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ORIGINAL ARTICLE

Association of socioeconomic profiles with cardiovascular risk factors in Iran: the Isfahan Healthy Heart Program

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Abstract
Objectives To determine the relationship between socioeconomic status (SES) and cardiovascular disease (CVD) risk factors.
Methods A representative sample of adult populations living in three cities in Iran was studied. The demographic and subjective data were collected by questionnaires prepared and validated for this study; physical examination and laboratory tests were conducted under standard protocols. Three components of SES including education, occupation, and income were determined. The univariate ANOVA was used for statistical analysis.
Results The population studied (99.3% response rate) comprised 12,514 subjects (51% females, mean age 38.4 ± 14.3 years). While higher education was a protective factor against smoking in men OR = 0.8 (95% CI = 0.7–0.8), it increased the risk of smoking in women OR = 1.2(95% CI = 1.02–1.5). The other risk factors increased with education especially in men. Higher income level increased the OR of CVD risk factors. Occupation had an inverse association with the aforementioned risk factors. The employed individuals had higher serum lipid level and body mass index than unemployed individual.
Conclusion In line with previous studies, we found an association between SES and CVD risk factors. Education level was the strongest associated factor.

Keywords Socioeconomic status · Cardiovascular disease · Risk factor · Education · Occupation · Income

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Introduction

The socioeconomic status (SES) is one of the strongest predictors of morbidity and mortality experience at population level (Winkleby et al. 1992). SES is a multidimensional and complex phenomenon consisting of financial, occupational, and educational components (McFadden et al. 2008). The association of cardiovascular disease (CVD) risk and mortality with SES has been proved many Western countries (Mensah et al. 2005; Mensah 2005; Huisman et al. 2005).

Although the dimensions of SES are interrelated, they have different individual forces on CVD which depend on culture and customs of people in different countries and regions. Our previous study revealed an inverse association between educational attainment and some CVD risk factors such as lipid profile, blood pressure, and overweight, whereas no significant association was documented between smoking and educational level (Roohafza et al. 2005). Many studies have shown that low education is positively associated with CVD risk factors (Panagiotakos et al. 2008; Malyutina et al. 2004; Pearson 2003). Occupation is one of the SES factors which is found to affect CVD risk factors independently (Gregory et al. 2007;Helmert et al. 1997). The cultural influences on the relationship between SES and CVD risk factors should be considered as well. Ezeamama et al. have compared the association of SES and CVD risk factors in the two populations with different cultural backgrounds of American Samoan and Samoan people, and found some varieties in comparison. Unemployment was documented as the risk factor of obesity in American Samoan but it did not affect the other group; furthermore, while unemployment was the risk factor of high blood pressure in American Samoan women, occupation was the risk factor for high blood pressure in Samoan men. They concluded that cultural context and customs interrelated SES and CVD (Ezeamama et al. 2006).

There is limited experience on the relation of SES and CVD risk factors in developing countries. The purpose of this study was to investigate the cross-sectional associations of three dimensions of SES indicators with CVD risk factors in a representative of Iranian adults to explore the direction of associations between the aforementioned factors.

Methods

Setting

A comprehensive integrated community-based action-oriented program for CVD prevention and control named Isfahan Healthy Heart Program (IHHP) has been conducted in three cities in central part of Iran by Isfahan Cardiovascular Research Center (ICRC), a WHO collaborating center in the Eastern Mediterranean region and Isfahan Provincial Health Office, both affiliated to Isfahan University of Medical Sciences. Its methodology has been previously described in detail (Sarrafzadegan et al. 2003).

The program was conducted in three phases: (1) situation analysis (2) integrated community-based interventions, and (3) outcome evaluation.

