ACUTE ANTERIOR WALL MI;
IN-HOSPITAL MORTALITY WITH AND WITHOUT RBBB.

dearnaeem06@gmail.com
drsa495@hotmail.com

1. Consultant Cardiologist,
   Cardiology Department,
   Faisalabad Institute of Cardiology,
   Faisalabad.
2. Senior Registrar,
   Cardiology Department,
   Faisalabad Institute of Cardiology
   Faisalabad.
3. Senior Registrar,
   Cardiology Department,
   Faisalabad Institute of Cardiology
   Faisalabad.

Correspondence Address:
Dr. Naeem Asghar
Consultant Cardiologist
Cardiology Department,
Faisalabad Institute of Cardiology,
Faisalabad.
dearnaeem06@gmail.com
drsa495@hotmail.com

Dr. Naeem Asghar[1], Dr. Shakeel Ahmad[2], Dr. Muhammad Nouman Ahmad[3]

ABSTRACT… Objectives: To compare the frequency of in-hospital mortality of anterior wall myocardial infarction with and without right bundle branch block. **Study Design:** Cohort Study. **Setting:** Cardiology Department of Faisalabad Institute of Cardiology, Faisalabad. **Duration:** 1st September, 2013 to 28th February, 2014. **Methodology:** 80 patients including both genders fulfilling the inclusion criteria were collected. Informed consent was obtained from the patients. Effect modifiers such as hypertension, diabetes mellitus, hyper-lipidemia and smoking were noted. Patients were monitored according to the hospital protocol and mortality was noted. **Results:** Out of 80 patients, 62(77.5%) were males and 18(22.5%) were females. Smoking was present in 45% patients, diabetes mellitus in 35% patients, hypertension in 27.5% patients and hyper-lipidemia in 23.8% patients. In hospital mortality in group A was 23(57.5%) and in group B was 7(17.5%) with P value of 0.0001. **Conclusion:** Acute anterior wall myocardial infarction combined with right bundle branch block suggests the severity of disease and is an independent predictor of increased mortality. RBBB after myocardial infarction suggests poor prognosis.

Key words: Myocardial infarction, right bundle branch block, mortality

INTRODUCTION

Ischemic heart disease and in particular ACS, is the leading cause of mortality and disability in the world.[1] It accounts for 16.7 million mortalities every year worldwide. According to WHO, coronary artery event deaths will reach a total of 25 million per year by the year 2020 which is alarming.[2] Cardiovascular risk factors are on the rise in Pakistan.[3] In Pakistan ischemic heart disease causes more than 100,000 deaths (12% of total deaths) annually.[2]

The major presentation of coronary artery disease is an acute STEMI.[4] Approximately three to four million people are estimated to suffer from AMI each year.[5] Complications of myocardial infarction are ischemic, mechanical, arrhythmic, thrombo-embolic, extra-cardiac and others.[6] The presence of new onset conduction defects complicating acute myocardial infarction is relatively frequent presentation in our medical emergencies. The most commonly observed conduction defects after acute myocardial infarction include varying degrees of Atrioventricular nodal blocks and Intraventricular conduction defects.[7]

RBBB is an independent predictor of post MI mortality as a complication.[8] The increased mortality in patients with new permanent RBBB may be due to more extensive involvement of the ventricular wall by the infarction and ischemia.[9] In one study, those who developed new RBBB accompanying anterior AMI had a high 30-day mortality of over 30% (31% with RBBB and 11.7% without RBBB).[10]

In another study, in-hospital mortality in patients of AMI with RBBB was 55.1% and in patients without RBBB was 11.2%.[11] So, no doubt, that conduction system disturbances show worse ischemic disease outcomes. With evolving treatment strategies like better and early intervention (Primary PCI) this complication will decrease in future. Conduction problems like RBBB, cause

mechanical and arrhythmic problems in future. It also increases the chance of future heart failure.

