

Original Article

COMPARSION OF CARDIOVASCULAR RISK PROFILE IN PATIENTS PRESENTING WITH DIFFERENT SUBGROUPS OF ACUTE CORONARY SYNDROME

SK Pahari*, K Manandhar**, AB Upadhyaya***

MB KC****, YKD Bhatta****, A Maskey****, MR Bajracharya*

Abstract

Acute Coronary Syndrome comprises of unstable angina, non-ST segment elevation myocardial infarction and ST-segment elevation myocardial infarction. Patients suffering from coronary artery disease are most likely to present with one of the above groups at some point in their disease process but which patients are going to present with what type of ACS have not been well studied in this part of the world.

General Objectives

To identify and compare different cardiovascular risk factors associated with unstable angina, NSTEMI and STEMI.

Methodology

This is a cross-sectional observational study. Participants were selected from Sahid Gangalal National Heart Centre. 105 successive subjects were selected as defined in inclusion criteria which consisted of all consenting patients with ACS and those who

did not give consent were excluded. The patients selected underwent detailed history taking, physical examination as well as relevant investigations.

Results

Altogether 105 patients participated in the study. The spectrum of the diagnosis was as follows-unstable angina were 71.43%, STEMI were 19.05% and NSTEMI were 9.52%. All three groups had more than half of their patients above the age of 59 years. There were more females in the NSTEMI group although males were twice the number of female patients when all three groups were combined. Family history, hypertension and protective effects of menopause were similar in all three groups. Unstable angina group had highest number of patients with a past history suggestive of CAD (27%) and smokers (30%). Number of diabetic patients were highest (30%) in the NSTEMI group and the mean BMI ($> 25\text{kg/m}^2$) was also high in this group along with higher levels of TC, HDL

*Physician, Department of Medicine, Bir Hospital, NAMS

** Professor, Department of Medicine, Bir Hospital, NAMS

***Consultant Cardiologist, Head of Medicine Department, Bir Hospital, NAMS

****Consultant Cardiologist, Head of Cardiology Department, Sahid Gangalal National Heart Centre

*****Consultant Cardiologist, Sahid Gangalal National Heart Centre

and LDL as compared to the other two groups. Mean TG was high in the STEMI group. Alcohol appeared to have a protective effect against NSTEMI and unstable angina.

Conclusion

Risk factors like age, hypertension and menopause were similar for all three groups. Although total number of male patients were more than double the number of female patients, NSTEMI group had more females than males. Patients having a past history suggestive of CAD and smokers were more likely to present with unstable angina. Diabetic patients, patients with BMI > 25kg/m² and with high levels of TC, HDL,LDL were likely to present with NSTEMI. Mean TG levels were highest in those presenting with STEMI. Larger, multicentered studies are required to achieve more statistically significant results.

Keywords

Acute Coronary Syndrome, Unstable Angina, NSTEMI STEMI

Introduction

Acute Coronary Syndrome (ACS), which comprises of unstable angina, Non-ST segment elevation MI(NSTEMI) and ST-segment elevation MI(STEMI) is a growing major public health problem in the country.

In many countries with a high prevalence of coronary heart disease, mortality is now falling rapidly.¹Concomitantly, acute myocardial infarctions are becoming low and unstable angina, a less lethal form of ACS, now accounts for a substantial proportion of all admissions.² Studies in this field are lacking in Nepal. This study aims to

identify and compare the different risk factors of involved in different subgroups of ACS. There are three basic diagnostic tools used in the diagnosis of ACS in emergency department-clinical history, ECG and cardiac markers.

Unstable angina can be defined as ischemic type of chest pain that is more frequent, severe or prolonged than usual angina symptoms, occurs at rest or minimal exertion or is difficult to control with drugs. NSTEMI presents similarly as unstable angina but is accompanied with rise in cardiac enzymes and without ST segment elevation or new Q waves in ECG.

