

In-hospital Outcome and Angiographic Profile of Elderly Patients with Non ST-Segment Elevation Myocardial Infarction

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Abstract:

Background: Non ST - segment elevation myocardial infarction is heterogeneous in its presentation and is a major life-threatening cause of emergency medical care and hospitalization. Patients with non ST-segment elevation myocardial infarction are at risk for adverse cardiac events and if associated with increased age, it become a strong predictor of adverse cardiac events in patients with non ST-segment elevation myocardial infarction.

Objective: To find out in - hospital outcome and severity of coronary artery disease of older patient with non - ST segment elevation myocardial infarction.

Methods: This was a descriptive cross sectional study. The study was carried out in the department of cardiology, National Heart Foundation Hospital and Research

Institute from June 2011 to May 2012. Patients of non ST - segment elevation myocardial infarction admitted at National Heart Foundation & Research Institute who fulfill the inclusion criteria were the study population. Patients were recruited by nonrandom sampling. One hundred and thirty four patients were recruited in this study. Data

were prospectively collected in a pre - designed data collection form and analyzed by using SPSS - 16 software.

Results: In this study patients had a greater prevalence of hypertension, diabetes mellitus. Chest pain and shortness of breath were common presentations observed in study patient during admission. They had a lower left ventricular ejection fraction than their younger counter parts. Older group was associated with an increased risk of triple vessel disease. In-hospital complications were significantly higher in older patients. Duration of hospital stay was longer in older patients.

Conclusion: Older patients with non- ST segment myocardial infarction strongly predicts adverse in-hospital outcome and severe coronary artery disease profile. Older patients should alert physicians to an increased risk of morbidity and mortality, which may in turn support more judicious treatment including appropriate utilization of cardiovascular diagnostic tests and therapeutics used in current cardiovascular care to optimize outcomes in these high-risk patients.

Keywords : Elderly patients, non ST-segment elevation myocardial infarction, coronary angiography

(Bangladesh Heart Journal 2022; 37(1): 52-58)

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DOI: <https://doi.org/10.3329/bhj.v37i1.60104>

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Introduction:

Coronary heart disease (CHD) is a worldwide health epidemic. Globally of those dying from cardiovascular diseases, 80 percent are in developing countries¹. Between 1900 and 2020, CHD mortality is expected to increase by 12.0 percent in women and by 13.7 percent in men in developing countries. It is estimated that the annual number of deaths caused by CHD in developing countries will rise to 11.1 million in 2020.²

Cardiovascular diseases are leading causes of morbidity and mortality in the

industrialized countries and also in the developing countries, including Bangladesh. The incidence of myocardial infarction seems to be higher in Bangladesh than the developed countries among the smokers. Epidemiologic research has identified risk factors that increase the likelihood of coronary heart disease events. When risk factors coexist, they multiply the risk of CHD several fold.³

Patients with acute coronary syndrome (ACS) are in major health problem & represent a large number of hospitalizations annually.⁴ ACS is a major source of mortality and morbidity both during and after hospitalization⁵. Non ST-segment elevation myocardial infarction and unstable angina are more heterogeneous in their presentation. Non ST-segment elevation myocardial infarction is distinguished from unstable angina by the presence of elevated serum levels of cardiac biomarkers.⁶

Non ST-segment elevation myocardial infarction is characterized by an imbalance

between myocardial oxygen supply and demand. Angiographic, intravascular ultrasound and angioscopic studies indicate that non ST-segment elevation myocardial infarction usually results from coronary artery narrowing caused by a nonocclusive thrombus that has developed on a disrupted atherosclerotic plaque with a subsequent cascade of pathologic processes that decrease coronary blood flow.⁶

The number of patients with non ST-segment elevation myocardial infarction increased in a linear fashion with increasing age.⁷

Age had an adverse prognostic significance, with a 1.7 fold increased risk for every 10 years⁸.

Older patients tend to have more severe coronary disease than their younger

counterparts, and a worse outcome⁹. Prevalence of multivessel disease, including left main increased with

age and the proportion of patients with >2 vessels with significant stenosis increased in older age group¹⁰.