We calculated the sample size and divided it into different age groups (19–25, 25–34, 35–44, 45–54, 55–64 and ≥65 years) in both sexes according to the distribution in the community. We doubled the total number owing to our use of the cluster method. Considering the missing rate, we calculated the total number of 12,600 for the three cities. By conducting quota sampling, the study population was stratified by their living area (urban vs. rural) according to regional population distribution as per the national population census in 1999. The project team conducted this baseline survey of 12,514 randomly selected adults aged ≥19 years via two-stage random cluster sampling. Initially, they randomly selected census blocks from each city and divided them into clusters, each with approximately 1,000 households. They randomly selected approximately 5–10 of households within these clusters for enumeration. After enumeration, they randomly selected one of the eligible individuals aged ≥19 years per household, providing that he or she had Iranian nationality, was mentally competent, and not pregnant. The urban-to-rural ratio in Iran is approximately 68/32, and in the cities of Isfahan, Najaf-Abad, and Arak it was 90/10, 60/40, and 66/34, respectively. It should be mentioned that in Iran, all places with a population of at least 10,000 and being a municipality are considered being an urban area.

In the first step, the SES as well as the knowledge, attitude, and practice of people regarding to life style and CVD were assessed and data about physical examination and laboratory examinations were collected in a representative sample of general population. All assessments were done by the trained team of physicians, nurses, and some health professionals.

Study variable

Three dimensions of SES including education, occupation, and income, which were obtained from the self-report response of participants to the questions asked and registered by interviewers, were selected as independent variables. Education was defined based on the levels defined in the Iranian training system (illiterate, elementary, middle-, high school and university). Occupation was categorized to three main groups of governmental, private sector, and unemployed. Income was categorized based on the income levels characterized by Iranian Central Bank for Iranian families. We should acknowledge that the self-reported response to the income level might be untrustworthy; however, we categorized the respondent quotation regarding family income and assumed this untrustworthy would distribute to the whole population under study.

The dependent variables were divided into two categories: (1) life style behaviors as physical activity, and cigarette smoking (2) CVD risk factors as fasting serum lipid profile [total cholesterol (TC), triglyceride (TG), low-density lipoprotein cholesterol (LDL-C) and high-density lipoprotein cholesterol (HDL-C)], systolic and diastolic blood pressure, diabetes mellitus, and obesity.

Data on physical activity, expressed as metabolic equivalent task (MET) minutes per week, were obtained through an interview including questions on four activity domains: job-related physical activity; transportation-related physical activity; housework and house maintenance activities; recreation, sport, and leisure-time physical activity. We asked participants to think about all the vigorous and moderate activities they had performed in the past 7 days, considering the number of days a week and the time spent on these activities. We included the leisure time physical activity in the analysis. (Sarrafzadegan et al. 2003, 2006, 2009).

Obesity was defined by body mass index (BMI) and waist circumferences. A scale with 0.5 kg precision was used to measure weight. Height was measured in standing position with barefoot to the nearest 0.5 cm. BMI was determined as weight divided by squared height (kg/m^2). Waist circumference was measured by a non-elastic tape measure with 0.5 cm rounding to locate the lower costal rib and the iliac crest.

Trained nurses obtained the participants' blood samples by venipuncture from the left antecubital vein. They kept all blood samples frozen at −20°C to be assayed within 72 h at the central laboratory of ICRC, which meets the criteria of the National Reference Laboratory (a WHO-collaborating center) and is under external quality control of St. Rafael University, Leuven, Belgium, The results from the laboratories highly correlated with each other. Serum TC, TG, and fasting blood sugar (FBS) measured enzymatically using an auto-analyzer (Ependorf, Germany) and determined serum HDL-C after precipitation of LDL and very low-density lipoproteins (VLDL) with dextran sulfate-magnesium. Serum LDL-C was calculated using the Friedwald equation in subjects with TG <400 mg/dl and used standard kits in other cases (Friedwald et al. 1972; Rafiei et al. 1999).

Each participant's blood pressure was measured after 5 min of rest in a sitting position and repeated once more at least 5 min after by trained health professionals using calibrated mercury sphygmomanometers and appropriate-sized adult cuffs. None of the participants had tea/coffee intake or had smoked within 30 min preceding the measurements.