STEMI, also known as "current of injury", is defined as the occurrence of new or presumed new ST elevation in two or more contiguous leads (ie. ≥ 0.2 mV in leads V1, V2 and V3 and >0.1 mV in other leads) or the occurrence of new onset left bundle branch block. An ECG not only helps in establishing the diagnosis of STEMI but also provides valuable information on infarct location, success or failure of reperfusion, as well as prognosis. The ECG presentation in NSTEMI not only helps differentiate it from STEMI but the nature of ST changes itself provides key diagnostic and prognostic clues. Cardiac biomarkers, are released into the blood in large quantities from necrotic heart muscle after acute MI. Commonly measured markers are Creatine phosphokines (CK) and its more specific isoenzyme CK-MB. Newer cardiac markers like Cardiac specific troponin T (cTnT) and cardiac specific troponin I (cTnI) have sequences different from those aminoacid of the skeletal muscle forms of these proteins. CK-MB and cardiac

troponin I are highly specific for myocardial tissue and are raised in NSTEMI and STEMI. Patient with acute coronary syndromes are at high risk of myocardial infarction death unless appropriately treated. Patients at highest risk are older than 70 years with pain at rest, acute ST segment depression on initial electrocardiogram, and raised cardiac troponin T or I concentration with or without haemodynamic complications. Patients with no risk factors and negative results of exercise testing can be managed out of the hospital. Patients in the medium risk group have one or more high risk features or have recurrent ischemia, early post myocardial infarction ischemia, diabetes mellitus, or a history of myocardial infarction or a history of MI or heart failure or taking aspirin. Patients at high risk should receive glycoprotein IIb/IIIa inhibitors within 24 hours of onset of chest pain plus early angiography and intervention.³ Unstable angina and non-ST segment elevation myocardial infarction account for about 2.5 million hospital admissions worldwide and are a major cause of mortality and morbidity in western countries. The prognosis is substantially worse than for chronic stable angina. In-hospital death and re-infarction affects 5-10%. Despite optimal treatment with anti-ischaemic and antithrombotic drugs, death and recurrent myocardial infarction occurs in another 5-10% of patients in the month after acute episodes. Several studies indicate that these patients may have a higher long term risk of death and myocardial infarction than do patients with ST segment elevation.⁴

Major Risk factors for CAD include cigarette smoking, hypertension (blood pressure $> 140/90$ mm of Hg or on antihypertensive medication) dyslipidemia (high total cholesterol/ high LDL/ Low HDL / high triglyceride levels), Family history of premature CHD (male first degree relative < 55 years and female first degree relative < 65 years), age (men > 45 years and women > 55 years) and diabetes. Other related risk factors are sedentary life style, obesity etc.⁵

Methodology

This is a cross-sectional observational study. Participants were selected from Sahid Gangalal National Heart Centre. 105 successive subjects were selected as defined in inclusion criteria which consisted of all consenting patients with ACS and those who did not give consent were excluded. The patients selected underwent detailed history taking, physical examination as well as relevant investigations.

Results

Altogether 105 patients participated in the study. The spectrum of the clinical diagnosis was as follows- unstable angina 71.43%, STEMI were 19.05% and NSTEMI were 9.52%, as shown in Fig .1.

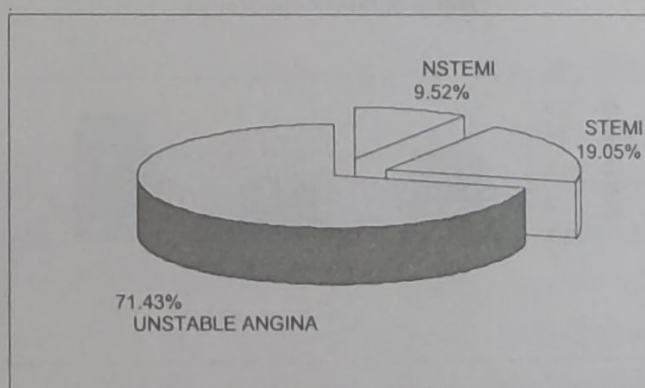


Fig. 1 Total distribution of different subgroups.

Regarding age distribution, it was seen in the results that all three groups had more than half of their patients above the age of 59. When age above 39 years was considered, the percentage in all three groups reached equal to or more than 90%.

Altogether there were sixty nine patients (65.7%) were male, and thirty six patients (34.3%) were female. There were more male patients in the unstable angina group and more female patients in the NSTEMI group (Fig 2).

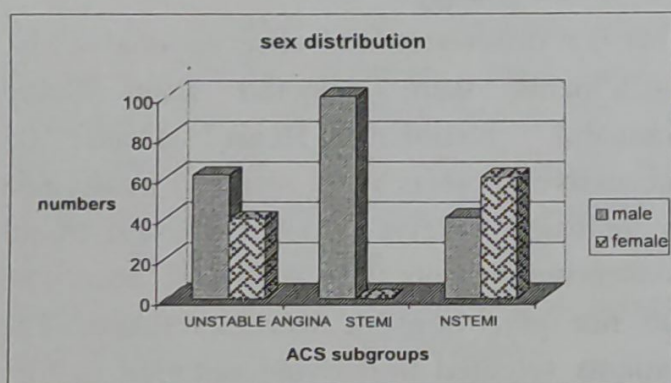


Fig 2. Sex distribution in different subgroups.

