

Outcome of Coronary Artery Diseases in 12 weeks Treatment Tenure

Mir Sufian¹, Abu Zahid², Hasanul Islam³, Ahsanul Kabir⁴, Mahub Alam Siddiqui⁵, Muktar Hossain⁶, A.N.M. Monowarul Kadir⁷, Israt Sultana⁸

Abstract

Background: Prediction of the proximal right coronary artery lesion in the setting of acute inferior myocardial infarction is very crucial for the reduction of significant morbidity and mortality.

Objective: The objective of the study was to determine the validity of right ventricular free wall strain detected by speckle-tracking echocardiography for identifying proximal right coronary artery lesion in acute inferior myocardial infarction.

Methodology: This was a prospective observational study which was conducted in the Department of Cardiology, 250 Bedded General Hospital Naogaon, Bangladesh during the period from July 2020 to June 2021. 67 patients with acute inferior MI were included in this study. Echocardiographic examination was done with the measurement of conventional parameters and strain analysis. Patients with RCA occluded proximal to right ventricular branch were assigned to group I and patients with RCA occluded distal to right ventricular branch were assigned to group II. Correlation was done with the echocardiographic and angiographic parameters.

Results: RV-FW strain was lower in group I patients compared to group II ($-12.21 \pm 4.22\%$ vs $-18.16 \pm 2.93\%$). Based on ROC curves average RV-FW at a cut off value of $\geq -15.8\%$ predicted proximal RCA lesion with 83.0% sensitivity and 75.8% specificity which was much reliable than the sensitivity and specificity of other conventional parameters like FAC (44.7% and 39.4%), TAPSE (48.9% and 39.4%) and TDI-TV Sm (44.7% and 30.3%).

Conclusion: RV-FW strain at a cutoff value of $\geq -15.8\%$ is an independent predictor of the proximal RCA lesion in patients with acute inferior MI.

Affiliation:

¹Senior Consultant, Department of Cardiology, 250 Bedded General Hospital Naogaon, Bangladesh.

²Assistant Professor, Department of Cardiology, Rangpur Medical College & Hospital, Rangpur, Bangladesh.

³Assistant Professor, Department of Cardiology, Rangpur Medical College & Hospital, Rangpur, Bangladesh.

⁴Junior Consultant, Department of Cardiology, Upazila Health Complex, Shahrasti, Chandpur, Bangladesh.

⁵Associate Professor, Department of Medicine, TMSS Medical College & Rafatulla Community Hospital, Bogura, Bangladesh.

⁶Senior Consultant, Department of Surgery, 250 Bedded General Hospital Naogaon, Bangladesh.

⁷Medical Officer, Department of Cardiology, BSMMU, Dhaka, Bangladesh.

⁸Medical Officer, 250 Bedded Mohammed Ali Hospital, Bogura, Bangladesh.

Keywords: *Key word: ST-segment elevation myocardial infarction (STEMI), Modified Shock Index (MSI), ECG findings.*

Introduction

Coronary artery disease (CAD) is a major cause of death and disability in developed countries. The burden of cardiovascular disease (CVD) is on the rise globally. Cardiovascular deaths account for 30% of deaths worldwide. [1] The burden of coronary heart disease is projected to be the highest in India by the year 2020, as compared to other countries. [2] In the WHO-PREMISE study, the proportion of coronary heart disease (CHD) among patients less than 50 years of age, was highest in India (22.6% in males and 3% in females) which is comparable to the prevalence in Bangladesh. [3] In another study conducted in the year of 2009, the authors determined that, cardiovascular

Corresponding author:

Mir Sufian, Senior Consultant, Department of Cardiology, 250 Bedded General Hospital, Naogaon, Bangladesh

Citation: Mir Sufian, Abu Zahid, Hasanul Islam, Ahsanul Kabir, Mahub Alam Siddiqui, Muktar Hossain, A.N.M. Monowarul Kadir, Israt Sultana. Outcome of Coronary Artery Diseases in 12 weeks Treatment Tenure. *Cardiology and Cardiovascular Medicine*. 7 (2023): 265-269.

