Family History of Coronary Artery Disease as an Additional Risk Factor Associated with Coronary Artery Disease: A Descriptive Observational Study

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Abstract

Background: Globally Coronary Artery Disease (CAD) has emerged as one of the leading cause of death. This descriptive observational study was undertaken to assess the role of family history of premature coronary artery disease as an additional risk factor for CAD.

Methods and materials: Data were prospectively collected of 1000 consecutive patients of Ischemic heart disease who underwent cardiac catheterization and subsequent revascularization at Heart Institutes, Apollo BGS hospitals, Mysore, India between April 1, 2013, and March 31, 2014. Among these patients in addition to traditional risk factors for coronary artery disease like diabetes mellitus, obesity, hyperlipidemia, hypertension, smoking and obstructive sleep apnoea, the role of family history of premature coronary artery disease was assessed.

Results: Total number of patients who underwent cardiac catheterization during the study period was 1000. Mean age was 62.2 ± 11.4 yrs. Male comprised 720 patients (72%) and females 280 patients (28%). Positive family history of premature CAD was present in 32% (320 patients) of the total CAD patients studied. When family history of premature CAD was considered as risk factor, the mean age of CAD diagnosis was at 56 years compared to 62.2 years for those with a negative family history of CAD.

Conclusion: Family history of premature CAD is an additional risk factor and lowers the age of diagnosis for CAD.

Introduction

Over the last decade, cardiovascular disease especially coronary heart disease has become the largest cause of death worldwide. By 2030, World Health Organization predicts that worldwide 14.9% of death in men and 13.1% of deaths in women will be caused by Coronary heart disease [1]. Family history of CAD is considered a major risk factor in disease development not only because of inherited susceptibility genes, but also because of shared lifestyles that may exacerbate individual susceptibility to CAD [2].

There are three ways in which a positive family history might be related to the development of coronary heart disease: (a) as an index of the inheritance of risk factors; (b) as a truly independent risk factor; and (c) as a vulnerability factor potentiating the action of risk factors [3].

The aim of this study was to determine the presence of family history of premature CAD and assess its impact on CAD risk, independent of established risk factors like diabetes mellitus, obesity, hyperlipidemia, hypertension, smoking and obstructive sleep apnoea.

Methods

Study population

This was a descriptive observational study. Data were prospectively collected of 1000 consecutive patients of Ischemic heart disease who underwent cardiac catheterization and subsequent revascularisation at Heart institutes, Apollo BGS hospitals Mysore, India between April 1, 2013, and March 31, 2014. Among these patients the presence of family history of premature CAD was noted by the commonly used definition of premature coronary artery disease that has been utilized in the Framingham study (family history of <55 years in men and <65 years in women, first degree relatives) and its impact on CAD risk was determined, controlling for diabetes mellitus, obesity, hyperlipidemia, hypertension, smoking and obstructive sleep apnoea. This study was approved by the Institutional Review Board and informed consent was obtained from all the patients who participated in the study.

Data collection and analysis

Patient, disease and procedure characteristics were collected prospectively on all patients in the study. Patient characteristics included age, gender, diabetes mellitus, hypertension, obesity, hyperlipidemia, smoking, obstructive sleep apnoea and family history of CAD. Cardiac disease characteristics included history of myocardial infarction and unstable angina. Cardiovascular procedure characteristics recorded were type of revascularisation undergone like Percutaneous Coronary Intervention (PCI) and Coronary Artery Bypass Graft (CABG). The data obtained was
Results
The mean age was 62.2 ± 11.4 years. Males comprised 720 patients (72%) and females 280 patients (28%). Family history of premature CAD was present in 320 patients (32%) of which males were 224 (70%) and females were 96 (30%). When family history of premature CAD was considered as risk factor for CAD, the mean age of at CAD diagnosis was at 56 years, compared to 62.2 years for the negative family history of CAD patient category (Table 1). Family history of premature coronary artery disease during an encounter with the patient has greater predictive value and in this study it did affect the age of disease diagnosis which occurred earlier compared to overall study population.

