http://www.pjbs.org

PJBS

ISSN 1028-8880

# Pakistan Journal of Biological Sciences

ANSInet
Asian Network for Scientific Information
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan

Pakistan Journal of Biological Sciences 14 (1): 25-33, 2011
ISSN 1028-8880 / DOI: 10.3923/pjbs.2011.25.33


# Coronary Risk Factors in Patients Underwent Coronary Artery Bypass Grafting

[1]Nasser Safaei, [2]Hossein Alikhah and [3]Younes Abadan
[1]Department of Cardiothoracic Surgery, Shahid Madani Hospital,
Tabriz University of Medical Sciences, Tabriz, Iran
[2]Continuing Medical Education Center, Tabriz University of Medical Sciences, Tabriz, Iran
[3]Tabriz University of Medical Sciences, Tabriz, Iran

**Abstract:** CoronaryArtery Disease (CAD) risk increases with increasing number of risk factors. This study was aimed to assess different coronary risk factors among Coronary Artery Bypass Grafting (CABG) surgery patients. A total of 700 patients younger than 45 or older than 65 years and underwent CABG in Tabriz Shahid Madani Heart Center since 2003 to 2007 were enrolled. We examined the probable differences of CAD risk factors between male and female groups and age groups. We also assessed the change of risk factors presentation in last 5 years. There was not significant difference between risk factor numbers in <45 and >65 years groups, but smoking and dyslipidemia was more prevalent in patients <45 than >65 years old. Hypertension and diabetes mellitus was more prevalent in patients >65 old than <45 years old; also differences were found between males and females patients, so that dyslipidemia, diabetes and hypertension were more prevalent in women than men. Some risk factors were recognized as acting more on one gender than the other. Also, the majority of patients have one or more risk factors, but different age and gender groups may have different risk factors that suggest the need for exact programming for appropriate prophylactic and therapeutic interventions in all groups.

**Key words:** Dyslipidemia, risk factor, revascularization, bypass grafting, over weight

## INTRODUCTION

Coronary Artery Bypass Grafting (CABG) surgery remains the most common and optimal procedure performed by cardiac surgeons for severe coronary artery disease. Surgical revascularization (CABG) provides significant benefit particularly in high risk patients (Muir *et al*., 2010; Caparrelli *et al*., 2009; Taggart, 2005).

This therapeutic method has been an accepted treatment for angina pectoris for more than two decades. Models have been developed that use preoperative information and risk factors to stratify surgical risk and predict the prognosis of CABG (Lindsay *et al*., 2001). Atherosclerosisand its most common manifestation, Coronary Artery Disease (CAD), are common causes of morbidity and mortality worldwide (Sharifkazemi *et al*., 2006); so, there has been an increasing interest in evaluating biomarkers related to the atherosclerotic process that might add to our ability to better predict CHD risk (Kullo and Ballantyne, 2005). A number of well-characterized factors, including advanced age, hypertension, dyslipidemia, diabetes, elevated lipoprotein (a) and smoking, contribute to cardiovascular risk. Assessment of global risk is particularly important in lipid management (Wilson, 2004).

American Heart Association (AHA) classified risk factors into 3 categories (Conventional, Predisposing and Conditional). The traditional/conventional risk factors appear to have a direct causal role in atherogenesis. Predisposing factors, including obesity, family history of early-onset CHD and sedentary lifestyle, mediate some risk through the causal factors. Conditional factors such as Low-density Lipoprotein (LDL) and C-reactive Protein (CRP) may enhance risk in the presence of the causative risk factors (Kullo and Ballantyne, 2005; Grundy *et al*., 1999; Hung *et al*., 2008).

Risk factor assessment is an important first step in primary prevention and guides the intensity of efforts to reduce a patient's CHD risk (Kullo and Ballantyne, 2005). The study of these risk factors is important for accurate prediction of CHD risk in specific individual and among different ethnic groups (Kullo and Ballantyne, 2005).

**Corresponding Author:** Nasser Safaei, Department of Cardiothoracic Surgery, Shahid Madani Hospital,
Tabriz University of Medical Sciences, Tabriz, Iran

This survey was aimed to evaluate a number of CAD risk factors in patients underwent CABG and to compare their frequency in sex and age groups and in five y follow up.

## MATERIALS AND METHODS

This is a descriptive and cross sectional study performed on 2000 patients admitted in Tabriz Shahid Madani Heart Center and underwent CABG surgery from September 2003 to March 2007.

Inclusion criteria were having the age of less than 45 years or more than 65 years and the history of CABG during the past 4 years. Exclusion criteria were incomplete data. A total of 700 patients had inclusion criteria and were enrolled in the study.

The data of selected patients were collected by questionnaire and the patients were classified in two groups according to their age: (1) less than 45 years and (2) more than 65 years.

The study was approved by the Regional Ethics Committee. The patients' information was saved as secret.

The studied variables were age, sex, occupation, history of chest pain in admission, recent MI, heart failure with EF <45%, smoking, hypertension, hyperlipidemia, hypercholesterolemia, HDL-/ LDL-/ total cholesterol, triglyceride, Psychologic disorders, familial history of premature CAD, opiate and alcohol abuse, arrhythmias, duration of disease and hospitalization, ICU stay, number of involved arteries, number of grafted vessels, type of vessels used for grafting, surgery status, CPB use, reoperation, mortality, LML, number of risk factors, background disease and body weight and height.

Hypertension was defined according to the criteria of the Joint National Committee 7: Systolic blood pressure of 140 mm Hg or higher, diastolic blood pressure of 90 mm Hg or higher, or current use of antihypertensive medication (Yan *et al*., 2003; Chobanian *et al*., 2003).

Finally, the collected data were compared between two studied age groups. The data were analyzed by SPSS-16 statistical software and expressed as percentage and mean±SD. Continuous (quantitative) variables were compared by Student T-test or One-way ANOVA (Independent samples). Categorical (qualitative) variables were compared by contingency tables and Chi-square test or Fisher's Exact Test. $p \leq 0.05$ were considered statistically significant.