Increasing age is a strong predictor of adverse events in patients with coronary heart disease, including patients undergoing coronary revascularization.¹⁰

Smaller coronary artery luminal diameter potentially reflects neointimal thickening; which has been recognized as an important early step in the development of atheromatous plaque. Hence, the likely presence of neointimal thickening as reflected by small coronary artery luminal diameter may represent a manifestation of more severe atherosclerotic vascular disease, corresponding to the increased CAD morbidity and mortality observed in South Asians relative to other ethnic groups.¹¹

Materials and Methods:

This is a descriptive cross sectional study. The study was carried out in the department of cardiology, National Heart Foundation Hospital and Research Institute, Mirpur, Dhaka, Bangladesh from June 2011 to May 2012. Patients of non ST-segment elevation myocardial infarction admitted at National Heart Foundation & Research Institute who fulfill the inclusion criteria were the study population. It was a nonrandom sampling. A total number of 134 patients of both sexes were included in this study. Ethical consideration was taken from ethical consideration committee of National Heart Foundation Hospital and Research Institute.

Statistical Analyses:

After processing of all available data, statistical analysis of their significance was done. Obtained data were expressed in frequency, percentage, mean and standard deviation as applicable. Logistic regression was done. The whole

analyses were done with the help of computer based SPSS (Statistical Programme for Social Science) version 16.0. p value of < 0.05 was considered as significant.

NSTEMI⁶

NSTEMI is defined by electrocardiographic ST-segment depression or prominent T wave inversion and/or positive biomarkers of necrosis (e.g. troponin) in the absence of ST-segment elevation and in an appropriate clinical setting (chest discomfort or angina equivalent).

Older Age¹²

The ageing process is of course a biological reality which has its own dynamic, largely beyond human control. In developed world, chronological time plays a paramount role. The age of 60 roughly equivalent to retirement ages in most developed countries, is said to be the beginning of old age. Although defining old age is different in many societies, older age may be defined as the point age at which the active contribution is no longer possible.

Severity of Coronary Stenosis ¹⁹

- 0-Normal coronary artery
- 1-Irregularities of the vessel
- 2-Narrowing of less than 50%
- 3-Stenosis between 50% and 75%
- 4-Stenosis between 75% and 95%
- 5-Total occlusion.

Results:

In this study, 134 patients of non ST – segment elevation myocardial infarction were included and the mean age of these patients were nearly 57 ± 11.82 years ranges from 40 years to 80 years and 114 (85%) were male.

Table-I

Socio-demographic study of the study patients (n=134).

Age	Number (n)	Percentage (%)
≤40	09	6.70
41-50	33	24.60
51-60	38	28.40
61-70	42	31.30
≥70	12	9.00
Mean	57.71	
SD	1.82	
Sex		
Male	114	85.00
Female	20	15.00
Risk factors		
Smoking habit		
Yes	74	55.00
No	60	45.00
Hypertension		
Yes	95	70.89
No	39	29.10
Diabetes mellitus		
Yes	71	53.00
No	63	47.00
Dyslipidaemia		
Yes	31	23.00
No	103	77.00
Family history of ihd		
Yes	26	19.00
No	108	81.00

The socio-demographic study of the study patients shows that most of the patients belonged to 61-70 years which was 31.3%. The mean age of the patients was 57.81. Among the study population 85% was male and 15% was female. Regarding risk factors hypertension, smoking and diabetes mellitus were the common risk factors.

Table-II

Clinical presentation of study patients (n=134)

Clinical presentation	Number (n)	Percentage
Chest pain		
Yes	130	97.00
No	4	3.00
Shortness of breath		
Yes	34	25.00
No	100	75.00
Syncope		
Yes	1	0.75
No	133	99.25
Vomiting and sweating		
Yes	114	85.00
No	20	15.00

Here, the most common clinical presentation was chest pain (97%) followed by vomiting and sweating (85%) and then shortness of breath (25%) in the study population

Table-III

Distribution of the study patients (n=134) by severity of coronary artery lesion.

Percentage of lesion	Number (n)	Percentage
LM		
Normal	110	82.10
<50%	8	6.00
50%-75%	5	3.70
75%-99%	11	8.20
100	0	0.00
LAD		
Normal	18	13.40
<50%	6	4.50
50%-75%	13	9.70
75%-99%	83	61.90
100	14	10.40
LCX		
Normal	50	37.30
<50%	10	7.50
50%-75%	5	3.70
75%-99%	55	41.00
100	14	10.40
RCA		
Normal	58	43.30
<50%	5	3.70
50%-75%	9	6.70
75%-99%	40	29.90
100	22	16.40

LM: Left Main, LAD: Left Anterior Descending, LCX: Left Circumflex, RCA: Right Coronary Artery.

