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Influence of parental consanguinity on the prevalence of coronary artery disease in the progeny

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Abstract

Over the last decade, cardiovascular disease especially coronary heart disease has become the largest cause of death worldwide. This study was taken to determine the effects of parental consanguinity on the coronary artery disease (CAD) risk in the progeny. Over a period of one year from April 2010 to March 2011, 1000 patients of CAD who underwent cardiac catheterization were included in the study. Among these patients the presence of parental consanguinity and family history of CAD was noted and their impact on CAD risk was determined, controlling for diabetes mellitus, hyperlipidemia, hypertension and smoking. Parental consanguinity was present in 1.5 % (15 patients) of the total CAD patients studied. 1% (10 patients) had both parental consanguinity and family history of CAD. While consanguinity did not promote risk of CAD, but along with family history of CAD it did affect age of disease diagnosis. When both consanguinity and family history of CAD were considered as risk factors for CAD, the mean age of at CAD diagnosis was 51.2 years, compared to 62.2 years for the no-risk factor patient category. Parental consanguinity and family history of CAD is an additional risk factor and lowers the age of diagnosis for CAD. Given the extremely high prevalence of premature CAD in South Asian population, an investigation of recessive genes as predisposing factors for CAD would appear to be warranted.
Keywords: Coronary heart disease, Consanguinity.

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Introduction

Deaths due to coronary heart disease (CAD) in India are increasing; from 1990 to 2000, CAD deaths rose from 1.17 million to 1.59 million. It is predicted that annual deaths from CAD will be approximately 2.03 million by 2010 (Ghaffar *et al*., 2004; Robert *et al.,* 2012). CAD is a multifactorial disease, with both acquired and inherited components implicated in its etiology (Nordlie *et al*., 2005). Consanguinity, defined as individuals whose parents are blood relatives, has been demonstrated to play a role in the development of CAD in young adults. Enhanced autozygous inheritance of recessive susceptibility alleles influences disease development

Independent of family history (Abu-Amero *et al.,* 2006).Consanguineous marriage is common in most Indian communities. Family history of CAD is considered a major risk factor in disease development (Scheuner *et al.,* 1997), not only because of inherited susceptibility genes, but also because of shared lifestyles that may exacerbate individual susceptibility to CAD (Scheuner *et al.,* 2004). Hence, we sought to assess the impact of parental consanguinity on the prevalence of CAD in the progeny.

Materials and methods

We prospectively included in the study, over a period of 1 year from April 2010 to March 2011, 1000 patients of CAD who underwent cardiac catheterization (Table 1). Among these patients the presence of parental consanguinity and family history of CAD was noted and their impact on CAD risk was determined, controlling for diabetes mellitus, hyperlipidemia, hypertension and smoking.

Results

Total number of patients who underwent cardiac catheterization during the study period was 1000.Mean

Table 1. Baseline characteristics and results

	Total=1000 patients	Family h/o CAD=320(32%)	Consanguinity 15 (1.5%)	Family h/o & Consanguinity 10 (1%)
Age	Mean:62.2 ±11.4yrs	56 yrs	54 yrs	51.2 yrs
Male	720 (72%)	224 (70%)	14 (93.3%)	9 (90%)
Female	280 (28%)	96 (30%)	1 (6.6%)	1 (10%)
Diabetes	400 (40%)	126 (39.3%)	6(40%)	6 (60%)
Hypertension	530 (53%)	158 (49.3%)	8(53.3%)	5 (50%)
Hyperlipidemia	380 (38%)	79 (24.6%)	3 (20%)	2 (20%)
Smoking	340 (34%)	69 (21.6%)	3 (20%)	1 (10%)
Myocardial infarction	560 (56%)	112 (35%)	6 (40%)	3 (30%)
Unstable angina	440 (44%)	208 (65%)	9 (60%)	7 (70%)
PTCA	470 (47%)	187 (58.5)	7 (46.6%)	4 (40%)
CABG	190 (19%)	40 (12.5%)	3 (20%)	3 (30%)

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age was 62.2 ± 11.4yrs .Male comprised 720 patients (72%) and females 280 patients (28%). Parental consanguinity was present in 1.5 % (15 patients) of the total CAD patients studied. 1 % (10 patients) had both parental consanguinity and family history of CAD. When both consanguinity and family history of CAD were considered as risk factors for CAD, the mean age of at CAD diagnosis was at 51.2 years, compared to 62.2 years for the no-risk factor patient category. While consanguinity did not promote risk of CAD, but along with family history of CAD it did affect age of disease diagnosis which was earlier compared to overall study population.

Discussion

Consanguinity has long been encouraged by economic and cultural factors, promoting strong endogamy even in the presence of some gene flow, in small family-sized groups with correspondingly small effective population sizes (Bittles *et al.,* 2010). The numbers of alleles in such small populations are expected to reach equilibrium relatively quickly at a value reduced from pan-mictic levels (Hartl *et al.,* 2007). While family history indicates the possible presence of deleterious mutations, consanguinity promotes homozygosity among those mutations. Consanguinity can also mark subpopulations where drift can promote and sustain more deleterious mutations. Therefore, the relationship between consanguinity and disease risk with and without family history might be used to separate Population, behavioral, and environmental impacts of family history or consanguineous culture, and help determine the genetic effect (Youhanna *et al.,* 2010). Results of our study are consistent with many other studies, which have indicated diabetes, hypertension, hyperlipidemia and smoking as strong predictors of CAD. Nonetheless our results also provide strong evidence for the impact of consanguinity and family history on early diagnosis of CAD among the study population. Our study shows that while consanguinity does not appear to impact general disease risk, it does significantly increase early onset of CAD, as similarly shown in earlier studies (Youhanna *et al.,* 2010). Hence, genetic characteristics should be integrated into the CAD classification, especially in premature CAD prone high risk Indian subcontinent, where consanguinity is common in the general population.

Conclusion

Parental consanguinity and family history of CAD is an additional risk factor and lowers the age of diagnosis for CAD. Given the extremely high prevalence of premature CAD in South Asian population, an investigation of recessive genes as predisposing factors for CAD would appear to be warranted.

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