Received: May 30, 2023

Accepted: June 21, 2023

Published: June 26, 2023

diseases are the leading cause of death occur 20.3% in males and 16.9% in females among Indian adults of age between 25 and 69 years. [4] A systematic review of 31 studies reported that, the prevalence of CAD is higher in urban as compared to the rural areas. [5] Coronary artery disease (CAD) is a major cause of death and disability in developed countries. In the year of 2017, the Heart-Disease and Stroke Statistics' update of the American Heart Association reported that, 16.5 million persons aged 20 years or older in the USA have CAD, with a slight male predominance of 55%. On the other hand, in the year of 2013, The Global Burden of Disease estimated that, 17.3 million deaths worldwide were related to cardiovascular disease, a 41% increase since 1990 [6]. The goal of treatment for coronary artery disease (CAD) is to decrease the frequency and severity of angina symptoms and to increase the duration of one's functional capacity. There are three options for treatment of stable angina. Those are drug therapy, coronary balloon angioplasty, and coronary artery bypass graft surgery [7-10]. To control CAD, in order to implement nation-wide policies, we need a comprehensive view of its different aspects such as the disease burden, treatment patterns, manifestations and outcomes of the condition. The major objective of this study was to assess the outcome of coronary artery diseases in 12 weeks treatment tenure

Methodology

This was a prospective observational study which was conducted in the Department of Cardiology, 250 Bedded General Hospital Naogaon, Bangladesh during the period from July 2020 to June 2021. In total 67 diagnosed patients of coronary artery disease (CAD) were enrolled in this study as study subjects. Proper written consents were taken from all the participants before data collection. As per the inclusion criteria of this study, only cases of conservative treatment, patients not willing or not prepared to take any surgical treatment or even angioplasty were included in this study. On the other hand, patients underwent surgical procedures or angioplasty were excluded from this study. The whole intervention was conducted in accordance with the principles of human research specified in the Helsinki Declaration [11] and executed in compliance with currently applicable regulations and the provisions of the General DataProtection Regulation (GDPR) [12]. Along with outcomes all the demographic and clinical data were recorded. In-hospital managements and at-discharge medications were also recorded. Plasma glucose, uric acid, lipid profiles, renal and liver functions were measured within 24 hours of hospital admission following a minimum 8 hours fast for all patients. All blood samples analyses were done with standardized methods at the laboratory. We actively performed the follow-up by visiting patient's houses or by an interview via telephone. A predesigned questioner was used in data collection. All data were processed, analyzed and disseminated by using MSExcel and SPSS version 23.0 program as per necessity.

Results

In this study, among total 67 participants, 87% were male whereas the rest 13% were female. So male participants were dominating in number and the male-female ratio was 6.4:1. The highest number of the participants (45%) were from 61-70 years age group. In analyzing the major comorbidities of our participants, we found that 73%, 79% and 46% cases were with hypertension, diabetes mellitus and chronic kidney disease respectively. As initial ECG findings, left bundle branch block (LBBB) was found in 15% cases, right bundle branch block (RBBB) was found in 12% cases and the mean \pm SD QRS duration (in ms) of the total participants was found as 122.82 ± 33.42 . In this study, as concomitant medicine in more than 50% patients, beta-blocker (88%), angiotensin receptor blockers (73%), nitrates (63%) and thrombolytics (51%) were prescribed. At the 12 weeks follow-up, the mean \pm SD heart rate (bpm), SBP (mmHg), DBP (mmHg) and S. creatinine (mg/dL) and S. potassium (mEq/L) of the total participants were found as 66.72 ± 8.38 , 109.69 ± 11.23 , 71.25 ± 6.14 , 1.40 ± 0.35 and 4.15 ± 0.43 respectively. In this study, in assessing the final outcomes we observed that, withing 12 weeks, renal impairment was found among 18% cases and repeated hospitalization was observed among 12% cases which were noticeable. Besides these death, MI, acute decompensated heart failure (ADHF) and major adverse cardiac events (MACE) were found among 6%, 3%, 9% and another 6% cases respectively.

Table 1: Distribution of the study patients by age (N=67)

Age (Year)	n	%
41-50	6	9%
51-60	21	31%
61-70	30	45%
>70	10	15%

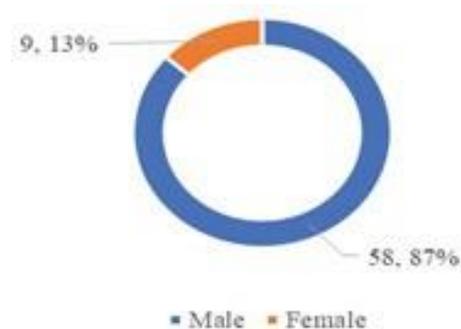


Figure 1: Gender distribution of participants (N=67)

Table 2: Major comorbidities among the participants (N=67)

Comorbidities	n	%
Hypertension	49	73%
Diabetes mellitus	53	79%
Chronic kidney disease	31	46%

Table 3: Initial ECG findings of participants (N=67)

