New Aspects of Family History of Heart Disease as a Risk Factor for Coronary Artery Disease in Patients with Acute Myocardial Infarction

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Abstract

Introduction-This an in-depth investigation of the relationship between some new aspects of positive family history (FH) of coronary artery disease (CAD) and other risk factors related to CAD in patients with acute myocardial infarction (AMI).

Method- The data of 200 patients with AMI and positive FH of CAD (FH Pos.)- as case group- and 200 AMI patients without FH of CAD -as control group- (FH Neg.) were collected. Information about first and second-degree relatives was obtained, including age, occurrence of MI, and other risk factors related to CAD. We also covered procedures such as coronary angiography (CAG), percutaneous intervention (PCI), and coronary artery bypass grafting (CABG) surgery.

Results- AMI with ST-segment elevation in ECG (69.61% vs. 26.76%), heart block (19.47%. vs. 6.34%), and low EF (mean 43±3.4% vs. 47±35%) were higher in the FH Pos. group than the FH Neg. group. As well as diabetes (42.71% vs. 11.27%), dyslipidemia (42.19% vs. 14%), and hypertension (73.74% vs. 64.79%) in the FH Pos. group were higher than those in the FH Neg. group. CAG (79.9% vs. 39.9%) and CABG (34.8% vs14.79%) were higher in the FH Pos. group (all p values<0.05). More patients in the FH Pos. group were male and younger. In the FH Pos. group, there was 65% positive finding in the second-degree relatives; most of these second-degree relatives came from the father's side (56%). Also, there were 1.35 times more events in brothers than in sisters.

Conclusion- Subjects with a positive family history of CAD were younger and more susceptible to CAD and needed frequent interventional procedures. Also, there was a difference in the power of various kinds of positive FH. In the FH Pos. arm, there was a stronger relationship between the patient and his/her brothers than with sisters and 56% incidence in the second-degree relatives (especially from the father's side) ***(Iranian Heart Journal 2011; 12 (3):6-11*)**.

Keywords: Family history■ Coronary artery disease■ Risk factors■ Acute myocardial infarction.

Coronary Artery Disease (CAD) is the most prevalent cause of death in the world. It is a multifactorial disease induced by several environmental and genetic factors[1, 2]. Age, male sex, and familial history (FH) of atherosclerosis are established risk factors for CAD[3, 4,5]. Several studies have indicated that FH of myocardial infarction (MI) or coronary heart disease (CHD) is the most important predictor of CHD in other family members [2, 3, 4, 5].

Yechiel Friedlander et al. in a case control study showed that the rate of MI among first-degree relatives of MI cases was twice as high as that among first-degree relatives of controls; this association was present for each familial relationship[6]. The FH of CHD is used in clinical guidelines for the prevention of CHD and in pediatric cardiology for screening. However, the interaction among other risk factors and

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positive FH is not clearly Explained, specially for second-degree elatives and the side of the family from which they come [4, 7].

To investigate the relationship between positive FH of CAD and other risk factors related to CAD and clinical features of MI, we designed this case control study and compared two groups of in-hospital MI patients with and without FH of CAD in the first- and second-degree relatives and the side of the family they came from (mother's side vs. father's side). Additionally, we examined the hypothesis that the extra risk related with a positive FH may in part be assignable to increased diagnostic and therapeutic procedures in these patients.

Methods

We conducted this case control study in a university hospital in Tabriz, in the northwest of Iran. The data of 200 patients with AMI and positive FH of CAD (FH Pos.)- as case group- and 200 AMI patients without FH of CAD -as control group- (FH Neg.) were collected from the medical records of the patients and entered in a structured questionnaire . Criteria for MI were adapted from the Cardiovascular Health Study [8], and were defined by evidence of symptoms, elevated enzymes, and electrocardiographic changes. Using these criteria, we identified 400 eligible AMI patients. Information about first-degree relatives (each biological parent, brother, or sister) was obtained, including age at the time of study, occurrence of MI, age at occurrence, and other risk factors related to CAD. The questionnaire also covered other known or suspected cardiovascular risk factors such as age, physician-diagnosed diabetes, hypertension, hypercholesterolemia, cigarette smoking, physical activity, coffee consumption, and dietary fat intake. The data were analyzed using SPSS Statistical Package version 16.0 (SPSS Inc, Chicago, IL, USA). Independent samples t-test was used for the comparison of the continuous variables between the two study groups. The Chi-square test or the Fisher exact test was used for the analysis of the categorical parameters in the two study groups. A p value$\leq$ 0.05 was considered statistically significant.

