

ORIGINAL RESEARCH**A single centre study of clinico-epidemiologic profile, course during treatment and outcome in patients presenting with ST-elevation myocardial infarction at A.N.M.M.C.H. Gaya, Bihar****¹Pramod Kumar Sinha, ²MD. Nasar Zubair, ³Kamlesh Kumar,**¹Associate Professor & HOD, ²Assistant Professor, ³Associate Professor, Department of General Medicine, Anugrah Narayan Magadh Medical College, Gaya, Bihar, India**Correspondence:**

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Email: drpk012@gmail.com**Abstract**

Background and purpose: Cardiovascular diseases are the leading cause of mortality and morbidity globally. Recently as a changing trend cardiovascular diseases have emerged as a major health burden in developing countries also. Myocardial infarction (MI) is the myocardial cell necrosis due to significant and sustained ischaemia. This study was done with the aim to summarize the risk factors, clinical profile, course and outcome of patients with ST elevation MI admitted in medicine department of tertiary care center A.N.M.M.C.H. GAYA (BIHAR), INDIA.

Methods: This observational study was conducted at A.N.M.M.C.H. Gaya, Bihar, from June 2019 to October 2021. 230 patients admitted in medicine emergency with diagnosis of ST elevation MI were included in the study and followed up to discharge/referral/death. Demographic features, cardiovascular risk factors, clinical presentation, Electrocardiogram (ECG) findings, regions of infarction and rhythm disturbances were studied and documented.

Results: Out of total 230 patients 167 were males, rest were females. Mean age of presentation was 61.7 years. Typical chest pain was the most common presentation. Hypertension, diabetes and smoking were the common risk factors. Mean time of presentation was 650 minutes. 95 out of 230 patients(41.3%) were thrombolysed. Majority of patients were of extensive anterior infarction followed by anterolateral and inferior infarction. 159 patients were in Killip class 1 and only 7 patients were with cardiogenic shock i.e., Killip class 4. Most common complication was complete heart block followed by some other kind of arrhythmias and hypotension. 10 patients died despite extensive treatment.

Conclusion: Patients presenting with STEMI were mostly male. Diabetes, hypertension and smoking were most common risk factor that highlights the importance of removal or proper control of risk factors. Only 41.3% patients were thrombolysed. This rate needs to be improved by general public awareness about reaching health facility at earliest symptom and extending health care and transport to the remote locations.

Introduction

Cardiovascular diseases are the most common cause of death globally[1,2]. CVD are also the leading cause of Disability Adjusted Life Year (DALY)[3,4]. Cardiovascular diseases have emerged as a major public health issue in developing countries recently[5-7]. Deaths due to cardiovascular disease tend to occur earlier in developing countries than they do in western

countries[7]. When seen in perspective of India one fourth of all deaths are caused due to cardiovascular disease (CVD) and the age adjusted CVD death rate in India is significantly higher than global average (272 vs 235 per 100,000 population)[5]. Five major manifestations of coronary heart disease are chronic stable angina, unstable angina, MI, heart failure and sudden death[8]. Myocardial infarction (MI) is defined as significant and sustained ischemia leading to myocardial cell necrosis. Myocardial infarction once used to be more common in elderly population, but now its incidence in young has been increasing[9]. The arbitrary cut-off of 45 years age has been used in most studies to differentiate young patients from elderly with CAD or an acute myocardial infarction[10]. Time interval between onset of symptom and first medical contact is very important and precious. It is a notion that in patients with STEMI every minute counts. So it is very important that patient should be aware of the symptom and seek medical attention as early as possible after typical symptom onset. Denial of symptom by patient and by family members that he may not be having "heart attack" adds to the delay and loss of precious time. Creating general public awareness regarding typical symptoms and seeking early medical help can prevent mortality and morbidity. Early detection and treatment of risk factors helps to prevent the onset. There are some registries on acute coronary syndrome (ACS) from India; the large important two are CREATE (20,937 patients; 2001-2005)[11] and KERALA -ACS registry (25,748 patients 2007-2009)[12] which provided useful information about variable spectrum of presentation of ACS patients and their outcomes. The only large registry from North India is HP-ACS registry done on 5180 patients from 2012-2014[13]. So in view of the importance of this condition, this study was done with the aim of knowing the risk factors, clinical profile, complications and outcome in STEMI patients presented to A.N.M.M.C.H , GAYA (BIHAR) INDIA.