In-hospital mortality of AMI with RBBB has not been much studied in Pakistani population. Hence the rationale of this study is to find in-hospital mortality of AMI with RBBB and without RBBB, so that the patients can be stratified according to the risk. This will help in early Risk stratification and proper treatment and reduction in the mortality.

OBJECTIVE
The objective of the study was to compare the frequency of in-hospital mortality of anterior wall myocardial infarction with and without right bundle branch block.

OPERATIONAL DEFINITIONS

In-Hospital Mortality
In hospital mortality means the death of patients from anterior wall myocardial infarction during hospital stay (each patient remained admitted for 5 days).

Acute Anterior Wall Myocardial Infarction
Acute Anterior Myocardial Infarction defined by using the following criteria:
Detection of a rise of cardiac biomarkers (Troponin-I value greater than 0.30ng/ml).
Plus one of the followings
1. Symptoms of ischemia like chest pain.
2. ECG changes (ST segment elevation of 1mm in leads v1-v6)

Right Bundle Branch Block (RBBB)
RBBB defined by using all of the followings:
- QRS duration > 120 msec
- rsr', rsR', or rSR', pattern in leads V_1 and V_2 (QR pattern in leads V1 and V2 in acute anterior wall myocardial infarction).
- S wave in leads 1 and V6 > 40 msec wide.

The QRS duration measured with a caliper in the lead with the longest QRS duration. ST segment levels measured at the J point.

Hypothesis
In-hospital mortality is more in patients of acute anterior wall myocardial infarction with right bundle branch block.

MATERIAL AND METHODS
Setting
Department of Cardiology, Faisalabad Institute of Cardiology, Faisalabad.

Study Duration
Six months from 1st September 2013 to 28th February 2014.

Study Design
Cohort Study

Sample Size
By using WHO sample size calculator for two proportions,
- P1 = 55.1% [12]
- P2 = 11.2% [12]
- Power of study = 90%
- Level of significance = 5%
- Sample size = 80 (40 in each group)

Sample Technique
Non-Probability Consecutive sampling.

Inclusion Criteria
1. Age 20-70 years.
2. Either sex
3. Patients of anterior wall myocardial infarction presenting within 12 hours of onset of pain and thrombolysed.
4. Patients with anterior wall myocardial infarction with right bundle branch block (exposed group) and patients with anterior wall myocardial infarction without right bundle branch block (un-exposed group)

Exclusion Criteria
1. Patients having cardiogenic shock on presentation. It will be diagnosed as systolic blood pressure less than 90 mmHg with signs of tissue hypoperfusion like sweating, cold peripheries, mental obtundation and urine output less than 30 ml per hour.

2. Patients developing mechanical complications of myocardial infarction like ventricular septal rupture, acute mitral regurgitation and ventricular free wall rupture.
3. Patients having bifascicular or trifascicular block.
4. Patients having pre-existing Right bundle branch block.
5. Patients who are not thrombolysed.
6. Patients having co-morbid conditions like renal failure and chronic liver disease onavailable medical record and history.

Data Collection Procedure

A total of 80 patients (40 in exposed group and 40 in un-exposed group) including both genders fulfilling the inclusion criteria were collected from Department of Emergency, Faisalabad Institute of Cardiology, Faisalabad. Informed consent was obtained. Risk factors for cardiovascular disease such as hypertension, diabetes mellitus, hyperlipidemia, and smoking were noted. All patients received standard medications of myocardial infarction, including thrombolysis by Streptokinase. The patients were divided in two groups. Group A having acute anterior wall myocardial infarction with right bundle branch block (exposed group) and Group B having acute anterior wall myocardial infarction without right bundle branch block (unexposed group). All the patients remained admitted in hospital for minimum 5 days. The patients were monitored and mortality noted. All these information were collected through prescribed Performa.