## RESULTS

We studied 700 CABG patients aged less than 45 or more than 65 years. The demographic characteristics of studied patients are showed in Table 1.

Table 1: The demographic characteristics of studied patients

| Variable | <45 years | >65 years | Total |
|---|---|---|---|
| Number (%) | 277 (39.5%) | 423 (60.5%) | 700 (100.0%) |
| Male | 246 (46.5%) | 283 (53.5%) | 529 (75.6%) |
| Female | 30 (17.6%) | 141 (82.4%) | 171 (24.4%) |

Table 2: The frequency of risk factors in all patients

| Variable (risk factor) | No. | % | Value |
|---|---|---|---|
| Cardiac arrhythmia | 25 | 3.5 | |
| Mean cholesterol (mg $dL^{-1}$) | - | - | 201.0±2.0 |
| 1HDL (mg $dL^{-1}$) | - | - | 36.56±0.32 |
| Systolic BP (mmHg) | - | - | 122.5±1.83 |
| Diastolic BP (mmHg) | - | - | 76.32±1.79 |
| Chest pain | 434 | 62.0 | - |
| Stable angina | 205 | 47.3 | - |
| Unstable angina | 229 | 52.7 | - |
| MI in last 90 days | 163 | 23.3 | - |
| Familial history for premature CAD | 91 | 13.0 | |
| Hypercholesterolemia | 350 | 50.0 | - |
| LDL>100 mg $dL^{-1}$ | 455 | 65.0 | - |
| Hyperlipidemia | 533 | 76.2 | - |
| Smoking | 329 | 47.0 | - |
| Alcohol use | 24 | 3.5 | - |
| Opiate use | 38 | 5.4 | - |
| LML | 84 | 12.0 | - |
| Diabetes mellitus | 149 | 21.3 | - |
| Hypertension | 343 | 49.0 | - |
| TG>150 mg $dL^{-1}$ | 448 | 64.0 | - |
| Overweight | 468 | 66.8 | - |

CABG: Coronary artery bypass grafting, LDL: Low Density lipoprotein, HDL: High density lipoprotein; TG, Triglyceride, CAD: Coronary artery disease

As shown in Table 1, the women in less than 45 age group was significantly less than males ($p<0.05$). The hospital mortality was 2.7% (19 patients) with no significant difference in both age and sex groups ($p>0.05$).

The patients were employee (10.2%), retired (12.5%), worker (5.6%), housekeeper (24.4%), free-job (34.1%) and farmer (13.3%) with significantly different occupations ($p = 0.000$).

The mean duration of hospitalization and ICU stay was 14.46±0.27 day and 6.53±0.15 day, respectively. Of all patients, 465 (66.5%) had elective and 235 (33.5%) had urgent surgery. CPB was used in 262 (37.4%). Psychologic problems were reported in 98 (14%) of patients and included depression, neurosis, low mood, anxiety and stress. Twenty two (3.1%) of patients were re-operated because of complications of the first surgery. The frequency of other risk factors in all patients is presented in Table 2.

The number of used grafts was ≥3 in 357(51%) of cases, 2 in 235 (33.5%) of cases and one in 108 (14.18%) of cases ($p = 0.249$). Of all patients, 421 (6.02%) had three vessel disease (3VD), 183 (26.2%) had 2VD and 90 (12.9%) had 1VD. Table 3 shows the Vessels used for CABG in two age groups.

The data suggest that 408 (58.3%) patients had ≥4 risk factors, the majority of them had ≥1 risk factor and

Table 3: Vessels used for coronary artery bypass grafting (CABG)

| Vessel | <45 years | <45 years | Total |
|---|---|---|---|
| Internal Mammary Artery (IMA) | 58 (21.1%) | 58 (21.1%) | 90 (12.8%) |
| Saphenus vein | 15 (5.3%) | 15 (5.3%) | 68 (9.6%) |
| Both | 204 (73.7%) | 204 (73.7%) | 542 (77.5%) |
| p=-value | 0.001 | 0.001 | 0.000 |

Table 4: Comparison of mean value of risk factors in age groups

| Variable (risk factor) | <45 years | >65 years | p-value |
|---|---|---|---|
| Hospitalization (day) | 12.56±0.37 | 15.70±0.37 | 0.000 |
| ICU stay (day) | 5.63±0.18 | 7.11±0.21 | 0.001 |
| Total cholesterol (mg $dL^{-1}$) | 206.19±3.30 | 197.67±2.53 | 0.037 |
| Hypercholesterolemia | 52.80% | 48.10% | 0.22 |
| HDL (mg $dL^{-1}$) | 35.09±0.46 | 37.5±0.43 | 0.000 |
| HDL<40 mg $dL^{-1}$ | 78.0% | 77.20% | 0.088 |
| Overweight | 66.20% | 66.4 | 0.96 |
| Alcohol use | 5.80% | 1.90% | 0.007 |
| Opiate use | 10.20% | 2.20% | 0.000 |
| Diabetes mellitus (DM) | 14.60% | 25.60% | 0.000 |
| Hypertension | 24.60% | 64.80% | 0.000 |
| TG>150 mg $dL^{-1}$ | 70.0% | 60.80% | 0.014 |
| TG>250 mg $dL^{-1}$ | 34.80% | 21.10% | 0.000 |
| LDL>100 mg $dL^{-1}$ | 62.30% | 66.70% | 0.243 |
| Hyperlipidemia | 78.80% | 74.60% | 0.204 |
| Psychologic problems | 17.40% | 11.70% | 0.035 |
| Premature CAD | 25.70% | 4.60% | 0.000 |
| Cardiac arrhythmia | 1.10% | 5.20% | 0.004 |
| LML | 7.80% | 14.60% | 0.007 |

ICU: Intense care unit, LDL: Low density lipoprotein, HDL: High density lipoprotein, TG: Triglyceride, CAD: Coronary artery disease

only three patients had three risk factors. Table 4 compares the mean value of risk factors between two age groups.

