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Original article

Nutritional factors and metabolic variables in relation to the risk of coronary heart disease: A case control study in Armenian adults

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ABSTRACT

Introduction: Dietary factors can affect the coronary heart disease (CHD). Results of previous studies on the association between the diet and CHD are not consistent in different countries. There were no data on this association in Armenia.
Objective: Aims of this case-control study were to evaluate the association between nutritional factors and CHD among Armenians in Yerevan.
Methods: During 2010 and 2011, we randomly selected 320 CHD patients with a diagnosis of CHD less than 6 months and 320 subjects without CHD (≥30 years old) from the hospitals and polyclinics in Yerevan. Dietary intakes with 135 food items over the previous 12 months were evaluated using a semi-quantitative food frequency questionnaire.
Results: After adjusting for some CHD risk factors higher intakes of polyunsaturated fatty acids (PUFA) and monounsaturated fatty acids (MUFA) were associated with a reduced risk of CHD, while this association was not witnessed for saturated fatty acids (SFA). In addition, findings indicated an inverse relation between vitamins (E, B6 and B12, folic acid) and fiber with CHD. In this population, smoking, hypertension, and metabolic syndrome (MetS) were significantly more common among patients with CHD.
Conclusion: The intake of vitamins E, B6 and B12, folic acid, PUFA, MUFA and fiber appeared to be predictors of CHD, independently of other risk factors.

1. Introduction

Dietary intakes are recognized to play prominent roles in the prevention and treatment of coronary heart disease (CHD) [1]. Awareness of dietary changes as a strategy is the most useful for both primary and secondary prevention of coronary risks [2]. The study of the relationship between dietary factors and CHD has been focused largely for almost half a century [3]. In prospective cohort studies dietary risk factors such as high saturated fatty acids (SFAs) [4–6], trans-fatty acid [7], low in marine omega-3 fatty acids, fiber, legume [8], vegetable and fruit have been well-established [3,9]. In addition, during the past decade, in numerous studies dietary factors have been associated with CHD risks such as the blood pressure [10,11], waist-to-hip ratio [11], dyslipidemia [12], and metabolic risk factor [13,14]. Despite decades of interesting researches, the association between dietary fat, particularly, its quantity and quality, and the risk of CHD is a subject of debate. In line with the same argument, prospective cohort studies have investigated the association between the CHD incidence and intake of total dietary fat with discrepant findings [4,15].

Evidence that the dietary intake of B vitamins is a protective risk factor for cardiovascular disease (CVD) remains limited. The Japan Public Health Center-based Prospective Study indicated that CHD was inversely associated with the dietary intake of folic acid, vitamin B6 and vitamin B12 after adjustment for the age and sex [16].

Epidemiological studies have not been entirely consistent with regard to the relationship between the intake of antioxidant vitamins and CVD [17]. Also, the preventive effect of antioxidant supplementation on cardiovascular events in humans is unproven [16,18,19]. However; few studies have examined the potential effect of the mixture of these vitamins [16,20]. The combination of multiple dietary factors is more powerful than a single factor [21].

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Recently, in a reviewed study from large cohort studies in Japan, investigators have reported that adequate control of total energy with restriction of SFAs from animal foods, increased intake of *n*-3 polyunsaturated fatty acids (PUFAs) including fish, soybean products, fruit and vegetable together with the low salt intake are responsible for promoting CHD prevention [2]. To the best of our knowledge, no previous study has looked at the association between dietary intake of nutrients and metabolic variable with CHD in the Armenia Adults. The objective of this study was to investigate nutritional factors and the metabolic variable in relation to the risk of CHD in this population.

2. Materials and methods

2.1. Participants

This observational case-control study was conducted from March 2010 to February 2011 in the Yerevan State Medical University (YSMU) hospitals and polyclinics, Patients aged ≥ 30 years as the case group ($n = 320$) with established CHD identified by cardiologists and for control ($n = 320$) were individuals aged ≥ 30 years without CHD who attended for check-up in hospitals and polyclinics in Yerevan. Subjects with previous history of myocardial infraction (MI), admission for angiography, heart surgery or angioplasty for CHD, pregnant women, and patients with history of systemic diseases according to the medical records were excluded. The study protocol was approved by the Bioethics Committee of the YSMU after M.Heratsi.