Data Analysis

All the collected information was transferred to SPSS version 10 and analyzed accordingly. Descriptive statistics were calculated. Mean and standard deviation were calculated for age. Frequency and percentage were calculated for sex, hypertension, diabetes mellitus, hyperlipidemia, smoking and in-hospital mortality. Chi-Square test was used to compare in-hospital mortality between two groups. P-value less than or equal to 0.05 was taken as significant. Relative risk was calculated. Confounding variables like age, sex, hypertension, diabetes mellitus, hyperlipidemia and smoking were controlled by stratification.

RESULTS

This study was conducted in the Department of Cardiology, Faisalabad Institute of Cardiology, Faisalabad for six months (1st September, 2013 to 28th February, 2014). Total 80 subjects were included in this study. The findings of the study are presented here.

The patient's were divided into six age groups. Maximum numbers of patients were in age group 41-50 years. In this study, the patient having minimum age was 27 years and maximum age was 70 years and mean was 50.08 with standard deviation of 9.0. (Table-II)

Most of the patients were males. Total numbers of females were 18, mostly in group having anterior wall myocardial infarction with right bundle branch block. (Table-III)

The number of patients having hypertension were more in group having anterior wall myocardial infarction with right bundle branch block than those without right bundle branch block. However, no statistical significant difference was found between patients of both groups. P Value = 0.617 (Table-IV).

Variable		Group A n=40	Group B n=40
Age		49.85±8.00	50.30±9.99
Gender	Male	30 (75.0%)	32 (80.0%)
	Female	10 (25%)	8 (20.0%)
Smoking		19 (47.5%)	17 (42.5%)
Diabetes Mellitus		17 (42.5%)	11 (27.5%)
Hypertension		12 (30.0%)	10 (25.0%)
Hyperlipidemia		9 (22.5%)	10 (25.0%)
Table-I. Baseline Characteristics of patients			

Age Groups	Groups		Total
	Group A n=40	Group B n=40	
21-30	1 2.5%	2 5.0%	3 3.8%
31-40	3 7.5%	6 15.0%	9 11.3%
41-50	22 55.0%	14 35.0%	36 45.0%
51-60	12 30.0%	11 27.5%	23 28.8%
61-70	2 5.0%	7 17.5%	9 11.3%
Mean Age±SD	49.85±8.00	50.30±9.99	50.08±9.00

Table-II. Distribution of patients according to age

Gender	Groups		Total	P Value
	Group A n=40	Group B n=40		
Male	30 75.0%	32 80.0%	62 77.5%	0.592
Female	10 25.0%	8 20.0%	18 22.5%	
Total	40	40	80	

Table-III. Distribution of patients according to Gender

Risk Factor	Groups		Total	P Value
	Group A n=40	Group B n=40		
Hypertension	12 30.0%	10 25.0%	22 27.5%	0.617
Diabetes	17 42.5%	11 27.5%	28 35.0%	0.160
Smoking	19 47.5%	17 42.5%	36 45.0%	0.653
Hyperlipidemia	9 22.5%	10 25.0%	19 23.8%	0.793

Table-IV Distribution of patients according to Risk Factors

Risk Factor	Gender	Group A n=40	Group B n=40	Total	P Value
Hypertension	Male	7 (23.3%)	8 (25.0%)	15 (24.2%)	0.878
	Female	5 (50.0%)	2 (25.0%)	7 (38.9%)	0.280
Diabetes Mellitus	Male	10 (33.3%)	6 (18.8%)	16 (25.8%)	0.190
	Female	7 (70.0%)	5 (62.5%)	12 (66.7%)	0.737
Smoking	Male	18 (60.0%)	17 (53.1%)	35 (56.5%)	0.585
	Female	1 (10.0%)	0	1 (5.6%)	0.357
Hyperlipidemia	Male	7 (23.3%)	7 (21.9%)	14 (22.6%)	0.891
	Female	2 (20.0%)	3 (37.5%)	5 (27.8%)	0.410

Table-V. Stratification of Risk factors According to Gender

Thirty five percent patients in this study were diabetics, mostly in group having anterior wall myocardial infarction with right bundle branch block as compared with patients without right bundle branch block. No statistical significant difference was found between patients of both groups. P value =0.160 (Table-IV).