Statistical analysis

SPSS for Windows (version 15.0; SPSS Inc., Chicago, IL, USA) was used for data analysis. For comparison of baseline characteristics among men and women, *t* test was used for continuous variables; Mann–Whitney *U* and χ^2 tests were used for comparison of categorized variables of education and income. Further analyses were carried out in two steps. First, the odds ratio was calculated for categorized dichotomous risk factors (smoking, diabetes mellitus) by using logistic regression models for adjusting age in men and women. Second, the age- adjusted means of continuous risk factors were estimated by general linear models of ANOVA in each socioeconomic category. These analyses were done for all three dimensions of SES, i.e., education, occupation, and income.

Results

A total number of 12,514 participants with a mean age of 38.40 ± 14.30 years were recruited to the analysis (99.30% response rate) and included 49% male and 51% female individuals. The distribution of population by education, income and occupation, and the risk factors are presented in Table 1. The SES was significantly different in terms of gender. Furthermore, the risk factors were different between men and women, except than FBS.

Table 1 Characteristics of the study population

	Men *n* (%)	Women *n* (%)	*P* value
Total	6,123 (49)	6,391 (51)	
Education			
Illiterate	850 (14.2)	1,667 (26.5)	<0.001*,**
Primary	1,745 (29.1)	2,135 (33.9)	
Middle school	1,118 (18.7)	936 (14.9)	
High school, diploma	1,522 (25.4)	1,240 (19.7)	
University	757 (12.6)	320 (5.1)	
Occupation			
Governmental	1,239 (20.2)	200 (3.1)	<0.001**
Private	3,607 (58.9)	161 (2.5)	
Unemployed	1,277 (20.9)	6,030 (94.4)	
Income			
Very low	227 (3.8)	434 (7.1)	<0.001*,**
Low	1,079 (17.9)	1,407 (22.9)	
Medium	3,692 (61.2)	3,591 (58.4)	
High	662 (11)	480 (7.8)	
Very high	370 (6.1)	232 (3.8)	
Cigarette smoking	101 (1.6)	1,777 (29)	<0.001**
Diabetes mellitus	296 (4.9)	397 (6.3)	<0.001**
Age (years)	38.8 ± 14.5	38.9 ± 15.3	>0.05***
Leisure–time physical activity	98.7 ± 95.5	70.3 ± 83.1	<0.001***
Total cholesterol (mg/dL)	193.6 ± 48.3	202.2 ± 50.2	<0.001***
Triglycerides (mg/dL)	178.6 ± 120.1	161.8 ± 99.5	<0.001***
High density lipoprotein (mg/dL)	45.2 ± 9.9	48.2 ± 10.4	<0.001***
Low density lipoprotein (mg/dL)	114.2 ± 40.1	122.3 ± 41.3	<0.001***
Systolic blood pressure (mg/dL)	116.4 ± 17.9	114.9 ± 20.3	<0.001***
Diastolic blood Pressure (mg/dL)	75.8 ± 10.4	75.2 ± 11.7	<0.01***
Body mass index (Kg/m^2)	24.5 ± 4.1	26.6 ± 5.2	<0.001***
Waist circumference (cm)	88.4 ± 12.1	92.6 ± 14.2	<0.001***

* Mann–Whitney test; ** χ^2 test; *** *t* test

While TG, HDL-C, systolic, and diastolic blood pressure were higher in men than in women, TC, LDL-C, BMI, and waist circumference were higher in women than in men (Table 1).

Education

The categorized levels of education were used in the analysis which was conducted in two parts. First, cigarette smoking and diabetes mellitus were categorized; the results of logistic regression analysis were different in terms of gender after age adjustment. While higher education was a protective factor against smoking in men OR = 0.8 (95% CI = 0.75–0.85), women with higher education level were at higher risk of smoking than those with lower education level OR = 1.2 (95% CI = 1.02–1.5). The results of diabetes mellitus were contrary to cigarette smoking. Education was a protective factor for diabetes in women OR = 0.8 (95% CI = 0.7–0.9); the corresponding figure was not significant among males.

