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METABOLIC SYNDROME, DIETARY INTAKE, AND FOOD HABITS IN PATIENTS WITH AND WITHOUT CORONARY HEART DISEASES: FIRST COMMUNICATION

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Abstract

Heart diseases and stroke cause most deaths in the developed world. There are several age, sex, and race related regularities in mortality from cardiovascular diseases (CVD). The continuing rise in prevalence of obesity and metabolic syndrome (MS) in many countries constitutes a serious threat to public health, increasing mortality, disability, and health care costs. The dietary habits create serious health concerns, including obesity, hypertension, diabetes, cardiovascular diseases, and even some types of cancer.

The aim of this study is to determine the relationship between MS, dietary intake, and food habits in patients with and without coronary heart diseases in Yerevan Health Care Centers.

The present study is conducted among patients of the Yerevan State Medical University hospitals and polyclinics. Usual dietary intake is assessed with the use of a semi-quantitative Food Frequency Questionnaire (FFQ). Serum chemistry values are determined at the hospital laboratories. Food habits and life style information are collected using a general questionnaire; anthropometric indices and blood pressure are measured by appropriate methods. Data collected from totally 640 patients is subject to be analyzed using appropriate parametric and non-parametric tests. Modern software for statistical analyses are used (SPSS, Epi Info 2000, etc.).

The present communication is the first to reflect our study; the most important outcomes will contribute to health policy making in the public awareness programs on preventive measures of MS and CVD in Armenia.

Keywords: Coronary heart disease, metabolic syndrome, dietary intake, Food-Frequency Questionnaire.

INTRODUCTION

Diseases of heart and the stroke cause most deaths in the developed world. Mortality from all heart diseases increases with age in all races in the USA. There are several age, sex, and race related regularities. Until the age of 65 years, black men have the highest rates of coronary heart disease (CHD) deaths; thereafter white men have the highest rates. Black women have higher rates than white females at all ages [*Mahan K., Escott-Stump S., 2008*]. Each year 600,000 Americans have a stroke, and 159,000 die of stroke. Strokes account for 17% of cardiovascular disease (CVD), and rates of death are 35% higher in blacks than in whites [*Linda K., 2001*]. Persons with the metabolic syndrome (MS) are at a greater risk of CVD [*Azadbakht L. et al., 2005; Esposito K. et al., 2007*]. The continuing rise in prevalence of obesity and MS in the USA constitutes a serious threat to public health, increasing mortality, disability, and health care costs [*May A. et al., 2008*].

As recommended by the American Heart Association/National Heart, Lung, and Blood Institute (AHA/NHLBI) "metabolic syndrome" is defined as the presence of three or more of the following components [*Mahan K., Escott-Stump S., 2008*]:

1. abdominal adiposity (waist circumference > 88 *cm*);
2. low serum HDL cholesterol < 40 *mg/dL* (1.03 *mmol/L*) in men and <50 *mg/dL* (1.3 *mmol/L*) in women;
3. high serum triacylglycerol (≥150 *mg/dL*);
4. elevated blood pressure ≥130 (systolic)/ ≥85 (diastolic) *mm Hg*; and
5. abnormal glucose homeostasis (fasting plasma glucose≥100 *mg/dL*).

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The prevalence of obesity is rapidly increasing in western populations, causing a parallel rise in the prevalence of MS. The incidence of obesity in developed countries is increasing at an alarming rate with a subsequent public interest in dietary strategies to reduce body weight and thereby reduce cardiovascular disease risk [*Muzio F. et al., 2007*].

In 2004, the Centers for Disease Control and Prevention (CDC) estimated that as many as 64 million Americans or 27% of the USA population, have MS and it carries a greater risk of type 2 diabetes and CVD [*Katcher H., 2008*].

The term "metabolic syndrome", since the work of G.M. Reaven, refers to the state, at which metabolic risk factors are clustered in persons. This syndrome is emerging as one of the major medical and public health problems in the USA and worldwide, and persons with this syndrome have an increased risk of morbidity and mortality due to cardiovascular disease and diabetes [*Esmaillzadeh A. et al., 2006*].

Dietary intake and food habits are recognized to play important roles in metabolic conditions such as obesity, diabetes, hypercholesterolemia, and cardiovascular diseases, as well as risk of cancer [*Esposito K. et al., 2007; Ding E., Malik V., 2008*]. Lifestyle changes such as diet, weight loss, and exercise are the first line of treatment for MS; however, the optimal diet composition is debated [*Katcher H. et al., 2008*]. The dietary habits of Americans are creating serious health concerns, including obesity, hypertension, diabetes, cardiovascular disease, and even some types of cancer [*Moore T. et al., 2008*].