Results

In this survey, we studied 400 AMI patients (200 patients in the case group and 200 patients in the control group). In the case (FH Pos.) group, 161 (80.5%) patients were male and 39 (19.5%) were female at a mean age of 54.94±3 years. Mean hospitalization rate in the positive FH group was 2.1 times, and the in-hospital death rate was 6%. In this study, 69.61% of the patients had AMI with ST-segment elevation and 30.39% showed non ST-segment elevation AMI. Moreover, we detected heart block in 19.47%. Mean of the ejection fraction (EF) in this group was 43±3.4%. Our results showed that 42.71% of the patients had diabetes mellitus (DM), 42.19% had dyslipidemia, and 73.74% had hypertension (HTN). Additionally, 79.9% of the patients had undergone coronary angiography (74.55% of them had abnormal findings), 36.27% percutaneous coronary intervention (PCI), 7.08% permanent pacemaker (PPM) implantation, and 34.8% coronary artery bypass graft (CABG) procedures.

In the FH Pos. group, 52.45% of the patients' parents [fathers (61%) more than mothers (39%); ratio=1.56; Fig.1]; also 47.55% of the sisters and brothers showed a positive history of CAD. Interestingly, we found that between the brothers and sisters, positive findings were 1.35 times more frequent in the brothers (57.5%) as opposed to the sisters (42.5%), which showed a stronger relationship between

the patient and his or her brothers (Fig 2). Another interesting finding was that there was a positive history of CAD in 65% of the second-degree relatives of the patients. There was more incidence of CAD history in the second-degree relatives from the father's side (56%) than the mother's side [44% (ratio=1.27); Fig. 3]. Furthermore, we detected positive FH of HTN in 24.51%, DM in 9.8%, coronary angiography in 26.98%, CABG in 19.05%, and PCI in 10.4 % in the FH Pos. group. In addition, the death rate because of CHD in the first- and second-degree relatives was 34.39%.

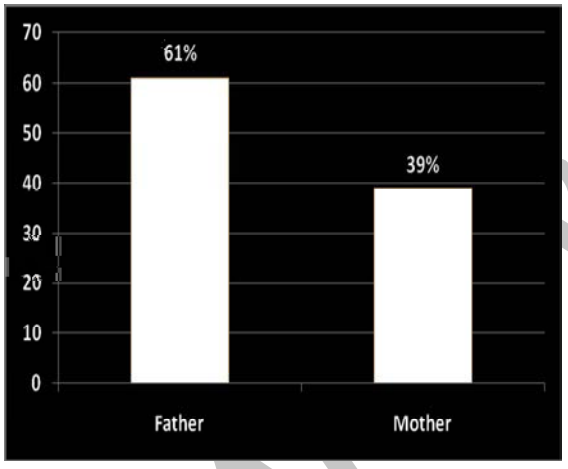

Fig.1. Relative frequency of history of coronary artery disease (CAD) in parents of patients in "Family history positive" group

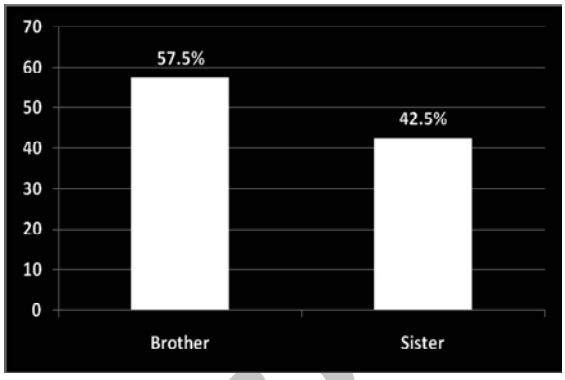

Fig. 1. Incidence of coronary artery disease (CAD) history in brothers and sisters of patients in "Family history positive" group

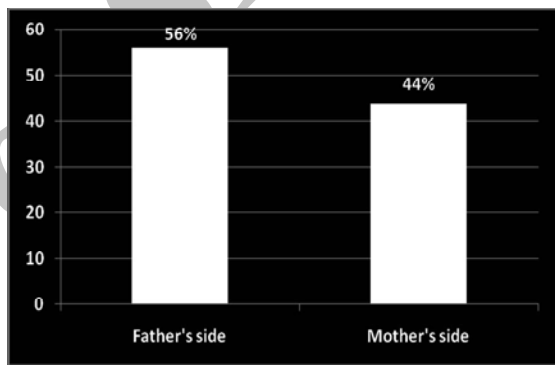

Fig. 3. Relative frequency of coronary artery disease (CAD) history in second-degree relatives of MI patients