In the second part of the analysis, general linear model of ANOVA demonstrated that the mean lipid profile (except than HDL-C), systolic and diastolic blood pressure, BMI, waist circumference, and physical activity were significantly different in various education levels. TC, TG, and LDL levels increased significantly in the higher educational levels in men. An inverse relation was documented in women only for serum TG level. The mean serum TG level decreased in higher education levels. The mean systolic and diastolic blood pressures were decreasing in higher education levels. Higher BMI and waist circumference levels were associated with higher education in men, whereas in women the risks of overweight and obesity were higher in those with middle educational level. PA level increased significantly with education in both sexes. Table 2 demonstrates the changes in the level of risk factors according to education in men and women.

Occupation

The same analysis conducted for education was done for occupation. The multiple logistic regression analysis indicated a risk effect of occupation for cigarette smoking; however, it was significant only in men. The employed and private job categories were compared to unemployed status after adjustment for age. Among women, being employee and having private job versus being unemployed had an OR = 0.70 (95% CI = 0.18–3.01) and OR = 1.93 (95% CI = 0.70–5.36), respectively, for CS. Among men, the corresponding figure for employees was OR = 1.2 (95% CI = 1.03–1.5) and for having private job versus being unemployed was OR = 1.8 (95% CI = 1.5–2.1). There

Table 2 Age-adjusted mean of cardiovascular risk factors in different educational level by gender

	Men						Women					
	Illiterate	Primary	Middle School	High school diploma	University	*P* value	Illiterate	Primary	Middle School	High school diploma	University	*P* value
TC	185.8 ± 1.8	192.2 ± 1.1	198.3 ± 1.4	194.6 ± 1.3	199.8 ± 1.7	<0.001	201.1 ± 1.3	203.9 ± 0.9	205.4 ± 1.6	202.0 ± 1.4	198.0 ± 2.6	<0.05
TG	156.6 ± 4.7	181.3 ± 2.9	180.9 ± 3.7	184.05 ± 3.3	191.2 ± 4.4	<0.001	158.8 ± 2.8	167.6 ± 2.1	167.9 ± 3.2	158.5 ± 2.9	151.08 ± 5.4	<0.001
LDL	110.9 ± 1.6	113.0 ± 1.0	118.5 ± 1.2	113.5 ± 1.1	117.3 ± 1.5	<0.001	122.3 ± 1.2	123.0 ± 0.9	124.5 ± 1.4	121.9 ± 1.2	119.5 ± 2.2	>0.05
HDL	45.2 ± 0.4	44.9 ± 0.2	44.8 ± 0.3	45.6 ± 0.2	45.6 ± 0.3	>0.05	47.9 ± 0.3	48.1 ± 0.2	47.8 ± 0.3	48.9 ± 0.3	49.0 ± 0.6	>0.05
SBP	116.3 ± 0.6	115.6 ± 0.4	116.7 ± 0.5	117.2 ± 0.4	116.9 ± 0.6	>0.05	116.6 ± 0.5	115.3 ± 0.3	114.5 ± 0.6	113.6 ± 0.5	113.8 ± 1.0	<0.01
DBP	75.5 ± 0.3	75.7 ± 0.2	75.7 ± 0.3	75.9 ± 0.2	76.6 ± 0.3	>0.05	76.0 ± 0.3	75.7 ± 0.2	75.0 ± 0.3	74.1 ± 0.3	73.8 ± 0.6	<0.001
BMI	23.2 ± 0.1	24.6 ± 0.1	24.7 ± 0.1	24.7 ± 0.1	24.9 ± 0.1	<0.001	25.7 ± 0.1	27.1 ± 0.1	27.4 ± 0.1	26.5 ± 0.1	25.9 ± 0.2	<0.001
WC	84.1 ± 0.4	88.1 ± 0.2	89.5 ± 0.3	89.7 ± 0.3	90.5 ± 0.4	<0.001	89.4 ± 0.3	94.1 ± 0.2	95.5 ± 0.4	93.1 ± 0.4	92.0 ± 0.7	<0.001
PA	76.1 ± 3.6	86.2 ± 2.2	92.3 ± 2.8	117.6 ± 2.5	116.0 ± 3.4	<0.001	57.4 ± 2.4	65.0 ± 1.8	75.4 ± 2.8	88.4 ± 2.5	80.9 ± 4.7	<0.001

General linear model of ANOVA

TC total cholesterol, *TG* triglyceride, *HD* high density lipoprotein, *LDL* low density lipoprotein, *SBP* systolic blood pressure, *DBP* diastolic blood pressure, *BMI* body mass index, *WC* waist circumference, *PA* physical activity was no association between occupation category and diabetes mellitus.

