Family History of Non-communicable Disease and its Relationship in Acute Coronary Syndrome with or without Diabetes Mellitus

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Abstract

Worldwide, non-communicable diseases which involve heart disease, diabetes mellitus and hypertension, represent a major risk factor that increases morbidity and mortality of acute coronary syndrome (ACS). The Objective of this study is to assess the Association of family history of non-communicable diseases in ACS patients with diabetes mellitus. This study is descriptive study of 175 ACS patients reported to the cardiology department in a tertiary care center in Ajman, UAE. Patient records were viewed on the computer database and all the necessary information required to achieve the objectives were extracted and filled in the checklist prepared. The data was analyzed by SPSS 20 and Chi square test was done to assess the association. The results shows that the non-communicable diseases reported were diabetes mellitus, hypertension and heart diseases. The degree of relation was divided into first and second degrees. The first degree of relation included (father, mother, brother, sister or more than one of them. The second degree of relation included (uncle, cousin, aunt, grandfather, grandmother etc.).

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There were 11(91.7%) patients with first degree family history of DM and 1(8.3%) patient with second degree relation. Out of the 14 patients that gave positive family history of hypertension only one was second degree of relation and all the rest were first degree of relation. Regarding the most common non-communicable disease, heart disease, 18(94.7%) patients had first degree relatives and 1(5.3%) second degree relative with history of heart disease. As a conclusion we can say that among the ACS patients with family history of heart diseases, majority of them (94.7%) had in first degree relatives whereas in the case of family history of hypertension and diabetes, it was also highly reported in first degree relatives with 92.9% and 91.7% respectively. It was also found family history of DM has a major role for the occurrence of DM in ACS patients.

Keywords: non-communicable disease; family history; acute coronary syndrome.

1. Introduction

World Health Organization reported that around 57 million individuals died worldwide in 2008. Around 7 million of them died due to ischemic heart disease (IHD) and 6.2 million people died because of stroke [1]. In the United Arab Emirates, cardiovascular disease mainly myocardial infarction is the principal cause of death; representing 28% of total deaths [2]. Thus IHD represents a serious socio-medical problem [3].

As for diabetes, in 2030 diabetes mellitus will be ranked as the seventh cause of death [4] and the number of cases of DM is expected to be 342 million. The fifth edition of the Diabetes Atlas, released in 2011 by the International Diabetes Federation (IDF), about 19.2 % of the UAE residents flanked by 20 and 80 years of age suffer from diabetes [5].

In recent years, studies have shown that there is a high association between diabetes and coronary heart diseases (e.g. myocardial infarction), in 10 to 24% of cases of myocardial infarction are actually diabetic and this makes DM a powerful risk factor for coronary heart disease [6,7]. In addition, the risk of acute coronary syndrome is doubled if diabetes is present [8].

Acute coronary disease contributes to many other risk factor other than diabetes mellitus such as family history of non-communicable diseases. In the Middle East, the incidence of non-communicable diseases in acute coronary syndrome continuously rises especially in non-diabetics. A conducted to monitor the prevalence of family history of non-communicable diseases in ACS which showed in order first heart disease (10.9%), second diabetes mellitus (8%) and thirdly hypertension (5.1%) [9]. Worldwide, non-communicable diseases which involves heart disease, diabetes mellitus and hypertension, represents major risk factor that increase morbidity and mortality of ACS [10]. Cardiovascular disease (CVD) is rising in developing countries. However, the impact of modifiable CVD risk factors on acute coronary syndrome has not been studied in the Gulf Cooperate Council Countries (GCC). Therefore, this study was set to assess the relation between family history of non-communicable disease in patients of ACS with or without diabetes mellitus.

2. Materials & Methods

This research was a hospital based descriptive study conducted among patients with acute coronary syndrome

reported to the Department of Cardiology in a tertiary care center in Ajman, UAE. After obtaining the approval from the Ethics Committee of Gulf Medical University and permission from Medical Director, data collection was started. Confidentiality of the information collected and anonymity of the patients was ensured.

Patients' hospital numbers were collected from the coronary care unit (CCU) register. Patient records were viewed on the computer database and all the necessary information required to achieve the objectives were extracted and filled in the checklist form prepared. The checklist had socio-demographic characteristics, personal history, and family history of non-communicable diseases. The data was fed into the Excel spread sheet directly. Personal and family history of diabetes mellitus, hypertension and cardiovascular diseases were collected from the records along with the socio-demographic details.