All the three groups had an average BMI of more than 23 Kg/m² but the group with NSTEMI had an average of more than 25kg/m². Patients in the unstable angina and STEMI group had the disease at a mean BMI of between 24 -25kg/m² (Fig. 3).

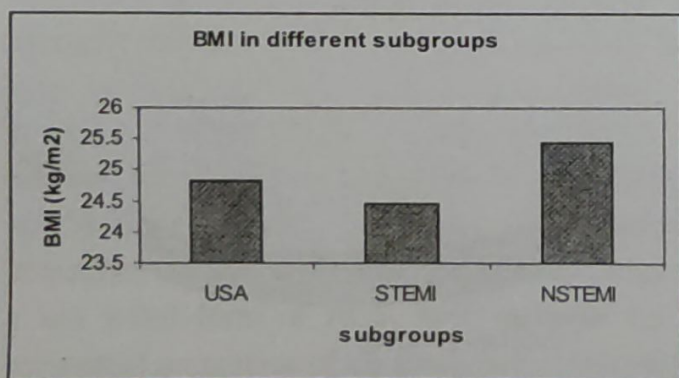


Fig. 3 BMI in different subgroups.

Family history was similar for all three groups with 13% for unstable angina, 15% for STEMI and 10% for NSTEMI group.

Regarding past history it is seen from Table 1 that about 10-15% had history of prior MI. More than one fourth of the patients in the unstable angina group had history suggestive of CAD in the past as well.

Table 1. Past history in different groups of ACS

Past history	UNSTABLE ANGINA (%)	STEMI (%)	NSTEMI (%)
Stable angina/unstable angina	8	10	0
Myocardial infarction	15	10	10
Post PTCA	3	0	0
Post CABG	1	0	0
Stroke	0	5	0
Total (%)	27%	21	10

Out of total 105 patients, 49 were smokers. In this study, smoking was not significantly associated with CAD (Chi square = 0.467, p= 0.495). Those who smoked cigarettes were smoking for more than 15 years and majority of them were smoking more than 15 cigarettes per day. Smokers and ex-smokers combined were more in the STEMI group and smokers were more in the unstable angina group. Non smokers occupied more than 50% in the unstable angina and NSTEMI group.

Hypertension occupied 40% in all three groups. DM was more common in the NSTEMI group with involvement of 30% of the patients. Other risk factors are as shown in Table 2.

Table 2. HTN, DM and dyslipidemia in the groups.

Risk factors	UNSTABLE ANGINA (%)	STEMI (%)	NSTEMI (%)
HTN/DM	10	15	0
HTN/DM/LIPID	1.3	0	0
HTN	40	40	40
HTN/LIPID	3.9	10	10
LIPID	2.6	10	10
DM	2.6	1	30

Lipid profile of the patients were as shown below in Table 3 and Fig. 4. Mean LDL, HDL and TC are higher in the NSTEMI group whereas mean TG is higher in the STEMI group.

Table 3. Lipid profiles of different groups of ACS

	UNSTABLE ANGINA		STEMI		NSTEMI	
	mean	Std. devi.	Mean	Std. devi.	mean	Std. devi
TG mmol/L	2.226	1.067	2.735	1.69	2.43	1.45
LDL mmol/L	2.840	0.982	3.150	1.028	3.33	0.81
HDL mmol/L	1.002	0.112	1.025	0.078	1.05	0.126
TC mmol/L	4.600	0.996	4.820	1.077	5.25	0.665

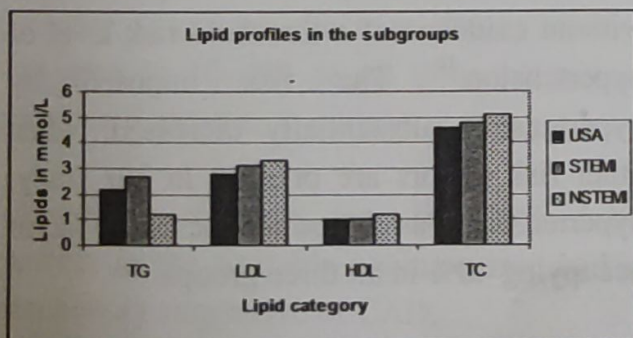


Fig. 4 Lipid profiles in different subgroups.