The main risk factors in patients underwent CABG were: HLP (76.2%), low HDL (74.5%), overweight (66.3%), LDL>100 mg $dL^{-1}$ (65%), TG>150 mg $dL^{-1}$ (64.5%), HCL (50%), hypertension (49%), smoking (47%), DM (21.3%), psychologic disorders (14%), opiate (5.4%) and alcohol use (3.5%). Analyses of risk factors for each year suggest the differences witch have been shown in Table 5.

We also compared the mean value and frequency of risk factors in both sexes. All alcohol and opiate users were belong to the male group.

The main risk factors in male patients underwent CABG were: HLP (73.2%), low HDL (71.3%), LDL>100 mg $dL^{-1}$ (63%), overweight (62.8%), TG>150 mg $dL^{-1}$ (61.5%), smoking (59%), HCL (46%), hypertension (39.6%), DM (17.3%), psychologic disorders (12.8%), opiate (7%) and alcohol use (4.5%).

The main risk factors in female patients underwent CABG were: HLP (86%), hypertension (77.8%), LDL>100 mg $dL^{-1}$ (70.1%), HCL (60%), DM (33.5%), psychologic disorders (17.4%), smoking (9%) and opiate and alcohol use (0%). Table 6 shows the comparison of risk factors between two sex groups.

The main risk factors in patients >65 years were: HLP (74.8%), low HDL (72.2%), LDL>100 mg $dL^{-1}$ (66.7%), overweight (66.4%), hypertension (64.8%), TG>150 mg $dL^{-1}$ (60.8%), smoking (35%), DM (25.6%), psychologic disorders (11.7%), opiate (2.2%) and alcohol use (1.9%).

The main risk factors in patients <45 years were: HLP (78.8%), low HDL (78%), TG>150 mg $dL^{-1}$ (70%), overweight (66.2%), smoking (65%), LDL>100 mg $dL^{-1}$

Table 5: Changes of risk factors during the time in studied age groups

| | Year | | |
|---|---|---|---|
| Variable (risk factor) | 2003 | 2007 | p-value |
| **ValueCABG patients** | | | |
| <45 Years | 47.20% | 27.30% | 0.000 |
| >65 Years | 52.80% | 72.70% | 0.000 |
| **Overweight** | | | |
| <45 Years | 76.0% | 47.90% | 0.000 |
| >65 Years | 79.80% | 60.20% | 0.003 |
| Total | 78.0% | 56.50% | 0.001 |
| **Chest pain** | | | |
| <45 Years | 45.90% | 68.80% | 0.000 |
| >65 Years | 47.60% | 58.60% | 0.000 |
| Total Years | 46.80% | 62.10% | 0.000 |
| **Ejection Fraction (EF) <45%** | | | |
| <45 Years | 32.0% | 49.0% | 0.625 |
| >65 Years | 33.40% | 31.0% | 0.015 |
| Total Years | 37.0% | - | - |
| **Hypertension** | | | |
| <45 Years | 26.70% | 31.30% | 0.319 |
| >65 Years | 70.20% | 63.30% | 0.001 |
| Total Years | 49.70% | 54.50% | 0.01 |
| **Hyper-cholesterolemia** | | | |
| <45 Years | 56.30% | 39.10% | 0.403 |
| >65 Years | 70.0% | 45.30% | 0.000 |
| Total Years | 63.60% | 43.60% | 0.001 |
| **LDL>100 $dL^{-1}$ mg** | | | |
| <45 Years | 72.70% | 54.30% | 0.282 |
| >65 Years | 84.20% | 65.0% | 0.000 |
| Total Years | 78.90% | 64.60% | 0.000 |
| **TG>150 $dL^{-1}$ mg** | | | |
| <45 Years | 70.0% | - | - |
| >65 Years | 60.80% | - | - |
| Total Years | 66.20% | 57.0% | 0.282 |
| **Hyper-lipidemia** | | | |
| <45 Years | 77.50% | 72.0% | 0.362 |
| >65 Years | 89.0% | 70.0% | 0.01 |
| Total Years | 83.0% | 71.0% | 0.076 |
| **Use of CPB** | | | |
| <45 Years | 37.30% | 45.80% | 0.258 |
| >65 Years | 31.0% | 57.0% | 0.003 |
| Total Years | 34.0% | 54.0% | 0.001 |
| **Smoking** | | | |
| <45 Years | 64.0% | 72.30% | 0.564 |
| >65 Years | 33.30% | 31.30% | 0.191 |
| **Total holesterol (mg $dL^{-1}$)** | | | |
| <45 Years | 211.16±5.76 | 191.52±7.33 | 0.357 |
| >65 Years | 223.22±5.44 | 192.02±4.46 | 0.000 |
| **HDL (mg $dL^{-1}$)** | | | |
| <45 Years | 38.74±0.96 | 34.58±1.25 | 0.000 |
| >65 Years | 41.40±0.43 | 35.88±0.43 | 0.000 |
| **Diabetes Mellitus (DM)** | | | |
| <45 Years | 14.70% | 14.90% | 0.992 |
| >65 Years | 31.0% | 27.30% | 0.293 |

CABG: Coronary artery bypass grafting, LDL: Low density lipoprotein, HDL: High density lipoprotein,TG: Triglyceride, CPB: Cardiopulmonary bypass

Table 6: Comparison of risk factors in sex groups

| Variables | Male | Female | p-value |
|---|---|---|---|
| Total cholesterol (mg $dL^{-1}$) | 197.0±2.3 | 234.0±3.89 | 0.001 |
| Hypercholesterolemia | 46.0% | 60.0% | 0.002 |
| HDL (mg $dL^{-1}$) | 35.95±0.35 | 38.58±0.72 | 0.001 |
| HDL<40 mg $dL^{-1}$ | 71.30% | 85.0% | 0.001 |
| Hospitalization (day) | 13.72±0.29 | 16.76±0.61 | 0.000 |
| Overweight | 62.80% | 77.30% | 0.000 |
| Smoking | 59.0% | 9.0% | 0.000 |

LDLL: Low density lipoprotein, HDL: High density lipoprotein

(62.3%), hypertension (24.6%), psychologic disorders (17.4%), DM (14.6%), opiate (10.2%) and alcohol use (5.8%).