The data obtained from the records were coded. After coding each option, data was imported to Statistical Package for the Social Sciences (SPSS) program version 20 for analysis. The results were then presented in frequency tables, figures and texts. Chi-square test was performed to test the association between variables. Statistical significance was set at p≤0.05.

3. Results

Table 1

Distribution of participants according to Family history of non-communicable disease (N=175)

Family history of non-communicable disease	No.	%
No diseases	128	73.1
Diabetes Mellitus	14	8.0
Hypertension	9	5.1
Heart diseases	19	10.9
Diabetes & Heart Diseases	1	0.6
Hypertension, Diabetes mellitus, and Heart diseases	4	2.3
Total	175	100

Table 1 represents the distribution of participants according to Family history of non-communicable disease (N=175). There are 128 (73.1%) patients with ACS who do not have family history of any non-communicable disease. 14 (8.0%) patients with ACS have a family history of diabetes mellitus; 9 (5.1%) patients with ACS have a family history of hypertension. 19 (10.9%) patients with ACS have a family history of heart disease. There was only 1 (0.6%) patient who had a family history of both diabetes and heart disease and 4 (2.3%) patients with ACS had hypertension, diabetes mellitus, and heart disease.

Table 2

Participants according to Family history of non-communicable and the degree of relation

Family history of non-communicable disease	First degree		Second degree	
	No.	%	No.	%
Diabetes Mellitus(N=12)	11	91.7	1	8.3
Hypertension(N=14)	13	92.9	1	7.1
Heart diseases(N=19)	18	94.7	1	5.3

Table 2 shows the distribution of the ACS patients according to presence of family history of non-communicable disease and the degree of relation. The non-communicable diseases that recorded are Diabetes Mellitus, Hypertension and Heart diseases. The degree of relation was divided into first and second degrees. The first degree of relation included father, mother, brother, sister or any two of them. The second degree relation included uncle, cousin, aunt, grandfather or grandmother etc. Out of the 175 patients, 47 (26.9%) patients gave a positive family history of non-communicable disease of which the most common disease with respect to the reported degree of relation was found to be heart disease with 19 patients of positive family history; Hypertension for 14 patients; Diabetes Mellitus for 12 patients and 2 patients were not stated regarding degree of relation. There were 11(91.7%) patients with first degree family history of DM and 1(8.3%) patient of second degree. Out of the 14 patients that gave positive family history of hypertension, only one was second degree relation and all the rest were first degree relations. Regarding the most common non-communicable disease, heart disease, 18 (94.7%) had first degree relation and 1(5.3%) second degree.

Table 3

Comparison of ACS patients with or without Diabetes mellitus by Family history of non-communicable disease

Family history of non-communicable disease	Groups	ACS with DM		ACS without DM		P value
		No.	%	No.	%	
Diabetes Mellitus	Yes	11	57.9	8	42.1	NS
	No	64	41.0	92	59.0	
Hypertension	Yes	8	42.1	11	57.9	NS
	No	67	42.9	89	57.1	
Heart diseases	Yes	6	25.0	18	75.0	NS
	No	69	45.7	82	54.3	

(N=175)

This table shows a comparison of ACS patients with and without Diabetes mellitus by family history of non-communicable diseases. All 175 participants are subdivided according to the presence or absence of family history of diabetes mellitus, hypertension, and heart diseases. Among participants with family history of diabetes mellitus, 11 (57.9%) had ACS with DM and 8 (42.1%) had ACS without diabetes. However, among participants with no family history of diabetes, there were 64 (41.0%) cases of ACS with DM, and 92 (59.0%) with ACS but without DM. In participants with family history of hypertension there were 8 (42.1%) patients who suffered from ACS with DM and 11 (57.9%) with ACS, but without diabetes mellitus. Participants with no family history of hypertension but with ACS and DM were 67 (42.9%), and among participants with no family history of hypertension 89 (57.1%) were with ACS but without DM. Among participants with family history of heart diseases, 6 (25.0 %) had ACS with DM and 18 (75.0%) had ACS without DM. However, in patients with no family history of heart diseases, there were 69 (45.7%) with ACS and DM, and 82 (54.3%) were ACS without DM.