Average blood glucose for both fasting blood glucose levels and random blood glucose were found to be higher in the NSTEMI group (Fig 5).

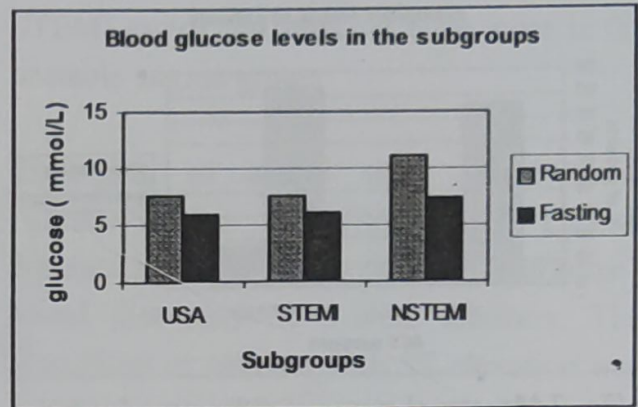


Fig. 5 Blood glucose levels in different subgroups

Regarding dietary habit 92.38 % of subjects were non-vegetarian and only 7.62 % were vegetarian. In all the three groups, non vegetarians seemed to have occupied above 80% of the patients.

Regarding consumption of alcohol, in the NSTEMI group about 60% of the patients never consumed alcohol and in the unstable angina group also teetotalers occupied more than 50% (Fig. 6).

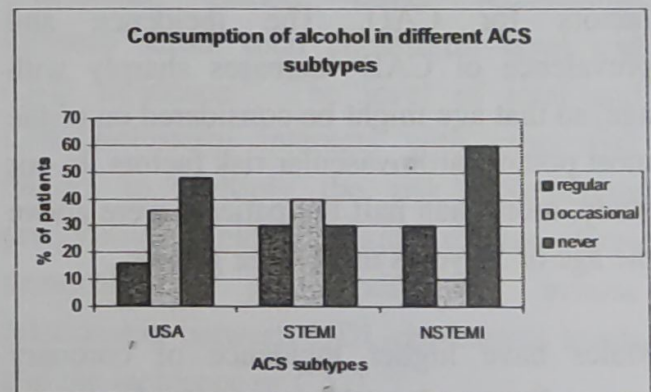


Fig 6. Alcohol consumption in different subgroups

In our study , menopause seemed to be one of the risk factors in women as both unstable angina and NSTEMI groups had more than 70% women patients with menopause. Those women who had not reached menopause had other risk factor like DM or dyslipidemia.

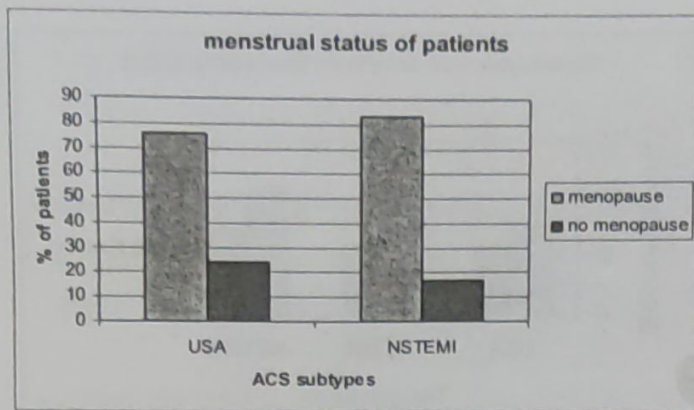


Fig. 7 Menstrual status of different subgroups

Discussion

105 patients had participated in the study. Unstable angina were 71.43%, STEMI were 19.05% and NSTEMI were 9.52%. It is well recognized that mortality from coronary heart disease has been declining in developed world for the past three decades. Data from other research also show that unstable angina has become more frequent than acute myocardial infarctions.⁶

Age and sex are important unmodifiable risk factors for CAD. The incidence and prevalence of CAD increases sharply with age, so that age might be considered one of the most potent cardiovascular risk factors. In our study, more than half the patients were above the age of 59 years in all three groups.

Males have higher incidence of coronary artery disease than pre-menopausal women. In another hospital based study done in Kathmandu, out of 518 patients who were admitted in CCU from January 1999 to November 2003, 388 were male and 180 were female.⁷ In Nairobi, similar study was conducted in two comparative groups, one in normal and another group with CAD.

