and informed consent was obtained from all participants.

2.2. Study design

Baseline sociodemographic data and MetS characteristics of the study population were reported and

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