Cases of ACS with DM were 11 (14.7%) in the presence of family history of DM but 64 (85.3%) in the absence of family history of DM. However, in all cases of ACS without diabetes, there were 8 (8.0%) cases with positive family history of DM and 92 (92.0%) cases with no family history of DM. Moreover, in cases of ACS with DM, there were 8 (10.7%) cases associated with positive family history of hypertension and 67 (89.3%) cases associated with negative family history of hypertension. In addition, in cases of ACS without DM there were 11 (11.0%) with positive family history of HT and 89 (89.0%) with negative family history of HT. The number of cases of ACS with DM having positive family history of heart diseases were 69 (92.0%) but 6 (8.0%) cases were with negative family history of heart diseases. However, in cases of ACS without DM there were 82 (82%) with positive family history of heart diseases and 18 (18%) having negative family history of heart diseases.

Table 4

Independent and combined effect of family history of non-communicable diseases in ACS patients with or without Diabetes mellitus (N=175)

Family history of non-communicable diseases in detail	ACS with DM		ACS without DM	
	No.	%	No.	%
Hypertension	2	22.2	7	77.8
Diabetes	9	64.3	5	35.7
Heart Disease	4	21.1	15	78.9
Combined Disease Effect	2	40.0	3	60.0

Table 4 describes the independent and combined influence of different non-communicable diseases on acute coronary syndrome and diabetes mellitus. The major contribution (64.3%) towards ACS patients with DM was found as from patients with family history of diabetes. It was also observed that 22.2% and 21.1% of ACS patients with family history of hypertension and heart disease had diabetes mellitus whereas major part of patients with family history of same diseases was without Diabetes mellitus. The ACS patients with family history of non-communicable diseases were not found to have a high impact on the occurrence of diabetes mellitus except for the family history of diabetes.
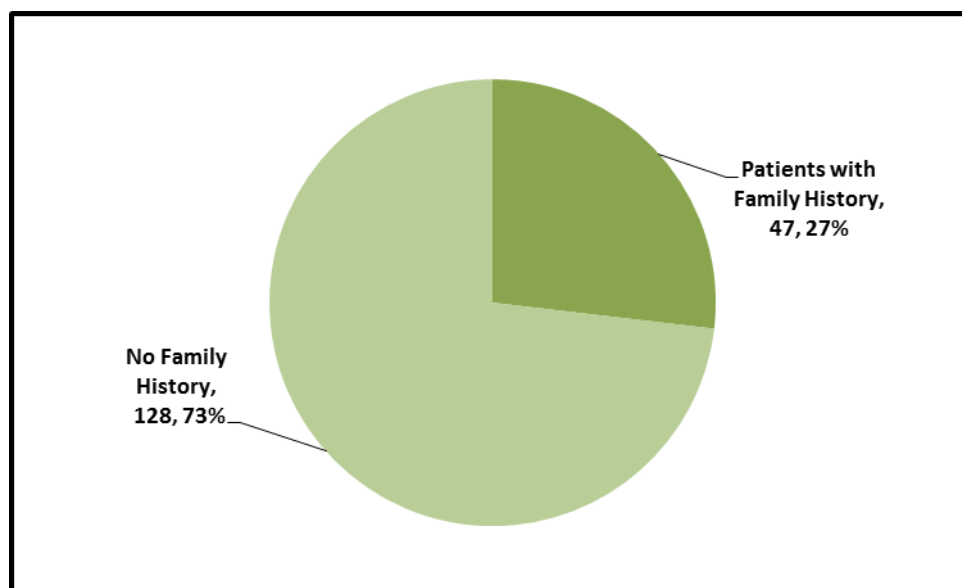
Figure 1

Distribution of ACS patients with Family history of any non-communicable disease (N=175)

The Figure 1 shows distribution of ACS patients without family history and with family history of any non-communicable disease such as Diabetes Mellitus, Hypertension and Heart Disease. This gives an overall idea about patients' family history among the total participants of 175 where 47 (26.9%) were with a family history of any non-communicable disease and 128 (73.1%) were without family history.