Smoking was the most dominant risk factor in this study. 45 % patients were smokers more in group having anterior wall myocardial infarction with right bundle branch block as compared to patients without right bundle branch block. No statistical difference was found between patients of both groups. P value = 0.653 (Table-IV).

The ratio of patients having hyperlipidemia was very low in the study. Only 19 patients (23.8%) were having hyperlipidemia, mostly those with anterior wall myocardial infarction without right bundle branch block. No statistical significant difference was found between patients of both groups. P value = 0.793 (Table-IV).

80 patients were included in the study, out of which 30 patients died, 23 having anterior wall myocardial infarction with right bundle branch block, while 7 patients having no right bundle branch block. The mortality among patients with anterior wall MI with right bundle branch block is higher than patients without right bundle branch

block. Significant statistical difference was found between patients of both groups. P Value = 0.0001(Table-VI).

In-hospital mortality was more in female patients compared to males. 44.4% female patients died in this study compared to 35.5% male patients. The mortality of both males and females is higher in group having anterior wall myocardial infarction with right bundle branch block. (Table-VII).

Diabetes was present in majority of patients those died with anterior wall MI, followed by hypertension, hyperlipidemia and smoking. No significant statistical difference in mortality was found between patients of both groups having hypertension and hyperlipidemia while significant statistical difference in mortality was found in patients of both groups having diabetes mellitus and smoking. (Table-IX).

DISCUSSION

Ischemic heart disease and in particular ACS, is the leading cause of death in the total population of the world especially in the developing countries like Pakistan. The presence of new onset conduction defects associated with acute myocardial infarction are relatively frequent and are associated with increase in short and long term mortality and other complication rates.

Groups	Yes	NO	Total	P Value	Relative Risk
Anterior Wall MI with RBBB (Group A)	23 57.5%	17 42.5%	40		
Anterior Wall MI without RBBB (Group B)	7 17.5%	33 82.5%	40	0.0001	3.28
Total	30 37.5%	50 62.5%	80		
Table-VI. Comparison of In-Hospital Mortality in Two groups					

Gender		Groups		Total	P Value
		Group A	Group B		
Males	In-Hospital Mortality	17 56.7%	5 15.6%	22 35.5%	0.001
Females	In-Hospital Mortality	6 60.0%	2 25.0%	8 44.4%	0.138
Table-VII. Distribution of mortality of patients according to Gender					

Age Group	In-Hospital Mortality	Groups		Total	P Value
		Group A	Group B		
21-30	NO	1 (100.0%)	2 (100.0%)	3 (100.0%)	
31-40	Yes	1 (33.3%)	0	1 (11.1%)	0.134
	NO	2 (66.7%)	6 (100%)	8 (88.9%)	
41-50	Yes	10 (45.5%)	3 (21.4%)	13 (36.1%)	0.143
	NO	12 (54.5%)	11 (78.6%)	23 (63.9%)	
51-60	Yes	10 (83.3%)	2 (18.2%)	12 (52.2%)	0.002
	No	2 (16.7%)	9 (81.8%)	11 (47.8%)	
61-70	Yes	2 (100.0%)	2 (28.6%)	4 (44.4%)	0.073
	No	0	5 (71.4%)	5 (55.6%)	

Table-VIII. Distribution of mortality of patients according to Age Group

Risk Factor	In-Hospital Mortality		Total	P Value
	Group A	Group B		
Diabetes	13 (76.5%)	4 (36.4%)	17 (60.7%)	0.034
Hypertension	8 (66.7%)	3 (30.0%)	11 (50.0%)	0.087
Hyperlipidemia	5 (55.6%)	3 (30.0%)	8 (42.1%)	0.260
Smoking	12 (63.2%)	3 (17.6%)	15 (41.7%)	0.006

Table-IX. Distribution of In-Hospital Mortality in patients having Risk factors

Age related degenerative changes in conduction pathways also play its role.