Compared to the normal group, CAD group was significantly older with a higher mean age of 54.4 years as compared to 49.8 years ($P=0.005$); the CAD group also had significantly more males, with a male to female ratio of 5.5:1 as compared to 2.3:1 ($P=0.045$).⁸

In our study, male patients were double the number of female patients altogether but in the NSTEMI group, there were more females than males.

Risk is equal for post menopausal women and men. The onset of symptomatic CAD is typically about 10 years earlier in men, but CAD incidence in women increases rapidly at menopause.⁹ 70% of the female patients in our study were already into menopause.

Several major prospective epidemiologic studies have found that both systolic and diastolic hypertension have a strong, positive, and graded relationship of CAD without evidence of a threshold risk level of hypertension.¹⁰ The risk imposed by hypertension substantially increased, when other risk factors are present. In our study, hypertension was the commonest risk factor occupying 40% in all three groups.

Diabetes is considered as a CAD equivalent disease these days.¹¹ Diabetes alone was seen as a risk factor in 30% of the patients in the NSTEMI group. Average blood glucose for both fasting blood glucose levels and random blood glucose were found to be higher in the NSTEMI group.

Obesity has been regarded as a modifiable risk factor for CAD. Generally a BMI of more than 25kg/m^2 has been considered as overweight whereas in the Asian population, a BMI of more than 23kg/m^2 is considered to be overweight.¹² Patients in the unstable angina and STEMI subgroup were found to be diseased at a mean BMI of $24\text{-}25\text{ kg/m}^2$ whereas NSTEMI were found to have mean BMI of more than 25kg/m^2 .

CAD is often found in several members of the same family. Although considered a non-modifiable risk factor, a positive family history should result in the careful screening of individual risk factors known to aggregate in families. Because the disease is so prevalent and because other risk factors are familiar, it is uncertain whether family history, per se, is an important risk factor. In our study, 14.29% were found to have positive family history of CAD and 85.71% were found to have a negative family history and it was not significantly associated with acute coronary syndrome. Positive family history was seen in 10-15% in all three subgroups considered together.

Regarding past history, more than 25% of the patients in the unstable angina group had a past history suggestive of CAD.

Strong relationship between cigarette smoking and CAD has been observed in both sexes, in the young and the elderly and in all racial groups. Cigarette smoking increases two to threefold risk and interacts with other risk factors to multiply risk.¹³ Smokers and ex-smokers combined were more in the

STEMI group and smokers were more in the unstable angina group.

Rosengren et al in their study about "Cardiovascular risk factors and clinical presentation in acute coronary syndrome" found that only 30% were smokers. The proportion of patients with ST elevation was higher among current smokers (p value < 0.0001) than non smokers (OR 0.76, 95% CI 1.67 to 2.02).¹⁴

Regarding dietary habits, non vegetarians occupied more than 4/5 of all patients in all the three subgroups. Alcohol appeared to have a protective effect against NSTEMI and unstable angina group.

Elevated LDL cholesterol is considered a major cause of CAD. Numerous prospective epidemiologic studies have identified a continuous, graded, direct relationship between serum total cholesterol level and CAD incidence.¹⁵ The level of total and LDL-cholesterol interacts with other risk factors to multiply the risk.¹⁶ Numerous prospective epidemiologic studies have demonstrated a continuous, inverse relationship between HDL-cholesterol levels and the incidence of CAD.¹⁷

The relationship between triglyceride and CAD is not so clear. This relationship disappears after adjustment for other risk factors such as HDL cholesterol, obesity, and diabetes.¹⁸ Hypertriglyceridemia, however, has been found to be an independent risk factor in women.¹⁹

In our study, mean LDL, HDL and TC were high in the NSTEMI group and TG was high in the STEMI group.

The number of patients in this study was done in only one institute hence has its limitations. More studies of this nature, preferably larger multicentred ones should be conducted in future to provide more support to the conclusions.