The severe coronary artery lesion (75% to 99% occlusion) were most commonly involved in all arteries and it was 8.2% in LM, 61.9% in LAD, 55% in LCX and 40 % in RCA respectively.

Table-IV

Distribution of patients according to in hospital outcome (n=134)

Outcome	Number (n)	Percentage
Heart failure	29	21.60
Cardiogenic shock	15	11.20
Arrhythmia	9	6.70
Mitral regurgitation	56	41.80
Death	1	0.70

In hospital outcome of the study population shows the common adverse events were mitral regurgitation (41.8%), heart failure (21.6%) and cardiogenic shock (11.2%)

Table-V

Distribution of study patients developing heart failure according to age

Age	Heart failure		P value .01 ^S
	Yes	No	
Mean±SD	63.65±7.45	56.20±12.31	

S = Significant, P value obtained from unpaired t- test

Among study population, elderly aged patients (mean age 63.65 ± 7.45) developed heart failure significantly.

Table-VI

Distribution of study patients according to cardiogenic shock

Age	Cardiogenic shock		P value .540 ^{NS}
	Yes	No	
Mean±SD	57.53±11.92	57.84±11.86	

NS=Non significant, P value obtained from unpaired t test.

In this study 15 patients developed cardiogenic shock which was not statistically significant.

Table-VII

Distribution of study patients according to arrhythmia

Age	Arrhythmia		P value .078 ^{NS}
	Yes	No	
Mean±SD	50.00±21.79	57.84±11.79	

P value obtained from unpaired t test.

In this study 9 patients developed arrhythmia . Here, we found that there was tendency to develop arrhythmia

Table-VIII

Distribution of study patients according to mitral regurgitation

Age	Mitral Regurgitation		P Value .05 ^S
	Yes	No	
MEAN±SD	61.19±9.97	55.38±12.49	

S= significant, P value obtained from unpaired t test.

In this study 56 patients developed mitral regurgitation which was statistically significant. It also states that older age group (mean age, 61.19±9.97) were more prone to develop mitral regurgitation.

Table-IX

Distribution of study patients according to number of vessel involvement

Number of vessel involvement	Age	P value
1 (n=51)	54.0±10.9	.001 ^S
2 (n=42)	56.4±13.5	
3 (n=41)	63.9±8.2	

S=Significant, P value reached from one-way ANOVA. 1 = SVD, 2 = DVD, 3 = TVD

The study patients according to number of vessel involvement shows that gradually the older age group developed more severe vessel involvement which was statistically significant

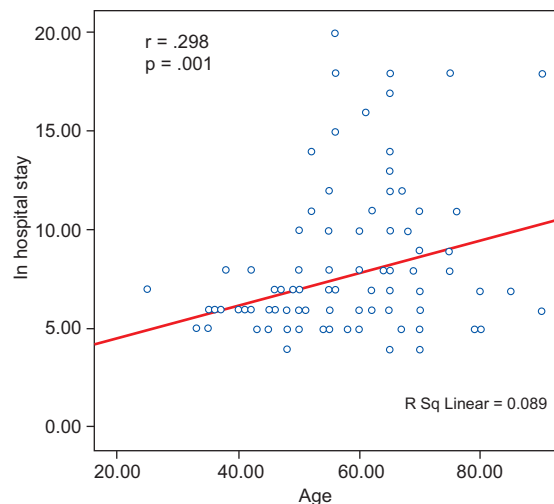


Fig.-1: The figure shows that there is positive correlation between age and hospital stay among the study population (r=.298 ; p=.001)

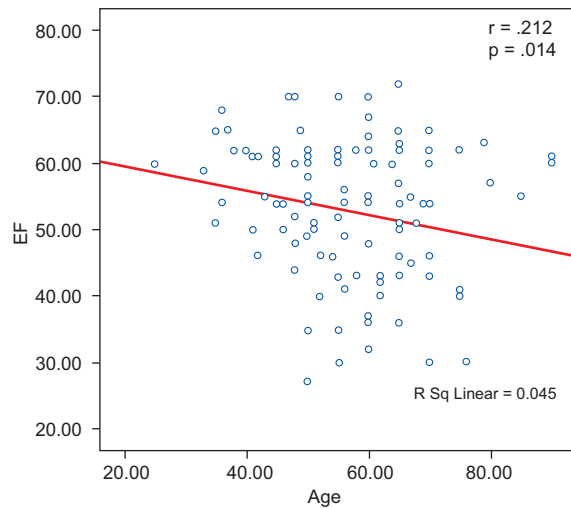


Fig.-2: The figure shows that there is negative correlation between age and ejection fraction, that means increasing age was associated with reduced ejection fraction ($r=.212$; $p=.014$).