2.2. Data collection

In this study, an informed consent was obtained from all study subjects. Research assistants collected data on family history of diabetes, heart diseases, hypertension, socioeconomic status, lifestyle factors (including smoking habits, physical activity, and alcohol drinking) and the dietary intake for each subject. Next, weight was measured by using digital scales while subjects were wearing light clothing and no shoes. Height was measured with a tape measure while the subjects were in a standing position (without shoes) and the shoulders were in a normal position. Measurements were recorded to the nearest 100 g and 0.1 cm for weight and height respectively. Waist circumference was measured while subjects were standing with a soft tape midway between the lowest rib and the iliac and it was not wrapped too tight or too loose. Then systolic and diastolic blood pressure was measured twice with a standard mercury sphygmomanometer after the participants sat for 15 min; the means of the two measurements were considered to be the participant's blood pressure at the time of health check-up.

2.3. Assessment of the dietary intake

Information on the usual intakes of foods and dishes over the previous year was obtained using a semi-quantitative food frequency questionnaire (FFQ). Nutritionists and public health specialists assisted in determining constructing a list of foods which ultimately consisted of approximately 135 foods and beverage items with a standard serving size that was commonly consumed by Armenians. Before the FFQ was implemented in the study, it was adapted to Armenian conditions and was field-tested on 50 individuals. Subjects were asked to select their frequency of consumption and amount of each food item during the previous 12 months by using household measures. For each subject, a mean intake according to grams per day of each food was calculated. Then, total energy and nutrients based on daily averages in both groups were calculated by Food Processor Software, Ver. 12. It is worth mention that vitamin and mineral supplements were not included in computing nutrient intakes.

2.4. Statistical analysis

The data collected through the questionnaire, clinical examinations, laboratory findings, and dietary intakes were entered into the database. All data were statistically analyzed using the SPSS, version 15. The qualitative data were compared between cases and controls by using the Chi Square test. Comparisons between the two continuous variables were made using an independent sample *t*-test. The relation between intakes of nutrients and the CHD risk was calculated by the univarite and multiple logistic regression, with further control for potential risk factors including hypertension, metabolic syndrome (MetS), the family history of CHD, physical activity status, smoking habits, waist circumference, alcohol consumption, and education status of the participants. All tests were 2-tailed and $P < 0.05$ was considered significant.

3. Results

The mean and percentage values of various cofactors among the cases and controls are shown in Table 1. The mean ± SD of age were 57.22 ± 10.9 and 55.5 ± 11.7 years in case and control groups respectively. Although patients in the case group were slightly older, the statistical analysis did not reveal any significant differences in age between groups. In our study, the percentage of current smokers, current alcohol consumers, the family history of CHD and MetS, using National Cholesterol Education Program-Third Adult Treatment Panel [NCEP-ATP (III)] definition, modified by American Heart Association/National Heart, Lung, and Blood Institute (AHA/NHLBI) [22], was significantly higher. Also, the cases had significantly higher means of waist girth (cm) than did

Table 1
Demography and clinical characteristics of participants with CHD and controls.

Variable	Cases N = 320)	Controls (N = 320)	
Age (y) Mean (SD)	57.22 (10.9)	55.50 (11.7)	P > 0.05
Male Sex N (%)	162 (50.6)	141 (44.1)	P > 0.05
Waist Girth (cm) Mean (SD)	102.19 (13.2)	98.53 (13.55)	P < 0.001
BMI (Kg/m2) Mean (SD)	29.52 (5.50)	29.38 (5.51)	P > 0.05
Obese N (%)	137 (42.8)	133 (41.6)	P > 0.05
Current Smokers N (%)	128 (40)	67 (20.9)	P < 0.0001
Current Alcohol Consumers N (%)	175 (54.7)	106 (33.1)	P < 0.0001
Family History of CHD N (%)	45 (14.1)	10 (3.1)	P < 0.0001
MetS N (%)	255 (79.6)	222 (69.4)	P < 0.005
Hypertension N (%)	250 (78.1)	206 (64.4)	P < 0.0001

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