Conclusion

The acute coronary syndromes, which comprise: unstable angina, myocardial infarction without ST-segment elevation and ST-segment elevation MI continue to be a major public health problem. Almost three fourths of the patients in our study presented with unstable angina followed by STEMI then NSTEMI. Age of above 59 years seems to be an unmodifiable risk factor in all the three groups. Regarding sex distribution although males were affected twice more than females, female patients were more in the NSTEMI group. Hypertension appeared to be the commonest risk factor and was present in almost half the patients in all three groups and diabetes mellitus appeared to be a risk factor for NSTEMI in one third of the patients of this subgroup. Both fasting and random blood glucose appeared to be higher in the NSTEMI group. Family history of CAD (10-15%) were similar for all three groups. Past history suggestive of CAD was more common in the unstable angina group. Menopause appeared to have a protective effect against ACS. Regarding dyslipidemia, LDL, HDL and TC were high in the NSTEMI group whereas TG was high in the STEMI group. Patients in the

NSTEMI group had a higher BMI (>25 kg/m²) and patients in the unstable angina and STEMI group had a mean BMI of 24-25 kg/m². Smokers were more common in the unstable angina group but STEMI group had a total of 85% when both ex-smokers and smokers were combined. Alcohol appeared to have a protective effect in the NSTEMI and unstable angina group.

References

1. Beaglehole R, Stewart AW, Jackson R, et al. Declining rate of coronary artery disease in New Zealand and Austria, 1983-1993. *Am J Epidemiol* 1997; 145:707-713.
2. Dauerman HL, Lessard D, Yarzebski J, et al. Ten years trend in the incidence, treatment, and outcome of Q-wave myocardial infarction. *Am J Cardiol*. 2000; 86:730-735.
3. Armstrong PW, Fu Y, Chang WC, et al. Acute coronary syndrome in the GUSTO IIb trial. Prognostic insights and impact of recurrent ischemia. *Circulation* 1998; 98:1860-1868.
4. Ever D Grech, David R Ramsdale. Acute coronary syndrome: unstable angina and non-ST segment elevation myocardial infarction. *BMJ* 2003; 326:1259-1261.
5. O'Rourke RA, Fuster V., R. Alexander W, et al. Manual of Cardiology. In; David J Maron, Scott M Grundy, Paul M Ridker and Thomas A Pearson (Eds). Dyslipidemia, other risk factors and the prevention of coronary heart disease. 11th Edition, Mc Graw Hill: 2005.196

6. Kleiman NS and White HD. The declining prevalence of ST Elevation myocardial in patients presenting with acute coronary syndrome, *Heart* 2005; 91:1121-1123
7. Rawat B., Baidya A., Gurung J, et al. Gender difference in coronary risk factors amongst patents with acute coronary events in Nepal. *Nepalese Heart Journal* Feb. 2004., Vol 3.
8. Kamotho C, Ogola E B, Josh M. Cardiovascular risk factor profile of black Africans undergoing coronary angiography. *East African Medical Journal* 2004; Vol. 81 No. 2 February 82-86.
9. Belchetz PE. Hormonal treatment of postmenopaunstable anginal women. *N Engl J med* 1994; 330:1062-1071.
10. MacMahon S, Peto R, Culter J, et al. Blood pressure, stroke, and coronary heart disease. Part I. prolonged differences in blood pressure. Prospective observational studies for the regression in dilution bias. *Lancet* 1990;335:765-774.
11. Manson JE, Willett WC, Stampfer MJ, et al. Body weight and mortality among women. *N Engl J Med* 1995; 333: 677-685.
12. Shah A, Parthasarathi D, Sarkar D, et al. Comparative study of body mass index (BMI) in diabetic and non diabetic individuals in Nepalese population, Kathmandu University Medical Journal .2006; Vol. 4, No. 1, Issue 13, 4-10.
13. Castelli WP, Garrison RJ, Dawber TR, et al. The filter cigarette and coronary heart disease:The Framingham study. *Lancet* 1981;2:109-113.
14. Rosengren A, Wallentin L, Simoons M, et.al. Cardiovascular risk factors and clinical presentation in acute coronary syndromes. *Heart* 2005;91:141-1147.
15. Stamler J, Wentworth D, Neaton JD. Is relationship between serum cholesterol and risk of premature death from coronary heart disease continuous and graded? *JAMA* 1986;256:2823-2828.
16. Wilson PWF. Established risk factors and coronary artery disease. The Framingham Study. *Am J Hypertens* 1994;7:7 S-12 S
17. Gordon DJ, Probstfield JL, Garson RJ, et al. High density lipoprotein cholesterol and cardiovascular disease. Four prospective American studies. *Circulation*1989;79:8-15.
18. Hulley SB, Rosenman RH, Bawol RD, et al. Epidemiology as a guide to clinical decisions. The association between triglyceride and coronary heart disease. *N Engl J Med* 1980;302:1383-1389.
19. Castel WP. The triglyceride issue: A view from Framingham. *Am Heart J* 1986;112:432-437.