Table-X
Distribution of the study patients by in-hospital complications

Complication	≤40 years		40-59 years		≥60 years	
	n	%	n	%	n	%
Present	2	22.20	17	24.30	43	78.20
Absent	7	77.80	53	75.70	12	21.80

Regarding in hospital complications, 22.2% patients had adverse in-hospital events in d" 40 year age group, 24.3% patient in 41-60 year age group and 78.2% patient in e" 60year age group during their hospital stay. Older patients had more adverse in-hospital events than others.

Table-XI
Result of logistic regression analysis

A step wise logistic regression model was done with in-hospital complications as dependant and old age, hypertension, diabetes mellitus and smoking as independent variables. However, only age remain in the final model in stepwise logistic regression.

Variable	B	SIG	Exp (B)	95.0% C.I. for EXP (B)	
				Lower	Upper
Age	.096	.001 ^S	1.101	1.055	1.150
Hypertension	-.542	.238 ^{NS}	.582	.237	1.431
Diabetes	.560	.178 ^{NS}	1.751	.774	3.961
Smoking	-.313	.444 ^{NS}	.732	.329	1.629
Constant	-5.53	.001	.004		

Here, out of old age, hypertension, diabetes mellitus and smoking, only old aged patients had higher risk of developing in-hospital complications.

Discussion:

In this study the most of the patients belonged to 61-70 years which was 31.3%. The mean age of the patients was 57.81. Among the study population 85% was male and 15% was female. Regarding risk factors hypertension (70.89%), smoking (55%) and diabetes mellitus (53%) were the common risk factors. In this study male: female ratio was 5.7:1. These findings were also close to the study done by Malik, et al.¹³, where the ratio was 7.9:1. The smaller percentage of female patients in our country may be due to protective effect of estrogen, less incidence of smoking in female and social negligence towards the female for seeking medical help. Hypertension was the commonest risk factor in this study which was also found by Salim¹⁴ although Malik, et al.²³ found smoking was the leading risk factors in about 81.8% of patients.

During admission, the most common clinical presentation was chest pain (97%) followed by vomiting and sweating (85%) then shortness of breath (25%) in the study population. These findings were also very much close to the study done by Malik, et al.¹⁵ where chest pain (92.6%), nausea and vomiting (56.9%) and breathlessness (62%). Regarding ejection fraction, there was decrement in left ventricular ejection fraction with increased age with non-ST- segment elevation myocardial infarction.

Regarding Coronary artery involvement, the mean age of SVD was in 54.0±10.9 , DVD was in 56.4±13.5 and TVD was in 63.9±48.2 which were statistically significant. Wennberg, et al.¹⁶ found the prevalence of multi-vessel disease, including left main increased with age and the proportion of patients with >2vessels with significant stenosis is increased from 32.4% of those were non older age group to 57.9% in older age group.

Regarding severity of lesion of the study patients, the most common lesion in all arteries was 75-99%, which was 8.2% in LM, 61.9% in LAD, 41% in LCX and 29.9% in RCA. This findings were supported by Veeranna, et. al¹⁷, who also found severe occlusion (> 80 % occlusion) in patients with non ST elevation myocardial infarction.

The common adverse events were mitral regurgitation (41.8%), heart failure (21.6%) and cardiogenic shock (11.2%) in this study. Avenzum, et , al.,¹⁸ found in their study, incidence of heart failure increased with age (68.4% vs 22.6%), cardiogenic shock more common in

the oldest compared with non older group (9.8% vs 1.6%). rates of death (18.4% vs 1.3%).

In this study we found that increase duration of hospital stay with increasing age which was supported by Fox, et al.,¹⁹ higher in older patients.

In this study showed that, 22.2% patients had adverse in-hospital events in <40 year age group, 24.3% patient in 41-60 year age group and 78.2% patient in >60 year age group during their hospital stay. Older patients had more adverse in-hospital events than others which was also seen by Madhavan, M, V et al.,²⁰. One patient (.7%) die from in hospital complication, he was suffering from triple vessel coronary artery disease and waiting for CABG.

Conclusion:

Old age was associated with an increased risk of triple vessel disease in contrast the prevalence of single vessel disease was higher in younger patients. In-hospital complications were significantly higher in older patient. Patients with non ST elevation myocardial infraction with old age had longer hospital stay.

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