Patients with TG>150 mg $dL^{-1}$ had total cholesterol of 213±2.5 mg $dL^{-1}$ and HDL of 36 mg $dL^{-1}$. In comparison, the patients with TG<150 mg $dL^{-1}$ had total cholesterol of 180±3 mg $dL^{-1}$ and HDL of 38 mg $dL^{-1}$ ($p = 0.000$).

Smoker patients had less EF than non- smokers (44% vs. 48%; $p = 0.014$). The differences about duration of hospitalization were as following: 13.5 days in smokers and 15.2 days in non-smokers ($p = 0.000$); 16 days in patients with chest pain on admission and 12 days in patients without chest pain ($p = 0.000$); 17.2 days in patients with MI in recent 3 months and 13.5 days in patients without history of recent MI ($p = 0.000$); 15.3 days in diabetics and 14.2 days in non-diabetics ($p = 0.000$); 15.7 days in hypertension patients and 13.2 days in non- HTN patients ($p = 0.000$); 15.5 days in patients with LDL>100 mg $dL^{-1}$ and 14.5 days in those with LDL<100 mg $dL^{-1}$ ($p = 0.025$).

Hyperlipidemia was seen in 91.4% of overweight patients and 77.5% of others ($p = 0.000$). Hypercholesterolemia was seen in 54.6% of overweight patients and 38.9% of others ($p = 0.000$). Hypertriglyceridemia (TG>150 mg $dL^{-1}$) was seen in 72.3% of overweight patients and 74.6% of others ($p = 0.000$). The mean HDL was significantly less in overweight patients than others ($p = 0.043$), but the difference of LDL was not significant ($p = 0.100$). DM was more prevalent in overweight patients than others (24.6% vs. 14.9%; $p = 0.003$), but the prevalence of HTN was not significant between these weight groups.

The overweight patients had more Risk Factors (RF) than other patients: 72.3% of overweight patients and 30.3% of others had ≥4 RF ($p = 0.000$). Patients with more risk factors had worse lipid profile: The mean HDL was 40.3 mg $dL^{-1}$ in patients with 2 RF and 34.6 mg $dL^{-1}$ in patients with 4 RF ($p = 0.000$); the mean cholesterol was 185±5 mg $dL^{-1}$ in patients with 2 RF and 207±2.5 mg $dL^{-1}$ in patients with 4 RF ($p = 0.000$).

The mean cholesterol was 209.5±4.5 mg $dL^{-1}$ in diabetics and 199±2 mg $dL^{-1}$ in non- diabetics patients ($p = 0.036$). Also, diabetic patients had more HDL (37.8 vs. 36.2 mg $dL^{-1}$; $p = 0.045$) and more ICU stay (8 days vs. 6 days; $p = 0.000$).

In patients with familial history of premature CAD: The LDL>100 mg $dL^{-1}$ was less prevalent (55% vs. 66%; $p = 0.043$), the RF≥4 was more prevalent (92% vs. 53.4%; $p = 0.000$), MI in recent 3 months was more prevalent (32% vs. 22%; $p = 0.045$), psychologic problems was more (23% vs. 13%; $p = 0.043$) and HTN was less (38% vs. 51%; $p = 0.019$).

## DISCUSSION

Cardiovascular Disease (CVD) is the leading cause of death and disability. By the year 2020, it is estimated that CVD will surpass infectious diseases as the world's leading cause of death and disability (Hackam and Anand, 2003; Roeters van Lennep *et al*., 2002). The lifetime risk of developing Coronary Heart Disease (CHD) at age 40 years is 50% for men and 33% for women (Roeters van Lennep *et al*., 2002). Coronary artery bypass grafting (CABG) has been shown to be safe and effective in terms of symptomatic relief and prolongation of life in various subsets of patients (Waly *et al*., 1997). Today, CABG can be performed with low operative morbidity and mortality rates (Waly *et al*., 1997). Also, with careful triage, CABG in octogenarians is as safe as and no more costly than, CABG in septuagenarians (Smith *et al*., 2001). The concept of cardiovascular risk factors arose from the Framingham Heart Study, a landmark study in cardiovascular disease epidemiology that established older age, male sex, Diabetes Mellitus (DM), hypertension, dyslipidemia and smoking as the major risk factors for CHD (Kullo and Ballantyne, 2005; Hackam and Anand, 2003). The identification of the major risk factors for CVD has been one of the most important advances in medicine (Hackam and Anand, 2003). Also, there are other factors which have long been recognized as associated with an increased risk of heart disease including behavioral, genetic and biomedical disorders, sedentary lifestyle, obesity and family history of CVD (Gharouni *et al*., 2008; Katon *et al*., 2004; Hurrell *et al*., 2007; Jomini *et al*., 2002; Roques *et al*., 1999). We studied the abovementioned risk factors and compared them between age and sex groups and 5 years follow up. The sedentary life style was assesses indirectly using lipid profiles and BMI. However, the main risk factors in patients underwent CABG were HLP, low HDL, overweight, hypertension, smoking, DM, psychologic disorders, opiate and alcohol use.

One third to one half of the variation in vascular disease occurrence remains unexplained by traditional risk

factors (Anderson *et al*., 2000). Khot *et al*. (2003) suggested that 80 to 90% of patients with CHD have conventional risk factors. Although research on nontraditional risk factors and genetic causes of heart disease is important, clinical medicine, public health policies and research efforts should place significant emphasis on conventional risk factors and the lifestyle behaviors causing them to reduce the epidemic of CHD (Khot *et al*., 2003; Rinkuniene *et al*., 2009).