In the control group, 69.01% of the patients were male and 30.99% were female, and the mean age of 63.74±12.56 years. Mean EF was 47±35% and mean hospitalization rate was 2.3 times. In this study, 26.76% of the patients had AMI with ST-segment elevation and 83.34% showed non ST-segment elevation AMI. Also, we detected heart block in 6.34% of the patients. Our results showed that 11.27% of the patients had DM, 14% had dyslipidemia, and 64.79% had HTN. Also, 39.9% of the patients underwent coronary angiography (25% abnormal), 3.52% PPM, and 14.79% CABG.

The differences between the case and control groups with respect to the amount of EF, coronary angiography, PCI, PPM, CABG, ST-elevation AMI, diabetes, and HTN were statistically significant ($p<0.005$). However, the difference between the two groups regarding DLP was not significant.

Discussion

This study showed that FH of MI, particularly parental history of MI, is associated with an increased risk of CAD. Our data also provide evidence that parental history of MI leads to more diagnostic and interventional procedures. Previous epidemiological studies showed that a parental history of heart disease was a significant independent risk factor for cardiac artery diseases [9-15]. Some of these studies paid attention to the initiating role of a familial propensity for CHD in the effect of lifestyle-related factors on the early onset of cardiovascular risk factors [1,3,7,14,17]. As a result, recently, FH of CAD is considered as an important risk factor in preventive medicine and in guidelines for clinical practice [4,12,19]. In this survey, we studied 400 MI patients regarding their FH of CAD and other cardiovascular risk factors. Most of the patients in the case and control groups were male. The results of the present study are in line with those of the previous reports by Kari et al. and Jomini et al., who showed that CAD was more prevalent in the male gender [16,20]. Also, the mean age in the patients with positive FH was lower than that in the control group (54.94 vs. 63.74 years). In this regard, our results are similar with those of the Harpaz study, which reported that patients with positive FH were younger (53 vs. 64 years) and more often male [9].

In comparison between the case and control groups, more patients had MI with ST elevation (69.61% vs. 26.76%), heart block (19.47%. vs. 6.34%), and low EF (mean 43±3.4 vs. 47±35) in the case group than in the control group. Moreover, major risk factors such as diabetes (42.71% vs. 11.27%), DLP (42.19% vs. 14%), and HTN (73.74% vs. 64.79%) in the patients with positive FH of CAD were higher than those in the patients with negative FH of CAD. In addition, the need to diagnostic and therapeutic procedures such as coronary angiography (79.9% vs. 39.9%), PPM (7.08% vs. 3.52%), and CABG (34.8% vs14.79%) was higher in the case group. In other words, during the hospital stay, coronary angiography, PCI, and CABG were more frequently carried out in the case group. The differences between the case and control groups in terms of all the aforementioned items were significant with the exception of DLP.

Our results, showing increased involvement among the patients with positive FH of CHD, are further supported by the De Bacquer et al. and Friedlander et al. studies: They noted in their studies that complications in subjects with positive FH of CAD were more than in patients with negative FH of CAD [6, 9, 10].

Regarding the history of CAD in the relatives of the case and control subjects, 52.45% of the parents of the case group (fathers more than mothers), 47.55% of the sisters and brothers (brothers 1.4 times sisters), and 65% of the second-degree relatives showed positive history of CAD. Furthermore, we detected positive history of HTN in 24.51%, diabetes in 9.8%, coronary angiography in 26.98%, CABG in 19.05%, and PCI in 10.4% among the relatives of the case group. In addition, the death rate due to CHD in the first- and second-degree relatives was 34.39%. These results showed that interventional procedures, major risk factors, and death rate because of CAD in the relatives of the patients in the case group were more than those in the control group.

This study showed that not only were the subjects with positive FH of CAD younger

and more susceptible to coronary heart disease than were the subjects with negative FH of CAD but also they required more frequent interventional procedures. There was also a difference in the power of the various kinds of positive FH. In the positive FH arm, there was a stronger relationship between the patient and his or her brothers than with sisters and there was 65% incidence in the second-degree relatives (especially from the father's side). We would, therefore, recommend that further studies be conducted to better evaluate second-degree relatives and their relationship with cardiovascular events.

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