In our study, total 80 patients were included and were divided into two groups. In Group A, Hypertension was present in 12 (30.0%), Diabetes Mellitus in 17 (42.5%), Smoking in 19 (47.5%) and Hyper-lipidemia in 9 (22.5%) of patients. In group B, Hypertension was present in 10 (25.0%), Diabetes Mellitus in 11 (27.5%), Smoking in 17 (42.5%) and Hyper-lipidemia in 10 (25.0%). In hospital mortality in Group A was more than Group B (57.5% patients compared to 17.5% of patients)

Most of the patients in this study were between 41-50 years of age and only small proportion of patients at extreme of ages (below 30 years and above 60 years). The mean age of patients was 50.08±9.00 which is less as compared to western countries in which ischemic heart disease is found in relatively older age group. This shows that CAD emerges at an earlier age than that in the West and hence mortality ratios as compared to other ethnic groups are highest in the South Asians. This was also collaborated in this study which showed that 22.8% of patients were under 45 years of age. Saleheen and Frossard also reported that relatively younger patients (<45 Years) represented 16.1% of total patients.[12] In another study, 28.3% of patients were below 45 years of age.[13] Joshi et al, found that mean age for acute myocardial infarction in South Asians was 53.0 years while the mean age of patients worldwide was 58.8 years.[14]

We have studies from neighboring countries. These also support this theory. In a study by Senthil Kumar P, the peak incidence of AMI was found in older age group (40 – 54), and the mean age was 47years.[15] This means that the mean age of patients with AMI is lower in South Asians but also it is affecting younger population.

In our study, most patients were males (77.5% compared to 22.5%). It has been established by previous studies that male gender is a risk factor for cardio-vascular disease.[16,17] The higher number of male patients also reflect that males get preference in seeking treatment. Males also have more tendency towards smoking. This is also shown by lifetime risk of developing CAD at 40 years of age is 50% for men and 33% for

women.[18] Jafar TH has reported a higher tendency of cardio-vascular disease risk factors in women as compared to men in Pakistan.[19] A study done at National Institute of Cardiology, Karachi also showed more number of female patients.[20]

The mortality was higher in females than males, in this study. A study by Roger VL et al, showed that coronary artery disease mortality is higher in females than men.[21] Another study also showed that women younger than 55 years, had worse prognosis after acute myocardial infarction than their counterparts, with great recurrence and higher mortality.[22] The increased mortality of females in this study could be due to the reason that most of the females were diabetics. Diabetes eliminates the usual gender gap in CAD mortality and may accelerate process of atherosclerosis in women than in men.[23]

Smoking constitutes the single most important modifiable risk factor for ischemic heart disease. We also found smoking as a leading risk factor (45% of patients) for CAD in this study. Compared to non-smokers, those who consume 20 or more cigarettes per day have 2-3 times increased risk of developing ischemic heart disease.[24] Cessation of smoking alone reduces the risk of first heart attack by nearly 65% as the time passes more than two years of cessation of smoking.[25]

Local and international studies support our findings. The studies of Akhtar et al,[26] and Pais et al,[27] conducted in Pakistan and India. They have shown very high percentage of their patients to be smokers. In CV-ASPIRE study, smokers across Europe were recruited in 2011. They concluded that reductions in risk of IHD could be obtained by smoking cessation.[28]

In our study, mortality was more of the patients having DM. Diabetes Mellitus is, no doubt, a major IHD risk factor. Currently, DM affects 240 million people worldwide and this number is projected to increase substantially to 380 million by 2025. Pakistan belongs to high diabetes prevalence area.[29] Among diabetics, type II diabetes is more common. Patients with diabetes are 2-8 times more likely to experience future cardiovascular events than age and ethnically matched individuals without diabetes.[30]

CONCLUSION
Acute anterior wall myocardial infarction combined with right bundle branch block suggests the severity of disease and the poor prognosis. The presence of right bundle branch block after anterior myocardial infarction is an independent predictor of increased mortality.

Copyright© 27 Aug, 2016.