Table 3 shows the results of age-adjusted multivariate ANOVA for the mean values of CVD risk factors in different occupations. Among men, lipid profiles, except than HDL, were associated with job categories. The serum TC, TG, and LDL levels were higher in employees than in the two other job categories. Among women, there was no significant difference in lipid profiles according to job categories. The relationship of BMI and waist circumference with occupation were similar to that of lipid levels, i.e., among men the BMI and waist circumference were higher in employees than in those with private jobs and unemployed individuals; with higher level in those with private jobs than unemployed individuals. Among men, unemployed individuals had higher levels of systolic blood pressure than those with two other job categories, whereas among women this association was not significant. The diastolic blood pressure did not associate with occupation, either in men or in women. The pattern of physical activity in men indicated the higher level of activity in unemployed individuals than in employees and those with private jobs. The physical activity of women was higher in those with private job than in those who were employee and/or unemployed.

Income

The logistic regression analysis showed no significant relation of income with cigarette smoking and diabetes mellitus. The association between TC level and income was different in men and women. The mean TC increased significantly in men with higher income levels, whereas among women, TC level was nearly similar in all income levels. The corresponding figures were similar for TG in both genders; the higher income was associated with higher serum TG level in both genders. However, the LDL-C and HDL-C levels did not have any association with family income. Systolic blood pressure was higher in both ends of the income dimensions, i.e., those persons with very high or very low income had higher blood pressure than those with the median income. Three variables of physical activity, BMI, and waist circumference increased significantly with higher income level (Table 4).

Discussion

In the current study, the three components of SES, i.e.,, education, occupation, and income were associated with life style behaviors and CVD risk factors. Moreover, we found significant differences in terms of gender not only for the socioeconomic components, but also for CVD risk factors.

There is a large body of evidence about sex differences in the prevalence of health problems, risk factors, access to medical care, and the course of diseases. Moreover, health problems in men and women also vary according to socio-economic status, and gender is shown to be strongly intertwined as risk factor with socio-economic status, ethnicity, and age (Lagro-Janssen et al. 2008; Stoverinck et al.1996; Pilote et al. 2007). Most previous studies have been conducted in Western countries; the current study is a confirmatory evidence for these gender differences in a Middle Eastern community.

Although different dimensions of SES are intercorrelated and have complex impact on health issues, the impact of some of its components on CVD risk factors in men and women might be different in various communities.

In our study, education was the strongest factor correlated with CVD risk factors. It was associated with all

Table 3 The age-adjusted mean of cardiovascular disease risk factors According to occupation by gender

	Men			*P* value	Women			*P* value
	Employee	Private	Unemployed		Employee	Private	Unemployed	
TC	197.4 ± 1.3	195.1 ± 0.7	185.4 ± 1.3	<0.001	199.2 ± 3.2	202.9 ± 3.6	202.2 ± 0.5	>0.05
TG	192.9 ± 3.4	179.0 ± 1.9	163.2 ± 3.3	<0.001	150.6 ± 6.6	156.1 ± 7.5	162.3 ± 1.2	>0.05
LDL	116.03 ± 1.1	115.7 ± 0.6	108.4 ± 1.1	<0.001	120.9 ± 2.8	123.9 ± 3.3	122.3 ± 0.5	>0.05
HDL	44.8 ± 0.2	45.3 ± 0.1	45.0 ± 0.2	>0.05	48.8 ± 0.7	48.1 ± 0.8	48.2 ± 0.1	>0.05
SBP	114.9 ± 0.4	115.9 ± 0.2	119.0 ± 0.4	<0.001	113.7 ± 1.2	114.9 ± 1.3	115.0 ± 0.2	>0.05
DBP	76.1 ± 0.2	75.5 ± 0.1	76.2 ± 0.2	<0.05	75.7 ± 0.7	75.5 ± 0.8	75.1 ± 0.1	>0.05
BMI	25.3 ± 0.1	24.5 ± 0.07	23.6 ± 0.1	<0.001	26.6 ± 0.3	26.4 ± 0.3	26.6 ± 0.06	>0.05
WC	90.4 ± 0.3	88.3 ± 0.1	86.7 ± 0.3	<0.001	92.02 ± 0.9	91.1 ± 1.0	92.6 ± 0.1	>0.05
PA	105.6 ± 2.6	88.1 ± 1.5	122.09 ± 2.6	<0.001	81.2 ± 5.8	80.03 ± 6.5	69.7 ± 1.0	0.05