Table 5

Comparison of ACS patients with or without Diabetes mellitus by family history of any non-communicable disease (N=175)

Family history of any non-communicable disease (DM, Hypertension & Heart Disease)	ACS with DM		ACS without DM		P value
	No.	%	No.	%	
Yes	17	36.2	30	63.8	NS
No	58	45.3	70	54.7	

Table 5 describes comparison between family history as a whole and ACS patients with DM/without DM. The ACS patients with family history of any non-communicable disease found to be 17 (36.2%) who had Diabetes Mellitus compared to patients without DM of 63.8%. Among the ACS patients with Diabetes, there was found 22.7% had family history of any disease whereas 77.3% without any family history. Based on the present data, it was observed that family history of any disease is not a statistically significant factor associated with Diabetes even though there is high chance of DM when there is family history of DM specifically.

4. Discussion

In our study, there was a considerable variability in agreement between patients with family history of non-communicable diseases and ACS patients with non-communicable diseases such as hypertension, diabetes and heart Diseases. In the present study of ACS patients, we found that 42.9% had diabetes and 83.4% hypertension. With respect to family history of non-communicable diseases, of the ACS patients 10.9% each had family history of Hypertension and Diabetes with a family history of heart disease for 13.7%. Also, our study could not find any statistically significant association between presence of non-communicable diseases and family history. In this study we observed that 84% of ACS patients without family history of hypertension had hypertension currently compared to 78.9% of ACS patients with family history of hypertension. With regard to family history of diabetes, it was seen that 57.9% of ACS patients with family history of diabetes had diabetes compared to 41.0% without family history of diabetes. Of the ACS patients with family history of heart disease, 79.2% and 25.0% were patients with hypertension and diabetes respectively compared to those without family history (84.1% and 45.7%). All the above mentioned results show that there is no a significant influence for family history on the occurrence of stated non-communicable diseases except in the case of diabetes.

A study done in Tehran Heart Centre among 6399 coronary artery disease patients, concluded that positive family history is a major risk factor for coronary artery disease and the mean age of clinical onset of ischemic heart disease in patients with a positive history was significantly lower than patients with no history (p≤0.001) [11]. But our study shows no significant association either between family history of heart diseases and past history of ACS or any other non-communicable disease such as hypertension, Diabetes and heart disease. Here the result shows 13.3% participants without family history of any non-communicable disease had past ACS history compared to 8.5% with family history. It was also seen that mean age of ACS patients are significantly different among those with family history of heart disease (p ≤0.05) and those without. Mean age is lower in patient group with family history of heart disease. Also a population-based case-control study conducted in Tirana shows that family history of coronary heart disease represents a strong predictor for acute coronary syndrome [12].

One of the studies done in Taiwan shows family history of diabetes, diabetes duration, diabetes regimen, control of blood glucose and the presence of nephropathy, as attested by proteinuria, did not contribute to the risk of hypertension. Among 608 diabetic subjects, the prevalence of hypertension was 42.2% (27 of 64) and 31.1% (169 of 544) respectively, for those with and without a family history of diabetes (P ≥0.10)[13]. Our study reports that 84.6% of ACS patients who do not have family history of diabetes have hypertension, more compared to 73.7% of ACS patients with family history of diabetes who had hypertension. On the other hand among ACS patients with hypertension only 9.6% had family history of diabetes.

In a study population consisting of type 1 and type 2 diabetic men and women, about 48% had family history of cardiovascular disease [14]. In our study, 17.3% of patients with II diabetes reported they had past history of ACS compared to 8.0% of non-diabetic participants with ACS history. It was also observed that there was no significant association between ACS history and current condition of diabetes (P≤0.06).

Articles on recent advances in the management of chronic stable angina II, Anti-Ischemic therapy reports traditional risk factors of CAD as age, gender, family history, use of tobacco, hypertension, dyslipidemia, and diabetes mellitus [15, 16]. But in our study of 175 ACS patients, we found only 13.7% of the participants to have family history of heart disease - 10.9% of participants each with family history of hypertension and diabetes. It was also observed in the study 42.9% had diabetes, 83.4% hypertension and 75.4% dyslipidemia. Majority (74.8%) of ACS patients were in above 40 years age group. When considering gender variation among ACS patients, 88.6% were males and 11.4% females. Of the total study group 54.9% were never smokers.