Discussion
As observed in this study family history of premature CAD indicates the possible presence of deleterious mutations and this can make an individual susceptible for premature CAD. Therefore, the relationship between family history and disease risk might be used to separate population, behavioural, and environmental impacts of family history and help determine the genetic effect [4]. The INTERHEART study, an international case-control study, carried out in 52 countries concluded that abnormal lipids, smoking, hypertension, diabetes, abdominal obesity, psychosocial stress, decreased consumption of fruits and vegetables, moderate consumption of alcohol, and physical activity accounted for most of the risk of myocardial infarction worldwide. Collectively, these nine risk factors accounted for 90 per cent of the population Attributable Risk (PAR) in men and 94 per cent in women. The risk of heart attacks imposed by these risk factors was similar in both sexes, for all the population groups studied at all ages in all regions emphasizing the role of environmental origin of cardiovascular risk factors for all the ethnicities of the world [5]. Other studies also showed that in direct contrast with conventional thinking, 80% to 90% of patients with CHD have conventional risk factors. Although research on non-traditional risk factors and genetic causes of heart disease is important, clinical medicine, public health policies, and research efforts should place significant emphasis on the four conventional risk factors and the lifestyle behaviours causing them to reduce the epidemic of CHD [6]. Results of our study are consistent with the above mentioned studies and many other studies, which have indicated diabetes, hypertension, obesity, hyperlipidemia, smoking and obstructive sleep apnoea as strong predictors of CAD. Nonetheless results observed in this study also provide strong evidence for family history on early diagnosis of CAD among the study population as shown in other studies [7]. Results of our study indicate that while positive family history of premature CAD does not appear to impact general disease risk, it does significantly increase early onset of CAD (p=0.03). Hence, genetic characteristics should be integrated into the CAD classification, especially since risk of premature CAD is on the rise Worldwide.

Limitations
The population included in this study has limitations of ethnicity as it is restricted to the Indian subcontinent.

Conclusion
The present study shows that family history of premature CAD reduces the age of onset of coronary artery disease in high risk population. More studies are warranted to confirm our findings.

Summary
This study observed the presence of family history of premature CAD and assessed its impact on CAD risk independent of established risk factors like diabetes mellitus, obesity, hyperlipidemia, hypertension, smoking and obstructive sleep apnoea and results observed in this study suggests that family history of premature CAD is an independent predictor of the presence of premature coronary artery disease.

Table 1: Baseline Characteristics and Results.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Total=1000 patients (100%)</th>
<th>No Family h/o CAD=680 patients (68%)</th>
<th>Family h/o CAD =320 patients (32%)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Mean:62.2 ±11.4yrs</td>
<td>Mean:62.2 ±11.4yrs</td>
<td>56 yrs (p=0.03)</td>
<td>0.03</td>
</tr>
<tr>
<td>Male</td>
<td>720 (72%)</td>
<td>496 (71%)</td>
<td>224 (70%)</td>
<td>0.04</td>
</tr>
<tr>
<td>Female</td>
<td>280 (28%)</td>
<td>184 (27%)</td>
<td>96 (30%)</td>
<td>0.05</td>
</tr>
<tr>
<td>Diabetes Mellitus</td>
<td>400 (40%)</td>
<td>274 (40%)</td>
<td>126 (39.3%)</td>
<td>0.02</td>
</tr>
<tr>
<td>Obesity</td>
<td>240 (24%)</td>
<td>163 (23.9%)</td>
<td>77 (24%)</td>
<td>0.04</td>
</tr>
<tr>
<td>Hypertension</td>
<td>530 (53%)</td>
<td>372 (54.7%)</td>
<td>158 (49.3%)</td>
<td>0.02</td>
</tr>
<tr>
<td>Hyperlipidemia</td>
<td>380 (38%)</td>
<td>301 (44%)</td>
<td>79 (24.6%)</td>
<td>0.02</td>
</tr>
<tr>
<td>Smoking</td>
<td>340 (34%)</td>
<td>271 (39.8%)</td>
<td>69 (21.6%)</td>
<td>0.03</td>
</tr>
<tr>
<td>Obstructive Sleep apnoea</td>
<td>310(31%)</td>
<td>211 (31%)</td>
<td>99 (30.9%)</td>
<td>0.05</td>
</tr>
<tr>
<td>Myocardial infarction</td>
<td>560 (56%)</td>
<td>448 (65.8%)</td>
<td>112 (35%)</td>
<td>0.01</td>
</tr>
<tr>
<td>Unstable angina</td>
<td>440 (44%)</td>
<td>232 (34%)</td>
<td>208 (65%)</td>
<td>0.01</td>
</tr>
<tr>
<td>PCI</td>
<td>470 (47%)</td>
<td>283 (41.6%)</td>
<td>187 (58.5)</td>
<td>0.02</td>
</tr>
</tbody>
</table>

tabulated and analyzed using rates, ratios, percentages and chi-square test.
References


7. Justin M. Bachmann, Benjamin L. Willis, Colby R. Ayers et al; Association Between Family History and Coronary Heart Disease Death Across Long-Term Follow-Up in Men-The Cooper Center Longitudinal Study. Circulation 2012; 125:3092-98.