

# Socioeconomic Status Alongside Other Risk Factors of Atherosclerotic Coronary Artery Disease

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## Abstract

**Background and Objective-** Atherosclerotic coronary artery disease is an important cause of mortality worldwide. Huge economic burdens, various health complications and high mortality due to atherosclerotic coronary artery disease necessitate the identification and control of its risk factors. In addition to serving as the underlying cause of many coronary-artery-disease risk factors, low socioeconomic status seems to act as an independent risk factor during childhood and adolescence for the development of cardiovascular diseases later in life. The objective of this study is to assess the influence of socioeconomic status during childhood, alongside other known risk factors, on the development of cardiovascular diseases.

**Patients and Methods-** This is a prospective, case-control study of 600 patients in private and state-run university hospitals with coronary care units. The patients were matched for sex, age and characteristics other than those under study. We assessed the influence of socioeconomic status in childhood, alongside other known risk factors, on the development of coronary artery disease.

**Results-** Men constituted 69.1% and 65.2% of the case and control groups respectively. The two groups were similar in terms of the patients' mean age. Most of the women were housewives, and men were typically occupied in jobs involving little physical activity. 47.5% and 45.5% of the patients in the case group belonged to the lower and middle-income brackets, respectively. 35.6% and 58.16% of the patients in the control group belonged to the lower and middle-income brackets respectively, showing a statistically significant difference from the case group. Positive family history of cardiovascular disease, cigarette smoking, hypertension, diabetes, obesity and hyperlipidemia were other risk factors of coronary artery disease in the case group as suggested by this study, with a statistically significant difference from the control group.

**Conclusion-** The income difference between the case and control groups was significant in terms of developing coronary artery disease. Similar studies have also pointed to a higher chance of developing atherosclerotic coronary artery disease in individuals belonging to the lower-income brackets during their childhood. Our findings regarding the influence of cigarette smoking, positive family history of cardiovascular disease, diabetes, hypertension, hyperlipidemia and obesity on the development of coronary artery disease are consistent with the results of similar studies in other parts of the world. These findings call for new measures to be taken by community health authorities and policy makers to curb the ever-increasing incidence of cardiovascular diseases in the society. (*Iranian Heart Journal*. 2002; 2(4)&3(1): 33-37)

**Keywords:** coronary artery disease < risk factors of atherosclerosis < socioeconomic status

**A**therosclerotic coronary artery disease (CAD) is a leading cause of mortality in the world. CAD accounts for a great number of deaths in Iran.<sup>1</sup> The health costs incurred by the Iranian health care system due to CAD rose from 30 billion Rials in 1989 to 150 billion Rials in 1993. The health costs of CAD are expected to increase to 400 billion Rials in 2002.<sup>5,6,7</sup> Studies show that the age of onset for atherosclerotic CAD in Iran is decreasing. In 1987, 14% of all patients with atherosclerotic CAD were aged less than 50 years. This figure rose to 26% in 1993. Identification of predisposing factors to CAD is essential for developing preventive policies at national level. Socioeconomic factors constitute an integral component of epidemiological studies about CAD. The influence of individuals' socioeconomic status during childhood and adolescence on the development of atherosclerotic CAD has been assessed as an independent risk factor in this study in order to shed further light on the epidemiological aspects of CAD, and to make ways for developing long-term preventive strategies.

### Patients and Methods

This is a descriptive case-control study, which was conducted between March and June 1996, at state-run and private hospitals with a cardiac care unit (CCU). The target population was divided into case and control groups, each comprising 600 patients. The case group, who consisted of patients aged 40 and over, were hospitalized in the CCU. The control group consisted of patients aged 40 and over without signs of CAD. They were similar to the case group in terms of CAD risk factors, but were different with respect to the variables under the study. Members of the control group were selected from patients hospitalized in other hospital wards who had undergone thorough examinations for evidence of CAD, thus reducing the likelihood of the presence of asymptomatic heart disease. Data collection was performed through 14-item

questionnaires designed by the Iranian Ministry of Health and Medical Education. The first part of the questionnaire asked about the patients' characteristics and known CAD risk factors, i.e. cigarette smoking, hyperlipidemia, hypertension, diabetes, obesity and positive family history of CAD. The second part consisted of questions providing clues about the patients' socioeconomic status during the past 10 years as well as the early decades of life (3-5 decades ago). Statistical reports from the Central Bank of Iran and the Budget and Planning Organization, calculating the average monthly income (i.e. gross and net income) together with the monthly spending of urban and rural Iranian households, served as the basis for the evaluation of the patients' socioeconomic status.<sup>6-11</sup> Some information regarding the socioeconomic status of the patients in the early decades of their life was obtained through a pilot study. The average monthly income of an urban household at the time of study and 3-5 decades ago stood at 42000 and 6000 Rials, respectively. Patients with unstable socioeconomic background – as determined by the questionnaires – were excluded from the study. The affluent households (with an average monthly income of 800,000 Rials at the time of study, and 9000 Rials 3-5 decades ago) were given 15-20 points. The middle-income households (with an average income of 250,800 thousand Rials at the time of study, and 3-9000 Rials 3-5 decades ago) were given 10-14 points. The lower-income households (with an average income of less than 250,000 Rials at the time of study, and less than 3000 Rials 3-5 decades ago) received 4-9 points. Based on this scale, the highest and lowest socioeconomic statuses were given 20 and 4 points, respectively. To determine the patients' socioeconomic status more accurately, additional information was obtained about the patients' place of residence and available facilities, number of family members, possession or otherwise of private estates, personal vehicles, etc. and the frequency of

recreational activities. Patients hospitalized at the CCU for non-cardiac reasons were also excluded from the study. Data analysis was performed by the Chi-square ( $X^2$ ) test using SPSS software.