General linear model of ANOVA

TC total cholesterol, *TG* triglycerides, *HDL* high density lipoprotein, *LDL* low density lipoprotein, *SBP* systolic blood pressure, *DBP* diastolic blood pressure, *BMI* body mass index, *WC* waist circumference, *PA* leisure time physical activity

Table 4 The age-adjusted mean of cardiovascular disease risk factors according to income by gender

	Men						Women					
	Very low	Low	Medium	High	Very high	*P* value	Very low	Low	Medium	High	Very high	*P* value
TC	189.5 ± 3.1	188.4 ± 1.4	194.4 ± 0.7	195.7 ± 1.8	195.8 ± 2.4	<0.01	201.1 ± 2.2	200.9 ± 1.2	202.1 ± 0.7	201.0 ± 2.0	201.3 ± 3.0	>0.05
TG	148.1 ± 7.9	162.8 ± 3.6	181.7 ± 1.9	185.9 ± 4.6	195.8 ± 6.2	<0.001	156.2 ± 4.6	154.1 ± 2.5	163.7 ± 1.5	165.4 ± 4.3	163.0 ± 6.2	<0.05
LDL	114.3 ± 2.7	112.5 ± 1.2	114.1 ± 0.6	115.9 ± 1.6	114.7 ± 2.1	>0.05	121.6 ± 1.9	121.9 ± 1.0	122.1 ± 0.6	121.6 ± 1.8	121.4 ± 2.6	>0.05
HDL	45.5 ± 0.6	45.0 ± 0.3	45.1 ± 0.1	45.5 ± 0.3	44.7 ± 0.5	>0.05	47.9 ± 0.5	48.5 ± 0.2	47.9 ± 0.1	47.8 ± 0.4	48.0 ± 0.6	>0.05
SBP	118.0 ± 1.0	116.8 ± 0.4	115.9 ± 0.2	115.5 ± 0.6	118.1 ± 0.8	<0.05	114.6 ± 0.8	114.8 ± 0.4	114.9 ± 0.2	113.3 ± 0.8	116.1 ± 1.1	>0.05
DBP	76.2 ± 0.6	75.4 ± 0.3	75.6 ± 0.1	75.9 ± 0.3	77.3 ± 0.5	<0.05	74.5 ± 0.5	75.1 ± 0.2	75.1 ± 0.1	75.2 ± 0.4	76.1 ± 0.7	>0.05
BMI	22.5 ± 0.2	23.5 ± 0.1	24.7 ± 0.07	25.02 ± 0.1	25.3 ± 0.2	<0.001	25.6 ± 0.2	25.8 ± 0.1	26.7 ± 0.08	27.3 ± 0.2	27.4 ± 0.3	<0.001
WC	83.3 ± 0.7	85.6 ± 0.3	88.8 ± 0.1	90.2 ± 0.4	91.9 ± 0.5	<0.001	90.0 ± 0.6	90.5 ± 0.3	93.3 ± 0.2	93.9 ± 0.6	94.6 ± 0.8	<0.001
PA	90.2 ± 6.2	91.9 ± 2.8	98.2 ± 1.5	110.6 ± 3.6	111.8 ± 4.8	<0.001	71.14 ± 4.0	63.7 ± 2.2	71.0 ± 1.3	78.1 ± 3.7	85.2 ± 5.4	<0.011