A. Shin and co-authors (2009) evaluated the association between the intake frequencies of certain food groups, eating habits, and the risk of MS in a cross-sectional study of Korean men. Study participants were recruited from the National Cancer Center in South Korea, totally 7,081 men aged 30 years and older. The association of MS and socio-demographic characteristics, food intake frequencies, and eating habits assessed by a Food Frequency Questionnaire was examined. The prevalence rate of MS for men aged 30 to 39, 40 to 49, 50 to 59, and 60+ years was 18.2%, 19.8%, 21.9%, and 20.5%, respectively. The study participants with MS had significantly higher family history of type 2 diabetes mellitus, and were more likely to be current smokers than their counterparts. Among food group items, participants with MS showed significantly higher intake of seaweed, and oily foods than participants without MS. In addition, the group with MS was more likely to eat quickly and to overeat frequently. In contrast, high fruit intake may be associated with a lower risk of MS. The importance of dietary habits in MS development needs to be pursued in further studies.

F. Muzio and associates (2007) compared the effects of 2 diets on cardiovascular disease risk factors in obese patients with MS. The study was carried out in 100 patients randomly assigned to either a diet relatively rich in carbohydrate, 65% of energy as carbohydrate, 13% as protein, and 22% as fat (17% as unsaturated fat), or a diet that was low in carbohydrate and high in protein and in monounsaturated fat, 8% of energy as carbohydrate, 19% as protein, and 33% as fat (24% as unsaturated fat). All patients completed the 5-month study. At the end of the study, all the components of MS (except HDL, which did not change) decreased significantly in both groups. With the high-carbohydrate diet, a significant decrease in LDL-cholesterol concentrations was also observed. Although the extent of the resolution of the MS was not different between groups, the low-carbohydrate diet was associated with a greater decrease in the prevalence of hypertension and hypertriacylglycerolemia. Tailoring diet interventions to the specific presentation of the MS may be the best way of reducing the risk factors for cardiovascular disease.

N. Babio and associates (2009) evaluated the relationship between adherence to the Mediterranean diet (MedDiet) and MS. A cross-sectional study was conducted with 808 high cardiovascular risk participants of the Reus PREDIMED Centre. An inverse association between quartiles of adherence to the MedDiet and the prevalence of MS was observed. After adjusting for age, sex, total energy intake, smoking status and

physical activity, participants with the highest score of adherence to the MedDiet had the lowest odds ratio of having MS of 0.44 compared to those in the lowest quartile. Participants with the highest MedDiet adherence had 47 and 54% lower odds of having low HDL-C and hypertriglyceridemia, MS criteria, respectively, than those in the lowest quartile. Some components of the MedDiet, such as olive oil, legumes and red wine were associated with lower prevalence of MS. Higher adherence to a MedDiet is associated with a significantly lower odds ratio of having MS in a population with a high risk of cardiovascular disease.

D.B. Panagiotakos and co-workers (2007) evaluated the associations between foods or food patterns and the characteristics of the MS. Participants without any clinical evidence of cardiovascular disease, including, 1,514 men (aged 18 to 87 years) and 1,528 women (aged 18 to 89 years), were randomly enrolled from the Attica region in Greece. Dietary habits were evaluated using a semi-quantitative Food Frequency Questionnaire. Characteristics of the MS (i.e. blood pressure, waist circumference, glucose, triglycerides, and high-density lipoprotein cholesterol) were also measured. Principal components analysis was applied to extract dietary patterns from 22 foods or food groups. Multivariate regression analysis evaluated the associations between the extracted dietary patterns and characteristics of the MS. Six components were derived explaining 56% of the total variation in intake. Component 1 was characterized by the consumption of cereals, fish, legumes, vegetables, and fruits; component 2 was characterized by the intake of potatoes and meat, component 6 was characterized by alcohol intake, whereas the other components were mainly characterized by consumption of dairy and sweets. After adjusting for various confounders, component 1 was inversely associated with waist circumference, systolic blood pressure, triglycerides, positively associated with high-density lipoprotein cholesterol levels, and inversely with the likelihood of the MS, whereas components 2 and 6 were positively correlated with the previous indexes, and the likelihood of having the MS. A dietary pattern that includes cereals, fish, legumes, vegetables, and fruits was independently associated with reduced levels of clinical and biological markers linked to the MS, whereas meat and alcohol intake showed the opposite results.