High preoperative risk always puts the physicians in a dilemma whether to operate or not (Peric *et al*., 2005). Study of 243 patients who underwent elective CABG suggested that 37% were in low risk group, 44% were in medium risk group and 19% were in high risk group (Peric *et al*., 2005). This is incompatible with our findings which suggest that 58.3% of patients (408 cases) underwent elective CABG had 4 or even more risk factors and the majority of them had one or more risk factor.

Appreciation of the crucial role of risk factors in the development of CHD is one of the most significant advances in the understanding of this important disease. Epidemiological researches haves established cigarette smoking, diabetes, hyperlipidemia and hypertension as independent risk factors for CHD (Khot *et al*., 2003). Smoking is the most important preventable cause for the development of CHD among men and women (Roeters van Lennep *et al*., 2002). It is surprisingly that the rate of opiate use is higher in patients undergoing CABG, probably because the majority of addicted patients believe that opiate has positive effect on chest pain relief and cardiovascular function (Safaei, 2008).Our study showed that smoker patients had less EF than non-smokers. A multicentre prospective study of 10593 men from France and Northern Irel and suggested a significant interaction between smoking and CHD risk (Troughton *et al*., 2007). Fortunately, smoking cessation can considerably reduce the risk of CHD in both genders (Roeters van Lennep *et al*., 2002). After 2-3 years of abstinence the level of risk of ex-smokers is similar to that of never smokers regardless of the amount or duration of cigarettes smoked or the age at which they stopped smoking. This beneficial effect is sustained at an older age (Roeters van Lennep *et al*., 2002). Dwivedi *et al*. (2008) reported a case of acute coronary syndrome occurring in a 23 years old young boy who was cannabis and tobacco smoker and suffered from hypertension and acute coronary syndrome at a very young age (Dwivedi *et al*., 2008). Poikolainen *et al*. (2005) evaluated coronary heart disease risk factors among alcohol drinkers. They concluded that smoking, sleep disturbances, trait anxiety, effort-reward imbalance and dependent life events were less common among never-drinkers than among light drinkers (Poikolainen *et al*., 2005). Pletcher *et al*. (2005) suggested the presence of proatherogenic effects of alcohol in young adults, especially Black men, which may counterbalance high density lipoprotein cholesterol elevation and other possible benefits of alcohol consumption (Pletcher *et al*., 2005). Illicit drug use is a significant predictor of cardiovascular complications in the first 6 months after coronary artery bypass grafting (Misra *et al*., 2003).

Diabetes, high density lipoproteins and triglycerides levels have been found to have a greater impact on coronary heart disease risk in women compared to men. On the other hand, lipoprotein (a), as a CVD risk factor, is stronger in men than in women (Roeters van Lennep *et al*., 2002). In our study, all alcohol and opiate users were belong to the male group. The main risk factors in males underwent CABG were HLP, low HDL, high LDL, overweight, high TG, smoking, HCL, hypertension, DM, psychologic disorders, opiate and alcohol use. The main risk factors in females underwent CABG were: HLP, hypertension, high LDL, HCL, DM, psychologic disorders, smokingand opiate and alcohol use.

Over the past decades there seems to be a trend towards a decrease in cardiovascular mortality. Controversy exists about the causes of this decline in mortality. Data from the World Health Organization study indicate that the decline in case fatality of acute myocardial infarction can be explained by an absolute reduction in the incidence of this disease (Roeters van Lennep *et al*., 2002; Tunstall-Pedoe *et al*., 1999). This effect might be the result of primary prevention and the modification of risk factors (Roeters van Lennep *et al*., 2002).

As reported in previous studies (Roeters van Lennep *et al*., 2002), elevated levels of triglycerides, total cholesterol and LDL were associated with an increased risk of CHD in both men and women. A meta-analysis including more than 46000 men and 11000 women showed for men and women, respectively, a 32 and 76% increase in cardiovascular risk associated with a 1-mmol/l increase in triglycerides. After adjustment for HDL and other risk factors, these risks were decreased to 14% in men and 37% in women, but this remained statistically significant for both genders (Roeters van Lennep *et al*., 2002).

High-Density Cholesterol (HDL) levels are reported to correlate closely and inversely with the risk of CHD (Taggart, 2005). HDL levels protect against CAD development (DeFaria Yeh *et al*., 2007), concluded that patients with high HDL and CAD had a similar or lower prevalence of traditional CAD risk factors compared with patients with normal HDL levels and CAD

(DeFaria Yeh *et al*., 2007). It is known that a decreased HDL cholesterol level is an important CAD risk factor and that raising HDL-C has been associated with CAD risk reduction (Schaefer and Asztalos, 2007).

Diabetes is a predictor of CAD and a powerful risk factor for CHD (Roeters van Lennep *et al*., 2002; Van Melle *et al*., 2010). Up to 75-80% of adult diabetic patients die of cardiovascular diseasesand 75% of these deaths are caused by CHD (Roeters van Lennep *et al*., 2002; Beller, 2007; Scognamiglio *et al*., 2006). The risk of cardiovascular events and the prevalence of silent CAD are elevated in diabetic versus non-diabetic patients (Miller *et al*., 2006). The financial implications of screening all asymptomatic diabetic patients determined to be at intermediate and high risk by clinical scoring systems is enormous (Miller *et al*., 2006).

Obesity is increasingly recognized as a public health epidemic and modifiable risk factor for CHD (Wessel *et al*., 2004; Manson *et al*., 2004; Mosca *et al*., 2004). The increase in body weight is associated with adverse CHD risk in both men and women (Wilsgaard and Arnesen, 2007; Zalesin *et al*., 2008; Panico *et al*., 2008). Even women with a modestly increased body mass index (>25 and<29 kg $m^{-2}$) had twice the risk of CHD as the leanest women (BMI<21 kg $m^{-2}$) (Roeters van Lennep *et al*., 2002). Intra-abdominal obesity is also unique as a cardiovascular risk state in that it contributes to or directly causes most other modifiable risk factors, namely, hypertension, dysmetabolic syndromeand type 2 diabetes mellitus (Zalesin *et al*., 2008; Panico *et al*., 2008). Obesity can also exacerbate cardiovascular disease through a variety of mechanisms including systemic inflammation, hypercoagulabilityand activation of the sympathetic and renin-angiotensin systems. Thus, weight reduction is a key strategy for simultaneous improvement in global cardiovascular risk, with anticipated improvements in survival and quality of life (Zalesin *et al*., 2008; Panico *et al*., 2008). These findings are compatible with our obtained results.