General linear model of ANOVA

TC total cholesterol, *TG* triglycerides, *HDL* high density lipoprotein, *LDL* low density lipoprotein, *SBP* systolic blood pressure, *DBP* diastolic blood pressure, *BMI* body mass index, *WC* waist circumference, *PA* leisure time physical activity

factors; it increased the risk of some of them and was protective for some others. This finding is in line with those of previous studies in different communities, which might be because the education level is the most expeditious component of SES. The highly educated persons can obtain better job and take more income. Winkleby and colleagues expressed that education was more strongly related to CVD risk factors than was income or occupation (Winkleby et al. 1992). A study in Finland showed that education had a fair linear association with the risk factor score in both genders (Luoto et al. 1994). Some other studies have demonstrated that education impacts strongly on human life style and subsequently influences frequency and severity of the CVD risk factors (Bobak et al. 1999; Potvin et al. 2000; Stelmach et al. 2005).

We found that after education, occupation was the second factor that mostly associated with CVD risk factors. The associations in occupational categories were greater in men than in women. The mean level of serum lipids and anthropometric measures were higher in employed individuals than in unemployed and those with private job. Meanwhile, the physical activity level was higher in unemployed men and those women with private occupation than in employed individuals. It is shown that the type of occupation is associated with incidence of CVD (Kaplan and Keil 1993; Vartiainen et al.1998; Thelle 1999; Tyroler 1999). Engstrom et al. found that the association between risk factors and job existed not only for major CVD risk factors but also for new risk factors as fibrinogen and markers of inflammation (Engstrom et al. 2006). It is suggested that employees, especially those in managerial and administrative positions have more favorable risk-factor profile than self-employed and industrial workers, and farmers (Luoto et al. 1994).

In the current study, the income level had different associations with CVD risk factors. Higher monthly income was associated with higher levels of serum TC and TG. Furthermore, BMI, waist circumference, and physical activity increased in higher income levels. The documents that support the association between CVD risk factors and income are scarce. Some previous studies found a statistically significant increase in obesity among women with lower family income (Ezeamama et al. 2006; Bobak et al. 1999; Potvin et al. 2000; Schroder et al. 2004). Many studies did not document any association between income and CVD risk factors (Stelmach et al. 2004, 2005; Ball and Crawford 2005; Wong and Donnan 1992). A recent study among cardiac patients in Slovakia found that patients with low income or education had a higher probability of having poor psychological well-being compared to participants with high income or education (Skodova et al. 2009).

It is noteworthy that different studies have addressed various definitions for SES. Additionally, they defined different categories for education, occupation, and income, as well. Hence, the results vary between this study and the other ones. However, in general, they have revealed an association between cardiovascular risk factors and the SES components.

It has been well documented even in systematic reviews (Tyroler 1999; Pollitt et al. 2005; Schulz et al. 2008) that SES might influence the lifestyle and CVD risk factors. Some controversies or differences in association rate depend on different definition of SES and various cultures in each community. However, it seems that the effect of education, as an important component of SES was similar in many studies and it is one of the most powerful factors affecting CVD risk factors.

We have some limitations in our study. As stated before, the untrustworthy among respondent to income should be taken into account. The other limitation related to Iranian culture, i.e., most Iranian women do not work out of home, and they have less outdoor activities and job. In many societies that provide basic material needs the psychological aspect of SES is very important (Bobak et al. 1999) We could not measure this component of SES. We suggest that following related studies that the psychological issues of SES measures with standard methods should be considered in the future.

In conclusion, we found that the three components of SES, i.e. education, occupation and income were associated with life style behaviors and CVD risk factors. Education was the most powerful determinant of CVD, whereas income was the weakest predictor. This might be because more educated people can obtain better job positions and consequently attain more wealth. More educated people understand the role of CVD risk factors on their health more than illiterate or low educated people.

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