G.L. Ambrosini and co-authors (2009) examined dietary patterns, CVD risk factors, and the clustering of these risk factors in 1139 14-year-olds living in Western Australia. The dietary intake was assessed using a Food Frequency Questionnaire. Two dietary patterns, "Western" and "Healthy", were identified using factor analysis. Associations between these dietary patterns and BMI, waist circumference, systolic blood pressure, fasting levels of serum glucose, insulin, total cholesterol, HDL-C, LDL-C, triglycerides and insulin resistance were assessed using ANOVA. Cluster analysis identified a high-risk group (the "high risk metabolic cluster") with features akin to adult MS. Belonging to the "high risk metabolic cluster" was examined in relation to dietary patterns using logistic regression, adjusting for aerobic fitness and socio-demographic factors. Higher "Western" dietary pattern scores were associated with greater odds for the "high risk metabolic cluster" and greater mean values for total cholesterol, waist circumference, and BMI in girls, but not boys. Scores for the "Healthy" dietary pattern were not related to the "high risk metabolic cluster", but were inversely associated with serum glucose in boys and girls and were positively associated with HDL-C in boys. Dietary patterns are associated with CVD risk factors and the clustering of these risk factors in adolescence.

Although the MS as a significant risk of chronic heart diseases became one of the major medical and public health problems well studied and analyzed in different countries, no reliable data about MS is available in Armenia. Meanwhile, the problem is specific for regions depending on local dietary habits, traditions, culture, etc. Therefore, the aim of this study is to determine relationship between MS and dietary intake and food habits in patients with and without CHD. The obtained results will support developing specific culturally acceptable and relevant MS risk reduction intervention program.

MATERIAL AND METHODS

Participants: This Observational Case-Control study is conducted in the group of patients at the Yerevan State Medical University hospitals and polyclinics, a minimum of 640 patients (320 cases with CHD and 320 controls without CHD) are invited to participate in the present study. The inclusion criteria are as follows: patient, who attends the Yerevan State Medical University hospitals and polyclinics for check up and age above 30 years. The exclusion criteria are as follows: current pregnancy, a history of systemic disease according to the medical records, recent myocardial infarction (MI) according to the medical records, previous history of admission for angiography, previous history of any kind of heart surgery or angioplasty for CAD. The study protocol is approved by the Bioethics Committee of the Yerevan State Medical University after M. Heratsi. The participants will be enrolled in the study after obtaining their signed informed consent form.

Data collection: Special general semi-structured questionnaire to reveal details of lifestyle and dietary habits was developed. The questionnaire was grouped into several relatively homogeneous blocks and consists of the general identifying questions, education, family history, history of diseases, prescribed medications intake. The block of lifestyle questions was about smoking and alcohol use, physical activity, character of work, leisure time, and food habits, etc. Separate semi-quantitative Food-Frequency Questionnaire (FFQ) translated from English and adapted to local food and dietary intake is used. The questionnaires was pre-tested prior to data collection as to ensure appropriateness, clarity, and interpretation of the instruments.

Assessment of dietary intake: Usual dietary intake is to be assessed with the use of semi-quantitative FFQ. The FFQ consists of a list of approximately 135 items of food and beverage with a standard serving size commonly consumed by Armenians. Participants are asked to report their frequency of consumption and portion sizes of each food item during the previous month on a daily (egg, bread), weekly (egg, rice or meat, vegetable, fruit), or monthly (egg, fish) basis using household measures.

Assessment of other variables: Body weight is measured while subjects are wearing light clothing and no shoes by using digital scales and is to be recorded to the nearest 100 g. Height is measured with a tape measure while the subjects are in a standing position and not wearing shoes and while the shoulders are in a normal position. Body mass index (BMI) is calculated. Waist circumference is measured at the narrowest level between the lowest rib and the iliac crest and hip circumference is measured at the maximum level over light clothing, with the use of a nonstretch tape measure without any pressure to body surface. Measurements will be recorded to the nearest 0.1 cm. Serum chemistry values are to be determined in the hospital laboratory. Fasting blood samples for the measurement of glucose and lipid concentrations should be drawn after an overnight fast of 12 h. Blood glucose, triacylglycerols, HDL cholesterol are measured in a biochemical unit of the hospital clinical laboratory using standard kits. Blood pressure should be measured twice with a standard mercury sphygmomanometer after the participants sat for 15 min; the mean of the 2 measurements is considered to be the participant's blood pressure.

Statistical analysis: Special database is developed to store and analyze obtained data. Data collected through the questionnaire, clinical examinations and laboratory findings should be entered into database and analyzed using appropriate parametric and non-parametric tests. Modern software for statistical analysis will be used (SPSS, Epi Info 2000, etc.)

CONCLUSION

The present communication is the first to reflect our study; the most important research findings will contribute to health policy making through public awareness programs to develop preventive measures of MS and CVD in Armenia.

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