Characteristics	n(%)	Mean ±SD
Ant. Q	19	28%
Inf. Q	11	16%
Left bundle branch block (LBBB)	10	15%
Normal	2	3%
Poor R	17	25%
Right bundle branch block (RBBB)	8	12%
QRS duration (in ms)	122.82 ± 33.42	
Arrhythmias	9	13%
Atrial Flutter (AF/AFL)	3	4%
Premature ventricular contractions (PVC/VT)	7	10%

Table 4: Concomitant medicine of respondents (N=67)

Characteristics	n	%
B blocker	59	88%
Angiotensin receptor blockers (ARBs)	49	73%
Nitrates	42	63%
Thrombolytics	34	51%
Anticoagulants	27	40%
Angiotensin-converting enzyme (ACE)	9	13%
Aspirin	7	10%

Table 5: HR, BP, S. creatinine changes among participants (N=67)

Characteristics	Mean ± SD
Heart rate (HR) in bpm	
Baseline heart rate	76.11 ± 14.03
Heart rate after 4wks	70.21 ± 9.17
Heart rate after 8wks	67.89 ± 6.76
Heart rate after 12wks	66.72 ± 8.38
Systolic BP (mmHg)	
Baseline systolic bp	116.84 ± 16.91
Systolic bp after 4wks	111.92 ± 12.76
Systolic bp after 8wks	111.87 ± 13.05
Systolic bp after 12wks	109.69 ± 11.23
Diastolic BP	
Baseline diastolic bp	72.88 ± 9.22
Diastolic bp after 4wks	72.11 ± 6.47
Diastolic bp after 8wks	72.18 ± 6.74
Diastolic bp after 12wks	71.25 ± 6.14
Serum creatinine	
Baseline s. creatinine	1.44 ± 0.42
S. creatinine after 4wks	1.43 ± 0.43
S. creatinine after 8wks	1.42 ± 0.36
S. creatinine after 12wks	1.40 ± 0.35
Serum potassium (mEq/L)	
Baseline s. potassium	3.97 ± 0.36

S. potassium after 4wks	3.96 ± 0.57
S. potassium after 8wks	4.07 ± 0.52
S. potassium after 12wks	4.15 ± 0.43

Table 6: Outcomes of respondents (N=67)

Characteristics	n	%
Death	4	6%
Repeated hospitalization	8	12%
Myocardial infarction (MI)	2	3%
Acute decompensated heart failure (ADHF)	6	9%
Renal impairment	12	18%
Major adverse cardiac events (MACE)	4	6%

Discussion

The aim of this study was to assess the outcome of coronary artery diseases in 12 weeks treatment tenure. In this study, male participants were dominating in number and the male-female ratio was 6.4:1. The highest number of the participants (45%) were from 61-70 years age group. The studies reported the age ranging from 55.0-58.2 years among males and 55.7-60 years in females. [13] Another US study reported an average age of the first MI of 65.8 for men and 70.4 years for women. [14] In this study, as concomitant medicine in more than 50% patients, beta-blocker (88%), angiotensin receptor blockers (73%), nitrates (63%) and thrombolytics (51%) were prescribed. The use of antiplatelets was good (68.0- 97.9%) whereas the use of other drugs like beta blockers 47.3-65.8% and ACEIs 27.8-56.8% were low in India when compared to other countries. [15] At the 12 weeks follow-up, the mean ±SD heart rate (bpm), SBP (mmHg), DBP (mmHg) and S. creatinine (mg/dL) and S. potassium (mEq/L) of the total participants were found as 66.72 ± 8.38, 109.69 ± 11.23, 71.25 ± 6.14, 1.40 ± 0.35 and 4.15 ± 0.43 respectively. These findings regarding SBP and DBP are comparable to another study [16]. In this study, in assessing the final outcomes we observed that, within 12 weeks, renal impairment was found among 18% cases and repeated hospitalization was observed among 12% cases which were noticeable. Besides these death, MI, acute decompensated heart failure (ADHF) and major adverse cardiac events (MACE) were found among 6%, 3%, 9% and another 6% cases respectively. Studies in patients with STEMI reported all-cause mortality of 16.9% [17] in 2004 and 8.2% in 2012. [18] D Xavier et al in another study reported the following rates of outcomes: death 6.7%, reinfarction 1.9% and stroke 0.5% at the end of one month after AMI. [19] In the Swedish Angina Pectoris Aspirin Trial, daily use of aspirin was associated with a 34% reduction in the incidence of sudden death and acute MI (Myocardial infarction), with an absolute reduction of 12 sudden deaths for every 1000 patients treated during the 15-month of period [20].

Conclusion & Recommendation

Renal impairment and repeated hospitalization may be considered as the most frequent events for coronary artery disease patients. Prompt hospitalization and diagnosis can reduce the complication, mortality and morbidity of coronary artery disease patients. In Bangladesh the treatment facilities of CAD patients should make available to the remote areas reduce the diseases burden of coronary artery diseases.