A study between Jan 1993 – Dec 1995, among 530 patients with acute myocardial infarction considered family history to be positive when symptomatic coronary artery disease occurred before the age 60 years in siblings, parents, parents' siblings or grandparents[17]. Our study shows 76.6% of the participants with ACS belong to the age group below 60 years among which only 10.4% had past history of ACS compared to the other age group 60 and above (17.1%). This study disagrees with a previous finding that adult patients (Age <65y) and elderly patients (Age ≥65y) had a significant association with past history of ACS (P ≤0.05); 27.8% of those in the age group 65 years and above had past history of ACS compared to 10.2% in those aged less than 65 years with past history of ACS. The above mentioned study did not find any difference in family history, chronic angina, and previous myocardial infarction, and hypertension, history of heart failure, diabetes, antianginal therapy and clinical symptoms of heart failure in the adult and elderly age groups. But our study shows variability between adult and elderly age group with respect to family history of hypertension, 11.5% and 5.6%. A major difference can be seen related to family history heart disease in adult and elderly category as 15.3% and 0.0%. Our study supports the stated study result in that there is no statistically significant association between age group and family history of heart disease (P≥0.139). But almost similar proportion of patients in the two age groups had family history of diabetes, 10.8% and 11.1%. Even though the 1995 study shows no significant association with Acute Myocardial Infarction and present condition of diabetes and hypertension in adult and elderly age groups, our study observed a statistically significant association for presence of diabetes (p ≤0.01), but not for hypertension (P≥0.741).

Kones R reported family history to be an important cardiovascular risk factor and epidemiologic evidence suggests about half of the risk for coronary heart disease is heritable[18]. While in our study, a wide-range of disparity is seen for association of family history of non-communicable diseases with current condition of hypertension, diabetes, history of ACS but none significant.

In a case-control study conducted in Italy found that the risk for acute myocardial infarction increased twofold to fourfold in subjects with a family history compared with those without. The study also reports that when known risk factors were considered for their interaction with family history, the effect on RR was approximately multiplicative for several variables, including smoking, serum cholesterol, hypertension, and hyperlipidemia but not for diabetes mellitus and body mass index[19]. Our study also reports family history of diabetes has a major influence on the occurrence of diabetes and in other non-communicable diseases, family history is not an influencing factor.

Our study has several limitations. Firstly, the sample size is small, that made it difficult to analyze the data for associations between the variables, and generalization. Secondly, being secondary data, a lack of reliable information related to some variables such as duration of diabetes and other details limited the scope of our analysis.

5. Conclusion

The study found that family history of Diabetes Mellitus has a major influence in the ACS patients of diabetes mellitus, even if there is no association for family history of other non-communicable disease such as hypertension and heart disease in the diabetes patients of acute coronary syndrome. Based on the study participants, distribution of ACS patients with or without diabetes is almost equally distributed among the groups, with and without family history of hypertension. Regarding patients with family history of heart disease, most of them were ACS patients without Diabetes Mellitus. Another finding was related to degree of relation and family history of non-communicable diseases where first degree relatives were found to be the majority compared to second degree relatives with heart diseases, hypertension and diabetes.

In an overall view on family history of all non-communicable diseases (Diabetes Mellitus, Hypertension and Heart Disease), family history is not possessing as a statistical significant factor for diabetes in ACS patients, even if there is notable contribution for family history of diabetes towards DM in ACS patients.

References

[1] World Health Organization. (2011). *Global atlas on cardiovascular disease prevention and control.* Available:http://www.who.int/cardiovascular_diseases/publications/atlas_cvd/en/[Jul 20, 2013].

[2] Staff Reporter. "Heart disease leading cause of deaths in UAE". *KhaleejTimes*(Dec. 15, 2006).

[3] S. Alajbegović, Z. Metelko, Z. Alajbegović, E. Mehmedika-suljić, H. Resić. "Prevalence and Significance of diabetes in patients with acute myocardial infarction."*DiabetologiaCroatica,Vol.* 35, pp. 75-82, 2007 .

[4] NR. Colledge, BR. Walker, SH. Ralston."Davidson's Principles and Practice of Medicine," 21st ed., Churchill Livingstone, 2010.

[5] International Diabetes Federation. (2011). *Diabetes Atlas.*Available: http://www.idf.org/diabetesatlas [Jul 19, 2013].