Methods

This was a descriptive observational study conducted in A.N.M.M.C.H., GAYA from June 2019 to September 2021. This study was done after obtaining written consent from selected 230 patients. The data was collected from the time of admission to the discharge/referral/death of the patients. The patients were included if diagnosed with ST-Elevation MI (STEMI). Patients with non ST elevation myocardial infarction, unstable angina and history of myocardial infarction in the past were excluded from the study. Patients were studied about parameters including demographic features, history of past or current risk factors (age, sex, diabetes, dyslipidemia, smoking, hypertension) and family history. Detailed enquiry about clinical presentation, course during treatment, complications and outcomes were recorded. Clinical evaluation was done and necessary investigations performed whenever required with electrocardiograph, cardiac markers and echocardiography on every patient. Other important investigations were done to rule out comorbid conditions like diabetes, hypertension, dyslipidemia etc. Patients included in the study having acute STEMI was defined as typical chest pain and ST segment elevation >1 mm in at least two contiguous standard limb leads or >2 mm in at least two contiguous precordial leads with positive cardiac biomarkers presented within 7 days. Duration of presentation was defined from the onset of severe chest pain to first contact with medical personnel in emergency department. Hypertension was defined as either already diagnosed case taking medication or as defined by the seventh Joint National Committee[14]. Diabetes was defined as either diagnosed case on medication or recently diagnosed based on the criteria defined by American Diabetes Association[15]. Dyslipidemia was defined as diagnosed case on medication or if fasting low density lipoprotein cholesterol ≥ 140 mg/dL or high density lipoprotein cholesterol <40 mg/dl or triglyceride >150 mg/dl[13]. Family history of coronary artery disease was defined as first degree relatives who had coronary artery disease. All the

patients presented with typical symptoms and ECG changes received standard anti-ischemic therapy and revascularisation with thrombolysis if fulfilling the criteria and absence of contraindications. Routine post MI management followed. Clinical course, complications and outcomes were evaluated by electrocardiograph, echocardiograph and other necessary investigations accordingly.

Results

Results are shown in tables. A total of 230 patients diagnosed with ST elevation myocardial infarction on ECG criteria were included regardless of the therapeutic intervention they received. The patients were predominantly male with male to female ratio being 2.65. Majority of males were between 61-70 years whereas most females were between 60-70 years. The mean age of patients was 61.7 years (Table 1).

Table 1 (age group)

Age group	Males	Females	Total
<50	17	3	20
50-60	85	15	100
60-70	43	32	75
>70	22	13	35
	167	63	230

The most common presenting symptom was chest pain (86.08%), followed by sweating(58.69%), dyspnea(53.47%) and palpitation (40.43%) (Table 2). Smoking was the most common risk factor (49.13%) followed by hypertension (46.52%) and diabetes (35.65%).other risk factors were obesity, dyslipidemia, previous or family history of CAD (Table 3).