Limitation of the study:

This was a single centered study with small sized samples. Moreover, the study was conducted at a very short period of time. So, the findings of this study may not reflect the exact scenario of the whole country.

Funding:

No funding sources

Conflicts of Interest:

None declared.

References

- Lopez AD, Mathers CD, Ezzati M, et al. Global Burden of Disease and Risk Factors. New York: Oxford University Press 1 (2006).
- Murray CJ, Lopez AD. Global patterns of cause of death and burden of disease in 1990, with projections to 2020. In: Investing in Health Research and Development: Report of the Ad Hoc Committee on Health Research Relating to Future Intervention Options. Geneva, Switzerland: World Health Organization; 133 (1996): 186.
- Mendis S, Abegunde D, Yusuf S, et al. WHO study on Prevention of REcurrences of Myocardial Infarction and Stroke (WHO-PREMISE). *Bull World Health Organ* 83 (2005): 820-829.
- Office of Registrar General, India. Ministry of Home Affairs, New Delhi. Report on Causes of Death in India 2001e2003. 14 (2010).
- Ahmad N, Bhopal R. Is coronary heart disease rising in India? A systematic review based on ECG defined coronary heart disease. *Heart* 91 (2005): 719-725.
- Von Elm E, Altman DG, Egger M, et al. STROBE Initiative. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. *Lancet* 370 (2007): 1453-1457.
- Ganz P, Ganz W. Coronary blood flow and myocardial ischemia. In: Braunwald E, Zipes DP, Libby P, editors. Heart Disease. Philadelphia: W.B. Saunders Company (2001): 1087-1113.
- Rosamond W, Flegal K, Furie K, et al. heart disease and stroke statistics—2008 update: A report from the American Heart Association statistics committee and stroke statistics subcommittee. *Circulation* 117 (2008): 25.
- Nichols M, Townsend N, Scarborough P, et al. Cardiovascular disease in Europe 2014: Epidemiological update. *European Heart Journal* 35 (2014): 2950.
- Benjamin EJ, Blaha MJ, Chiuve SE, et al. heart disease and stroke Statistics-2017 update: A report from the American Heart Association. *Circulation* 135 (2017): 146.
- World Medical Association. World Medical Association Declaration of Helsinki. Ethical principles for medical research involving human subjects. *Bulletin of the World Health Organization* 79 (2001): 373 - 374.
- Voigt, Paul, and Axel von dem Bussche. "Enforcement and fines under the GDPR." *The EU General Data Protection Regulation (GDPR)*. Springer, Cham (2017): 201-217.
- Rao, Mangala, et al. "Prevalence, treatments and outcomes of coronary artery disease in Indians: a systematic review." *Indian heart journal* 67 (2015): 302-310.
- Thom T, Haase N, Rosamond W, et al, American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Heart disease and stroke statisticse2006 update: a report from the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. *Circulation* 113 (2006): 85-151.
- Steg Philippe Gabriel, Goldberg Robert J, Gore Joel M, et al, for the GRACE Investigators. Baseline characteristics, management Practices, and in-hospital outcomes of patients Hospitalized with acute coronary syndromes in the Global registry of acute coronary Events (GRACE). *Am J Cardiol* 90 (2002): 358-363.
- Qanitha A, Uiterwaal CSPM, Henriques JPS, et al. Characteristics and the average 30-day and 6-month clinical outcomes of patients hospitalised with coronary artery disease in a poor South- East Asian setting: the first cohort from Makassar Cardiac Center, Indonesia. *BMJ Open* 8 (2018): 021996.
- Achari V, Prakash S, Sinha AK, et al. Short-term mortality and complications in ST elevation myocardial infarctionthe Heart Hospital experience. *J Indian Med Assoc* 106 (2008): 650-654.
- Mohanan Padinhare Purayil, Mathew Rony, Harikrishnan Sadasivan, et al, on behalf of the Kerala ACS Registry Investigators. Presentation, management, and outcomes of 25748 acute coronary syndrome admissions in Kerala, India: results from the Kerala ACS Registry. *Eur Heart J* 34 (2013): 121-129.

19. Xavier D, Pais P, Devereaux PJ, et al. Treatment and outcomes of acute coronary syndromes in India (CREATE): a prospective analysis of registry data. *Lancet* 371 (2008): 1435-1442.
20. Juul-Moller S, Edvardson N, Jahnmatz B, et al. Double-blind trial of aspirin in primary prevention of myocardial infarction in patients with stable chronic angina pectoris. *Lancet* 340 (1992): 1421-1425.