REFRENCES
1. Seghieri C, Mimmi S, Lenzi J, Fantini MP. **30-day in-hospital mortality after acute myocardial infarction in Tuscany (Italy): an observational study using hospital discharge data.** BMC Med Res Method. 2012; 12:170.

2. Ahmed S, Ahsan MB, Ehsan Ullah. **Stable angina: the frequency of coronary artery stenosis among patients having left bundle branch block.** Professional Med J. 2009; 16:94-9.

3. Hafeez S, Javed A, Kayani AM. **Clinical profile of patients presenting with acute ST elevation myocardial infarction.** J Pak Med Assoc. 2010; 60:190-3.

4. Hausenloy DJ. **Magnitude and relevance of reperfusion injury.** Heart Metab. 2012; 54:5-8.

5. Li YQ, Zhang MF, Wen HY, Hu CL, Liu R, Wei HY, et al. **Comparing the diagnostic values of circulating micro RNAs and cardiac troponin T in patients with acute myocardial infarction.** Clinics (Sao Paulo). 2013; 68:75-80.

6. Antman EM, Morrow DA. **ST-segment elevation myocardial infarction: management. In: Bonow RO, Mann DL, Zipes DP, Libby P, editors.** Braunwald's heart diseases: a textbook of cardiovascular medicine. 9th ed. Phildelphia: Saunders; 2012. p. 1111-77.

7. Bhalli MA, Khan MQ, Samore NA, Mehreen S. **Frequency and clinical outcome in conduction defects in acute myocardial infarction.** J Ayub Med Coll Abbottabad. 2009; 21(3):32-7.

8. Mirvis DM, Goldberg AL. Electrocardiography. In: Bonow RO, Mann DL, Zipes DP, Libby P, editors. **Braunwald's heart diseases: a textbook of cardiovascular medicine.** 9th ed. Phildelphia: Saunders; 2012. p. 126-67.

9. Iwasaki J, Kono K, Katayama Y, Takahashi N, Takeuchi K, Tanakaya M, et al. **Prgonostic significance of right bundle branch block in patients with acute inferior myocardial infarction.** Acta Med Okayama. 2009; 63; 25-33.

10. Wong CK, Gao W, Stewart RAH, French JK, Aylward PEG, White HD. **Relationship of QRS duration at baseline and changes over 60 min after fibrinolysis to 30-day mortality with different locations of ST elevation myocardial infarction: results from the Hirulog and Early Reperfusion or Occlusion-2 trial.** Heart. 2009; 95:276-82.

11. Mijailovic V, Mrdovic I, Ilic M, Asanin M, Srdic M, Rajic D. **Prognostic significance of acute bundle branch block in patients with acute myocardial infarction.** Vojnosanit Pregl. 2008; 65:733-7.

12. Saleheen D, Frossard P. **CAD risk factors and acute myocardial infarction in Pakistan.** 2004; 59:417-24.

13. Jafary MH, Abdus Samad, Ishaq M, Jawaid SA, Ahmad M, Vohra EA. **Profile of acute myocardial infarction (AMI) in Pakistan.** Pak J Med Sci. 2007; 23:485-9.

14. Joshi P, Shofiqul Islam, Pais P, Reddy S, Dorairaj P, Kazmi K. **Risk Factors for Early Myocardial Infarction in South Asians Compared With Individuals in Other Countries.** JAMA. 2007; 297:286-94.

15. Kumar PS, Than NH, Soe HHK, Sellahewa KH. **Clinical profile of acute inferior wall myocardial infarction in a semi urban population in India.** J Med Med Sci. 2013; 41:17-21.

16. Janghorbani M, Hedley AJ, Jones RB, Zhianpour M, Gilmour WH. **Gender differential in all–cause and cardiovascular disease mortality.** Int J Epidemiol. 1993; 22:1056-63.

17. Lawlor DA, Ebrahim S, Davey Smith G. **Sex matters: secular and geographical trends in sex differences in coronary heart disease mortality.** BMJ. 2001; 323:541-5.

