



Original article

Screening general population for family history of sudden cardiac death unmasks high risk individuals as potential victims (pilot study)

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ABSTRACT

As there are no large scale Egyptian surveys estimating the prevalence of cardiac disease and the incidence of SCD in a non-selected population, the purpose of this report was to assess the relation between family history of SCD and the presence of CAD or coronary risk factors in first degree relatives of SCD victims searching for potential victims.

A questionnaire screening CAD risk factors and cardiac problems as indicators for SCD was developed. Data were collected from 8786 candidates by means of a questionnaire only protocol (random samples (8117)) and questionnaire plus clinical examination, ECG and laboratory investigations during medical convoys (random samples (669)). Data were coded and verified according to presence and absence of CAD risk factors, IHD and other risk factors in order that a triage could be performed in the general population to detect adults at risk of SCD.

Family history of CAD, DM and HTN head the list of risk factors more frequently associated with family history of SCD clearly pointing the role played by those comorbidities in pointing to potential victims of SCD.

Compared to those with no family history of SCD, those with positive family history of SCD were 8.7 times more associated with family history of DM, 12 times more associated with family history of CAD, 7 times more associated with family history of HTN.

This study underscores the importance of searching for positive family history of sudden cardiac death as a warning marker a red flag that makes familial evaluation strongly recommended.

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1. Introduction

Sudden Cardiac Death is defined according to ACC/AHA/ESC 2015 guidelines for management of patients with ventricular arrhythmia (VA) and the prevention of sudden cardiac death (SCD) as an unanticipated and non-traumatic deadly event taking place within one hour of the symptoms onset [1].

SCD incidence is approximately more than 3.7 million per year around the world, out of which 250,000–300,000 are in USA [2,3]. The annual incidence of SCD in USA and Europe is estimated to be

from 50 to 100 per 100,000 in the general population [4–6], and reported to range from 37 to 43 per 100,000 in Asia [7–10]. Our study is an attempt to address the population of SCD and the associated risk factors of coronary artery disease in Egypt, an important large African nation.

SCD is what up to half of cardiac deaths are attributed to [4,38–40]. Although SCD mostly occur in CAD settings [11–13], CAD are not previously recognized in more than half of SCD cases and sudden cardiac arrest is the first symptom

In the general population, the risk factors for sudden death are generally the same as the major risk factors for the development of CAD [11].

The main reasons behind the ambiguity of SCD annual incidence is not only because most of studies are retrospective and/or dependent on death certificates data, but because of the discrepancies in case definitions and determination of SCD also [14].

Regardless the presence of many co-morbidities, SCD is listed to be the primary death cause in death certificates in many cases [18].

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Death certificates are found to overestimate the incidence of SCD yet it does not account SCA survivors [15–17].

Like death certificate data, other sources of retrospective case ascertainment such as vital statistics and census data also misclassify and can overestimate SCD. The prospective community-based studies, used data from first-responders, which results in the inherent exclusion of un-witnessed SCA and/or SCD [18].

As CAD has been found to cluster in families [19], individuals with positive family history of SCD are more liable to SCA, besides the main documented risk factors of CAD and primary cardiac arrest is found to have genetic determinants [19]. The hypothesis developed is whether the aggregation of PCA is due to the familial aggregation of these risk factors or to genetic and/or environmental determinants that other family members share. In several studies, a family history of MI or CHD was shown to be a strong predictor of CHD, even after adjustment for other risk factors [19], yet this issue has remained controversial [20].

As there are no large scale Egyptian surveys estimating the prevalence of cardiac disease and associated clinical symptoms or the incidence of SCD in a non-selected (e.g. non-athlete) population, the purpose of this report was to assess the relation between family history of SCD and the presence of CAD or coronary risk factors as first degree relatives of SCD victims.

2. Aim of the study

This pilot study is aiming to estimate the magnitude of SCD problem in Egypt and searching for potential victims. A fast-response questionnaire screening CAD risk factors and cardiac problems as indicators for SCD was developed, it had to be a short questionnaire in order to receive a great adherence and that could simultaneously provide precise information, in a way that a triage could be performed in the general adult population to detect adults at risk of SCD and with an indication for further evaluation and possible need of:

- Medical Treatment
- Electro-physiologic (EP) Study and/or Percutaneous Ablation
- Implantable Cardioverter Defibrillator (ICD)
- Pacemaker implantation
- Other Types Of Specialized Cardiac Interventions

3. Population

This is a prospective community based study conducted throughout the year 2015 (pilot study) on 8786 candidates. Of them, 7916 completed the questionnaires, with a response rate of 90% (total completed/total surveyed). Ages ranged from 4 years to 85 years with a median of 18, males constituted 34.4% of the total vs. (65.6%) females. Out of total those below 20 years constituted 77.6% (6497), those from 20 years to 40 years constituted 10.4% (868), and those above 40 years constituted 12.2% (1015) while males constituted 34.4% (3845) of the total vs. 65.6% (5936) females.

3.1. Places of sample collection

- University departments (Cairo University employees): 839
- Student associations and other places that gather university students (Cairo University): 6744
- Sports venues (shooting club): 534.
- Convoys to different geographic locations: 669. (El Saf, El Moneeb, El Marg, Ain el Syra, Shabramant)

Information collection in these places was performed under the permission of proper authorities.

4. Methodology

Data were collected by means of **1) a questionnaire only protocol** (random samples were collected among university students, social clubs and governmental employees) and **2) a questionnaire plus clinical examination, ECG and laboratory investigations** during medical convoys (random samples were collected from rural areas). Data were coded and verified according to presence and absence of coronary artery disease risk factors, ischemic heart disease and other risk factors shown in Fig. 1.

SCD Risk Factors studied/included:

- o **Family History of SCD**
- o **DM:** on anti-diabetic treatment
- o **Family history of DM**
- o **Hypertension:** Blood pressure above 140/90 mmHg
- o **Family history of Hypertension**
- o **Hypercholesterolemia:** Lipid lowering drugs
- o **CAD:** Coronary Artery Disease
- o **Family history of CAD**
- o **CHF:** Congestive Heart Failure
- o **ICD:** Implantable Cardioverter Defibrillator
- o **RHD:** Rheumatic Heart Disease
- o **CHB:** Complete Heart Block
- o **HOCM:** Hypertrophic Obstructive Cardiomyopathy
- o **Obesity:**
- o **Smoking**

Positive family history of SCD was chosen empirically as a potential marker for vulnerability of SCD. Data was analyzed using SPSS22 –statistical package for social science. We could elicit the number of subjects who completed the questionnaire according to each risk factor.

5. Statistical methods

- Data were coded, verified,
- All quantitative variables were expressed as mean and SD, qualitative variables were expressed as percentages in frequency tables
- Chi-square test has been used to test association between qualitative variables.
- P value less 0.05 considered significant.
- Data was analyzed using SPSS22 –statistical package for social science.
- Odds ratio (OR) has been calculated with 95% confidence interval (CI)

6. Results

Data were looked up and analyzed from four different aspects to estimate the following

1. The prevalence of positive family history of SCD among general population of 8786 candidates.
2. The prevalence of positive family history for variable risk factors for CAD, the actual presence of CAD risk factors and structural heart diseases within the entire group of 8786 representing the general population.
3. The prevalence of positive family history for variable risk factors for CAD, the actual presence of CAD risk factors and

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