[6] A. Tenerz, I. Longberg, C. Berne, G. Nilsson, J. Leppert."Myocardial infarction and prevalence of diabetes mellitus Is increased casual blood glucose at admission a reliable criterion for the diagnosis of diabetes?." *European Heart Journal*, Vol.22, pp. 1102-110, 2001.

[7] DK. McGuire, H. Emanuelsson, CB. Granger, E. Ohman, DJ. Moliterno, HD White, et al. "Influence of

diabetes mellitus on clinical outcomes across the spectrum of acute coronary syndromes."*Gusto-IIb.Eur Heart Journal*, Vol. 21, pp. 1750–8, Nov. 2000.

[8] National Heart, Lung, and Blood Institute. (2003). *The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7).* Available: http://www.nhlbi.nih.gov/guidelines/hypertension/ [Jul 24, 2013].

[9] RF. Al-Aqeedi, WK. Abdullatef, W. Dabdoob, A. Bener, HA. Albinali, A. Gehani. "The prevalence of metabolic syndrome components, individually and in combination, in male patients admitted with acute coronary syndrome, without previous diagnosis of diabetes mellitus." *The Libyan Journal of Medicine*, Vol. 19, pp. 20185, Mar. 2013.

[10] J.Suwaidi, M. Zubaid, AA. El-Menyar, R. Singh, W. Rashed, M.Ridha, et al. "Prevalence of the Metabolic Syndrome in Patients with Acute Coronary Syndrome in Six Middle Eastern Countries." *The Journal of Clinical Hypertension,* Vol. 12, pp. 890-899, Nov. 2010.

[11] K Hoseini, S. Sadeghian, M. Mahmoudian, R. Hamidian, A. Abbasi."Family history of cardiovascular disease as a risk factor for coronary artery disease in adult offspring."*Monaldi Archives for Chest Diseases*, Vol. 70, pp. 84-87, Jun. 2008.

[12] GencBurazeri,ArtanGoda, Gerhard Sulo, JonidaStefa,EnverRoshi, Jeremy Kark. "Conventional Risk Factors and Acute Coronary Syndrome during a Period of Socioeconomic Transition: Population-based Case-control Study in Tirana, Albania." *Croatian Medical Journal*, Vol. 48, pp. 225-233, Apr. 2007.

[13] TY. Tai, LM. Chuang, CJ. Chen, BJ. Lin. Link BetweenHypertension and Diabetes Mellitus Epidemiological Study of Chinese Adults in Taiwan. *Diabetes care*, Vol. 14, pp. 1013-1020, Nov. 1991.

[14] The ETDRS Investigators: "Aspirin effectson mortality and morbidity in patients withdiabetes mellitus: Early Treatment DiabeticRetinopathy Study report 14."*JAMA*, Vol. 268, pp. 1292-300, Sep. 1992.

[15] John Colwell. "Aspirin Therapy in Diabetes (modified)."*American diabetes association. Diabetes care*, Vol. 27, pp.72-73, Jan. 2004.

[16] Richard Kones. "Recent advances in the management of chronicstable angina II. Anti-ischemic therapy, options forrefractory angina, risk factor reduction,and revascularization."*Vascular Health and Risk Management,* Vol. 6, pp. 749–774,Sep. 2010.

[17] Pasquale Abete, Nicola Ferrara, Francesco Cacciatore, Alfredo Madrid, SabatinoBianco, Claudio Calabrese, et al."Angina-Induced Protection Against Myocardial Infarction in Adultand Elderly Patients: A Loss of Preconditioning Mechanism in theAging Heart?" *Journal of the American college of Cardiology,* Vol. 30, pp. 947-954, Oct. 1997.

[18] Richard Kones. "Molecular sources of residual cardiovascular risk, clinical signals, and innovative solutions: relationship with subclinical disease, under treatment, and poor adherence: implications of new evidence upon optimizing cardiovascular patient outcomes."*Vascular Health and Risk Management*, Vol. 9, pp. 617-670, Oct. 2013.

[19] M. C.Roncaglioni, L. Santoro, B.D'Avanzo, E.Negri, A.Nobili, A.Ledda, et al. Role of family history in patients with myocardial infarction. An Italian case-control study.GISSI-EFRIM Investigators. Journal of theAmerican Heart Association, Vol. 85, pp. 2065-2072, Jun. 1992.