Wessel study on 906 women suggested that overweight women are more likely than normal weight women to have CAD risk factors, but neither BMI nor abdominal obesity measures were significantly associated with obstructive CAD or adverse CV events after adjusting for other risk factors. So, the measures of obesity were not independently associated with outcomes (Wessel *et al*., 2004). However, in our study, the overweight patients had more Risk Factors (RF) than other patients; so that DM was more prevalent in overweight patients than others. On the other hand, the patients with more risk factors had worse lipid profile.

Women and men with a positive family history have an increased risk of premature coronary events. Recent results indicated that this risk might be higher in women compared to men (Roeters van Lennep *et al*., 2002). However, the familial history for premature CAD was only present in 13% of our studied patients. This highlights the cumulative effect of other risk factors in occurrence and severity of CHD.

Elevated systolic blood pressure is, as risk factor, at least as powerful as diastolic blood pressure. Isolated systolic hypertension (SBP≥160 mmHg and DBP<90 mmHg) is associated with an increased risk of cardiovascular disease in men and women independent of other risk factors (Roeters van Lennep *et al*., 2002).

Roques *et al*. (1999) assessed risk factors for mortality in 19030 consecutive adult patients undergoing cardiac surgery. The most common risk factors were hypertension (43.6%) and diabetes (16.7%) (Roques *et al*., 1999). Hypertension has long been established as a strong, independentand etiologically significant risk factor for cardiovascular disease (Yan *et al*., 2003). The role of psychosocial factors, such as the type A behavior pattern, depressive symptoms (depression) and anxiety, in the etiology of hypertension is supported by many epidemiological investigations (Yan *et al*., 2003; Jonas and Lando, 2000; Davidson *et al*., 2000).

Psychosocial factors such as socio-economic status and social support have been frequently linked to CHD in both men and women (Roeters van Lennep *et al*., 2002). Studies demonstrate the validity of gender as an important mediating mechanism underlying the differential perception of risk factors for the development of psychological distress (Ritsner *et al*., 2001). In this study, psychologic problems were reported in 98 (14%) of patients and included depression, neurosis, low mood, anxiety and stress. Psychosocial factors were more prevalent in females and patients aged <45 years, than males and patients aged >65 years.

Psychological factors are known to affect biological processes involved in the progression of CAD. Hemodynamic reactivity, blood clottingand inflammatory processes are mechanisms by which the psychological risk factors promote coronary disease progression and cardiac ischemia (Kop, 1999). Mental activities and emotions are potent triggers of myocardial ischemia and epidemiological studies suggest that outbursts of anger can provoke myocardial infarction (Kop, 1999).

Anger is associated with an increased risk of CHD events. Preliminary results suggest that an episode of anger is associated with a dysregulation in endothelium-dependent and -independent vasodilation, suggesting that these mechanisms might contribute to the link between anger and CHD events (Shimbo *et al*., 2007). In the last decade, the association between depression and an increased risk of cardiovascular events has been

repeatedly demonstrated in both the general population and patients with CHD (Katon *et al*., 2004; Pizzi *et al*., 2008). Pizzi *et al*. (2008) evaluated depression and selected CHD risk factors in 415 subjects and indicated an independent association between depression and impaired Heart Rate Variability (HRV), systemic inflammatory and endothelial function. They suggested a correlation between depression and CHD (Pizzi *et al*., 2008).

Anxiety and depression are associated with mechanisms that promote atherosclerosis (Frasure-Smith and Lesperance, 2008). The prevalence of major depression is approximately 2-fold higher in patients with diabetes mellitus. Major depression is associated with an increased number of known cardiac risk factors in patients with DM (Katon *et al*., 2004).

Substantial evidence indicates that psychological distress is a significant CAD risk factor and adversely affects recovery after major CAD events (Lavie and Milani, 2006; Rozanski *et al*., 2005). The importance of behavioral and psychological risk factors in the pathogenesis and expression of atherosclerosis and CAD has been controversial, although data support the concept that various factors, including depression, anxiety, long-term life stress and hostility or anger, contribute significantly to the pathogenesis of atherosclerosis and the development of major CAD events (Lavie and Milani, 2006; Rozanski *et al*., 2005; Lavie and Milani, 2005).

## CONCLUSION

This survey assayed the role of a number of risk factors with emphasis on patients underwent CABG. Some risk factors were recognized as acting more on one gender than the other. This finding indicates that the pathogenesis of CHD is not quite similar for men and women. Also, diabetes, HDL and triglycerides levels have been found to have a greater impact on CHD risk in women compared to men. The majority of candidate patients for CABG surgery that hospitalized have one or more than one risk factors, but different age and gender groups may have different risk factors that suggest the need for exact programming for appropriate prophylactic and therapeutic interventions in all groups.

## REFERENCES

Anderson, J.L., J.B. Muhlestein, B.D. Horne, J.F. Carlquist and T.L. Bair *et al*., 2000. Plasma homocysteine predicts mortality independently of traditional risk factors and C-reactive protein in patients with angiographically defined coronary artery disease. Circulation, 102: 1227-1232.

Beller, G.A., 2007. Noninvasive screening for coronary atherosclerosis and silent ischemia in asymptomatic type 2 diabetic patients: Is it appropriate and cost-effective. J. Am. Coll. Cardiol., 49: 1918-1923.

Caparrelli, D.J., M. Ghazoul and E.B. Diethrich, 2009. Indications for coronary artery bypass grafting in 2009: What is left to surgery. J. Cardiovasc. Surg. (Torino), 50: 19-28.