## Results

69.1% of the subjects were men with a mean age of 59 years. 30.9% were women with a mean age of 60.1 years. 65.2% of the subjects in the control group were men with a mean age of 60.3 years, and 34.8% were women with a mean age of 59.2 years. 69% of the subjects in the case group and 63% of those in the control group lived in cities. 44.5% of the subjects in the case group and 38.5% of those in the control group were illiterate. In both, the case and the control groups, women were housewives and men occupied jobs involving little physical activity. 47.5%, 45.5% and 7% of the subjects in the case group, and 35.16%, 58.16% and 6.16% of the subjects in the control group belonged to the lower, middle and higher income brackets respectively. Comparisons between the two groups revealed a statistically significant difference ( $p<0.05$ , odds ratio=1.5). Table I represents CAD risk factors and their frequency in the case and control groups as well as the odds ratio for each risk factor.

**Table I. Frequency distribution of risk factors in case and control groups.**

Risk Factor	Case Group	Control Group	P-Value	Odds Ratio
Positive Family History	171	42	<0.05	10.9
Cigarette Smoking	371	138	<0.05	5.42
Hypertension	193	89	<0.05	2.72
Diabetes	120	53	<0.05	2.57
Obesity	104	48	<0.05	2.41
Hyperlipidemia	180	110	<0.05	1.91

A statistically significant difference can be seen between the case and control groups in

terms of the frequency of each risk factor ( $p<0.05$ ). Cigarette smoking followed by a positive family history of CAD accounted for the highest odds ratios.

## Discussion

Atherosclerotic heart disease is an important cause of mortality worldwide; therefore, identifying associated risk factors is of cardinal significance in developing preventive strategies at the national level. Habibi and his colleagues estimated that the health costs of every heart attack in Iran in 1995 amounted to 1.1 million Rials.<sup>2</sup> The health costs of CAD rose from 30 billion Rials in 1989 to 150 billion Rials in 1994. CAD is expected to cost the Iranian health care system some 400 billion Rials in 2004.<sup>3,4</sup> This study assesses the influence of socioeconomic status, as an independent and preventable risk factor, on the development of CAD alongside other known CAD risk factors i.e. cigarette smoking, hypertension, hyperlipidemia, diabetes, obesity and positive family history of CAD in the case and control groups.<sup>5</sup> Even though the individuals' current socioeconomic status is recognized as having an important influence in giving rise to and intensifying other CAD risk factors, it can in the long term act as an independent CAD risk factor through affecting nourishment and contributing to build-up stressful conditions during childhood and adolescence. 47.5% of the patients in the case group belonged to the lower-income bracket, constituting the largest part of the case group. Most of the patients in the control group (58.16%) belonged to the lower-income bracket. Comparisons between the two groups revealed a statistically significant difference ( $p<0.05$ ). The odds ratio corresponding to the individuals' socioeconomic status was lower than that of other risk factors. Cigarette smoking followed by a positive CAD history accounted for the highest odds ratios. A study of 2679 people aged 40 and over in Finland, demonstrated a higher

likelihood of CAD in middle-aged individuals with a less affluent socioeconomic status during childhood and adolescence.<sup>11</sup> A different study involving 7 European and Asian states showed that the frequency of CAD in industrialized nations, like Italy and Finland was higher than that in China and Yemen.<sup>11</sup> This study suggested a positive CAD family history as the principal risk factor for the development of CAD; this was also confirmed by other studies.<sup>3</sup> In these studies, cigarette smoking was the second important CAD risk factor. A study by Chaturvedi suggests that low socioeconomic status can give rise to and intensify CAD, resulting in increased mortality.<sup>14</sup>

A prospective study conducted in Malaysia revealed twice as many CAD cases among cigarette smokers as in peers in the same group.<sup>11</sup> Dobson and his colleagues investigated the hazardous effects of smoking on the health of smokers' companions. They found these effects to be more prominent in the low socioeconomic group.<sup>12</sup> These studies highlighted hypertension as the third most important CAD risk factor. Our findings regarding the influence of diabetes, hyperlipidemia and obesity on the development of CAD are consistent with the findings of the aforementioned studies.<sup>13</sup> In a different study conducted in London, low socioeconomic status was found to be associated with increased mortality due to heart disease in diabetic patients.<sup>14</sup> Low socioeconomic status was directly correlated with mortality due to heart disease in a study carried out by Morrison and colleagues.<sup>15</sup> A study by Davey demonstrated a correlation between CAD-related mortality and age, sex and socioeconomic status. A study by Pickering and colleagues showed that job stress can lead to increased frequency of hypertension and the resultant left ventricular hypertrophy.<sup>16</sup> The results of our study suggest that low socioeconomic status during childhood and adolescence contributes to the development of CAD later

in life. These findings call for new measures to be taken by policy makers so as to curb the ever-increasing incidence of cardiovascular diseases in the society through eliminating CAD risk factors.

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