18. Faisal AWK, Ayub M, Waseem T, Khan RSA, Hasnain SS. **Risk factors in young patients of acute myocardial infarction.** J Ayub Coll Abbottabad. 2011; 23(3):10-13.

19. Jafar TH. **Women in Pakistan have a greater burden of clinical cardiovascular risk factors than men.** Int J Cardiol. 2006; 106:348-54.

20. Kazim SF, Itrat A, Butt NW, Ishaq M. **Comparison of cardiovascular disease patterns in two datasets of patients admitted in a tertiary care public hospital in Karachi five years apart.** Pak J Med sci. 2009; 25:55-60.

21. Roger VL, Go AS, Lloyed-Jones DM, Benjamin EJ, Berry JD, Borden WB et al. **Heart Disease and Stroke Statistics—2012 Update A Report From the American Heart Association.** Circulation 2012; 125:e2–220.

22. Vaccarino V, Krumholtz HM, Yarzebski J, Gore JM, Goldberg RJ. **Sex differences in 2 years mortality after hospital discharge for myocardial infarction.** Ann Intern Med. 2001; 134: 173-81.

23. Dale AC, Nilsen TI, Vatten L, Midthjell K, Wiseth R. **Diabetes mellitus and risk of fatal ischaemic heart disease by gender: 18 years follow-up of 74 914 individuals in the HUNT 1 Study.** Eur Heart J. 2007; 28: 2924–9.

24. Godtfredsen NS, Holst C, Prescott E, Vestbo J, Osler M. **Smoking reduction, smoking cessation, and mortality: a 16-year follow-up of 19,732 men and women from The Copenhagen Centre for Prospective Population Studies.** Am J Epidemiol. 2002; 156:994–1001.

25. Abbas S, Kitchlew AR, Abbas S. **Disease burden of ischemic heart disease in Pakistan and its risk factors.** Ann Pak Inst Med Sci. 2009; 5:145-50.

26. Akhtar J, Islam N, Khan J. **Risk factors and outcome of ischemic heart disease in young Pakistani adults.** Specialist. 1993; 9:123–6.

27. Pais P, Pogu J, Gerstein H, Zachariah E, Savitha D, Jayprakash S, et al. **Risk factors for acute myocardial infarction in Indians: a case control study.** Lancet. 1996; 348:358–63.

28. Mallaina P, Lionis C, Rol H, Imperiali R, Burgess A, Nixon M et al. **Smoking cessation and the risk of cardiovascular disease outcomes predicted from established risk scores: results of the Cardiovascular Risk Assessment among Smokers in Primary Care in Europe (CV-ASPIRE) study.** BMC Public Health 2013; 13; 362.

29. Qidwai W, Ashfaq T. **Imminent epidemic of diabetes mellitus in Pakistan: issues and challenges for health care providers.** J Liaquat Uni Med Health Sci. 2010; 9:112-3.

30. Howard BV, Rodriguez BL, Bennett PH, Harris MI, Hamman R, Kuller RH, et al. **Prevention Conference VI: Diabetes and cardiovascular disease: Writing Group I: epidemiology.** Circulation. 2002; 105:e132–7.
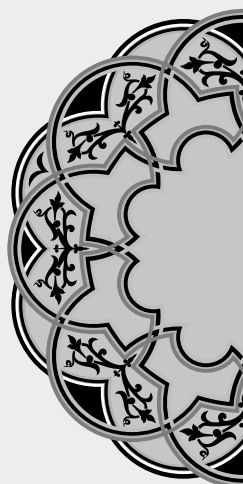
"To be rich, is not what you have is your bank account, but what you have in your heart."

Unknown

AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author-s Full Name	Contribution to the paper	Author=s Signature
1	Dr. Naeem Asghar	Manuscript drafting, data acquisition	
2	Dr. Shakeel Ahmad	Data interpretation, proof reading	
3	Dr. M. Nouman Ahmad	Statistical Analysis	