Chobanian, A.V., G.L. Bakris, H.R. Black, W.C. Cushman and L.A. Green *et al*., 2003. The seventh report of the joint national committee on prevention, detection, evaluation and treatment of high blood pressure: The JNC 7 report. JAMA, 189: 2560-2572.

Davidson, K., B.S. Jonas, K.E. Dixon and J.H. Markovitz, 2000. Do depression symptoms predict early hypertension incidence in young adults in the CARDIA study. Arch. Intern. Med., 160: 1495-1500.

DeFaria Yeh, D., M.W. Freeman, J.B. Meigs and R.W. Grant, 2007. Risk factors for coronary artery disease in patients with elevated high-density lipoprotein cholesterol. Am. J. Cardiol., 99: 1-4.

Dwivedi, S., V. Kumar and A. Aggarwal, 2008. Cannabis smoking and acute coronary syndrome: Two illustrative cases. Int. J. Cardiol., 128: e54-e57.

Frasure-Smith, N. and F. Lesperance, 2008. Depression and anxiety as predictors of 2-year cardiac events in patients with stable coronary artery disease. Arch. Gen. Psychiatry, 65: 62-71.

Gharoumi, M., P. Ebrahimi, M.J. Mahmoodi, M. Hasibi, A. Rashidi and P. Khashaya, 2008. Poor physical activity in the elderly as assessed by a visual analogue scale is associated with dyslipidemia. Pak. J. Biol. Sci., 11: 2367-2369.

Grundy, S.M., R. Pasternak, P. Greenland, S. Jr. Smith and V. Fuster, 1999. Assessment of cardiovascular risk by use of multiple-risk-factor assessment equations: A statement for healthcare professionals from the American Heart Association and the American College of Cardiology. Circulation, 100: 1481-1492.

Hackam, D.G. and S.S. Anand, 2003. Emerging risk factors for atherosclerotic vascular disease: A critical review of the evidence. JAMA, 290: 932-940.

Hung, J., M.W. Knuiman, M.L. Divitini, T. Davis and J.P. Beilby, 2008. Prevalence and risk factor correlates of elevated C-reactive protein in an adult Australian population. Am. J. Cardiol., 101: 193-198.

Hurrell, C., V. Wietlisbach, V. Jotterand, M. Volet and V. Lenain *et al*., 2007. High prevalence of major cardiovascular risk factors in first-degree relatives of individuals with familial premature coronary artery disease: The GENECARD project. Atherosclerosis, 194: 253-264.

Jomini, V., S. Oppliger-Pasquali, V. Wietlisbach, N. Rodondi and V. Jotterand *et al*., 2002. Contribution of major cardiovascular risk factors to familial premature coronary artery disease: The GENECARD project. J. Am. Coll. Cardiol., 40: 676-684.

Jonas, B.S. and J.F. Lando, 2000. Negative affect as a prospective risk factor for hypertension. Psychosom. Med., 62: 188-196.

Katon, W.J., E.H. Lin, J. Russo, M. Von Korff and P. Ciechanowski *et al*., 2004. Cardiac risk factors in patients with diabetes mellitus and major depression. J. Gen. Intern. Med., 19: 1192-1199.

Khot, U.N., M.B. Khot, C.T. Bajzer, S.K. Sapp and E.M. Ohman *et al*., 2003. Prevalence of conventional risk factors in patients with coronary heart disease. JAMA, 290: 898-904.

Kop, W.J., 1999. Chronic and acute psychological risk factors for clinical manifestations of coronary artery disease. Psychosom. Med., 61: 476-487.

Kullo, I.J. and C.M. Ballantyne, 2005. Conditional risk factors for atherosclerosis. Mayo Clin. Proc., 80: 219-230.

Lavie, C.J. and R.V. Milani, 2005. Prevalence of hostility in young coronary artery disease patients and effects of cardiac rehabilitation and exercise training. Mayo Clin. Proc., 80: 335-342.

Lavie, C.J. and R.V. Milani, 2006. Adverse psychological and coronary risk profiles in young patients with coronary artery disease and benefits of formal cardiac rehabilitation. Arch. Intern. Med., 166: 1878-1883.

Lindsay, G.M., L.N. Smith, P. Hanlon and D.J. Wheatley, 2001. The influence of general health status and social support on symptomatic outcome following coronary artery bypass grafting. Heart, 85: 80-86.

Manson, J.E., P.J. Skerrett, P. Greenland and T.B. VanItallie, 2004. The escalating pandemics of obesity and sedentary lifestyle: A call to action for clinicians. Arch. Intern. Med., 164: 249-258.

Miller, T.D., R.F. Redberg and F.J. Wackers, 2006. Screening asymptomatic diabetic patients for coronary artery disease: Why not. J. Am. Coll. Cardiol., 48: 761-764.

Misra, P., G.C. Caldito, A.K. Kakkar, M.C. Mancini and P.C. Reddy, 2003. Outcomes of coronary artery bypass grafting in patients with a history of illicit drug use. Am. J. Cardiol., 92: 593-595.

Mosca, L., L.J. Appel, E.J. Benjamin, K. Berra and N. Chandra-Strobos, *et al*., 2004. Evidence-based guidelines for cardiovascular disease prevention in women. Circulation, 109: 672-693.

Muir, A.D., P.P. McKeown and U. Bayraktutan, 2010. Role of gender, smoking profile, hypertension and diabetes on saphenous vein and internal mammary artery endothelial relaxation in patients with coronary artery bypass grafting. Oxid. Med. Cell. Longev., 3: 199-205.

Pamico, S., L. Palmieri, C. Donfrancesco, D. Vanuzzo and P. Chiodini *et al*., 2008. Preventive potential of body mass reduction to lower cardiovascular risk: The Italian Progetto CUORE study. Prev. Med., 47: 53-60.

Peric, V., M. Borzanovic, A. Jovanovic, R. Stolic, S. Sovtic and G. Trajkovic, 2005. The relationship between EuroSCORE preoperative risk prediction and quality of life changes after coronary artery by-pass surgery. Interact. Cardiovasc. Thorac. Surg., 4: 622-626.

Pizzi, C., L. Manzoli, S. Mancini and G.M. Costa, 2008. Analysis of potential predictors of depression among coronary heart disease risk factors including heart rate variability, markers of inflammation and endothelial function. Eur. Heart J., 29: 1110-1117.

Pletcher, M.J., P. Varosy, C.I. Kiefe, C.E. Lewis, S. Sidney and S.B. Hulley, 2005. Alcohol consumption, binge drinking and early coronary calcification: Findings from the Coronary Artery Risk Development in Young Adults (CARDIA) study. Am. J. Epidemiol., 161: 423-433.

Poikolainen, K., J. Vahtera, M. Virtanen, A. Linna and M. Kivimaki, 2005. Alcohol and coronary heart disease risk is there an unknown confounder. Addiction, 100: 1150-1157.

Rinkuniene, E., Z. Petrulioniene, A. Laucevicius, E. Ringailaite and A. Laucyte, 2009. Prevalence of conventional risk factors in patients with coronary heart disease. Med. (Kaunas), 45: 140-146.

Ritsner, M., A. Ponizovsky, Y. Nechamkin and I. Modai, 2001. Gender differences in psychosocial risk factors for psychological distress among immigrants. Compr. Psychiatry, 42: 151-160.

Roeters van Lennep, J.E., H.T. Westerveld, D.W. Erkelens and E.E. van der Wall, 2002. Risk factors for coronary heart disease: Implications of gender. Cardiovasc. Res., 53: 538-549.

Roques, F., S.A. Nashef, P. Michel, E. Gauducheau and C. de Vincentiis *et al*., 1999. Risk factors and outcome in European cardiac surgery: Analysis of the EuroSCORE multinational database of 19030 patients. Eur. J. Cardiothorac. Surg., 15: 816-822.

Rozanski, A., J.A. Blumenthal, K.W. Davidson, P.G. Saab and L. Kubzansky, 2005. The epidemiology, pathophysiology and management of psychosocial risk factors in cardiac practice: The emerging field of behavioral cardiology. J. Am. Coll. Cardiol., 45: 637-651.

Safaei, N., 2008. Outcomes of coronary artery bypass grafting in patients with a history of opiate use. Pak. J. Biol. Sci., 11: 2594-2598.

Schaefer, E.J. and B.F. Asztalos, 2007. Increasing high-density lipoprotein cholesterol, inhibition of cholesteryl ester transfer protein and heart disease risk reduction. Am. J. Cardiol., 100: 25-31.

Scognamiglio, R., C. Negut, A. Ramondo, A. Tiengo and A. Avogaro, 2006. Detection of coronary artery disease in asymptomatic patients with type 2 diabetes mellitus. J. Am. Coll. Cardiol., 47: 65-71.

Sharifkazemi, M.B., K. Eshraghian, G.R. Omrani, K.B. Lankarani and E. Hosseini *et al*., 2006. Homocysteine level and coronary artery disease. Angiology, 57: 9-14.

Shimbo, D., W. Chaplin, O. Akinola, A. Harris and D. Abraham *et al*., 2007. Effect of anger provocation on endothelium-dependent and independent vasodilation. Am. J. Cardiol., 99: 860-863.

Smith, K.M., A. Lamy, H.M. Arthur, A. Gafni and R. Kent, 2001. Outcomes and costs of coronary artery bypass grafting: Comparison between octogenarians and septuagenarians at a tertiary care centre. CMAJ, 165: 759-764.

Taggart, D.P., 2005. Surgery is the best intervention for severe coronary disease. Br. Med. J., 330: 785-786.

Troughton, J.A., J.V. Woodside, I.S. Young, D. Arveiler and P. Amouyel *et al*., 2007. Homocysteine and coronary heart disease risk in the PRIME study. Atherosclerosis, 191: 90-97.

Tunstall-Pedoe, H., K. Kuulasmaa, M. Mahonen, H. Tolonen, E. Ruokokoski and P. Amouyel, 1999. Contribution of trends in survival and coronary-event rates to changes in coronary heart disease mortality: 10-year results from 37 WHO Monica project populations. Monitoring trends and determinants in cardiovascular disease. Lancet, 353: 1547-1557.

Van Melle, J.P., M. Bot, P. de Jonge, R.A. de Boer, D.J. van Veldhuisen and M.A. Whooley, 2010. Diabetes, glycemic control and new-onset heart failure in patients with stable coronary artery disease: Data from the heart and soul study. Diabetes Care, 33: 2084-2089.

Waly, H.M., M.A. Elayda, V.V. Lee, G. el-Said, G.J. Reul and R.J. Hall, 1997. Risk factor analysis among Egyptian patients who underwent coronary artery bypass surgery. Tex. Heart Inst. J., 24: 204-208.

Wessel, T.R., C.B. Arant, M.B. Olson, B.D. Johnson and S.E. Reis *et al*., 2004. Relationship of physical fitness vs body mass index with coronary artery disease and cardiovascular events in women. J. AMA, 292: 1179-1187.

Wilsgaard, T. and E. Arnesen, 2007. Body mass index and coronary heart disease risk score: The Tromso study, 1979 to 2001. Ann. Epidemiol., 17: 100-105.

Wilson, P.W., 2004. Assessing coronary heart disease risk with traditional and novel risk factors. Clin. Cardiol., 27: 7-11.

Yan, L.L., K. Liu, K.A. Matthews, M.L. Daviglus, T.F. Ferguson and C.I. Kiefe, 2003. Psychosocial factors and risk of hypertension: The Coronary Artery Risk Development in Young Adults (CARDIA) study. JAMA, 290: 2138-2148.

Zalesin, K.C., B.A. Franklin, W.M. Miller, E.D. Peterson and P.A. McCullough, 2008. Impact of obesity on cardiovascular disease. Endocrinol. Metab. Clin. North Am., 37: 663-684.