Table 2: Symptoms

Presenting symptoms	Total (%)
Chest pain	198(86.08)
Sweating	135(58.69)
Dyspnea	123(53.47)
Palpitation	93(40.43)
Nausea/vomiting	78(33.9)
Dizziness/syncope	55(23.9)

Table 3: Risk Factors

Risk factors	Total
Diabetes	82 (35.65%)
Hypertension	107 (46.52%)
Smoking	113 (49.13%)
Obesity	76 (33.04%)
Dyslipidemia	63 (27.4%)
Previous CAC	51 (22.1%)
Family history	42 (18.2%)

143 patients (62.17%) presented within 12 hours (Table 4). Only 95 out of 230 patients(41.3%) were thrombolysed. Rest were either presented late, had some contraindication or demanded referral to advanced centre. Regarding the site of infarction, 65 patients (28.26%) presented with anteroseptal infarction. 53 patients (23%) were of anterolateral infarction, 27 patients (11.73%) presented with extensive anterior infarction, 45

patients (19.56%) were of inferior wall infarction. 22 patients were of inferolateral infarction and 13 patients were of combined inferior and lateral infarction. 5 patients were of high lateral wall infarction (Table 6). Majority of patients were in Killip class 1(69.13%). Only 7 patients were in cardiogenic shock (Killip class 4) (Table 5).

Table 4: time of presentation

Time to hospital	No. of patients
<6 hours	55
6-12 hours	88
12-24 hours	63
>24 hours	24

Table 5: Killip class

Killip class	No. of patients
1	159
2	45
3	17
4	7

19 patients(8.26%) developed complete heart block most of them were with inferior infarction, 12 developed some other kind of arrhythmias, 9 developed acute LVF and 10 patients died during course of treatment (Table 7).

Table 6: site of infarction

Site of infarction	No. of pts
Anteroseptal	65 (28.26%)
Anterolateral	53 (23.04%)
Extensive anterior	27 (11.73%)
Inferior	45 (19.56%)
Inferolateral	22 (9.56%)
Inferior & anterior	13 (5.65%)
High lateral	5 (2.17%)

Table 7: Complications

Complications	No.
Complete heart block	19
Arrhythmia	12
Acute lvf	9
Acute MR	3
Hypotension	10
Cardiogenic shock	7
Death	10

Discussion

Cardiovascular diseases are global health concern contributing to vast amount of disease burden and mortality. In low and middle income countries, the burden of cardiovascular diseases is more in comparison to affluent countries. Reason for this difference may be due to larger population size and high incidence of risk factors such as unhealthy lifestyle, tobacco use, diabetes, hypertension, hyperlipidemia physical inactivity and obesity[6,7,16]. In this study, the mean age of the patients was 61.7 yr with maximum 82 yrs and minimum 43 yrs. The occurrence of MI was higher in males than females (72.6% versus 27.4%) which is

consistent with findings in most other studies[17-19]. This study shown increasing number of females with MI as the age advances (3 females at <50 years to 15 at 51 to 60 years and 32 at 60-70 yrs). The loss of vasodilatory action of oestrogen in post menopausal women may be responsible for this effect[20]. In this study 143 patients(62.17%) presented within 12 hours, the time window that is decisive for thrombolysis. It means that 97 patients(37.83%) came after that period. The reasons for delay were ignorance of symptoms, unawareness of the critical situation, wasting time in taking treatment at local centre and remote location or difficult access to health care. This shows the importance of creating public awareness and improving health care services at small town and village levels. Out of 143 patients presented within the window period, only 95 patients received thrombolytic therapy. Rest 48 were either having 1 or more contraindication or wanted referral for treatment at advanced centre. Smoking was the most common risk factor present in 113(49.13%) patients. this finding is consistent with many other studies like INTERHEART study[21] and some western[22] and south Asian studies[17,18]. Hypertension was the second most common risk factor in this study found in 107(46.52%) patients. Of those, 11 were recently diagnosed and 32 were noncompliant with drugs. Hypertension has a significant association with MI as shown in different studies done in south Asia[16-18,21]. Diabetes was present in 82 patients(35.65%). 15 were newly diagnosed and 38 were poorly controlled or noncompliant. There is a significant association between diabetes mellitus and MI as shown in a United Kingdom study[23]. Framingham study[24] shown an increased risk of MI in diabetic patients. This increased association is due to accelerated atherosclerotic plaque formation and intraluminal thrombosis in diabetic patients as shown in a Harvard study(25). A study done in south India by Misiriya et al[26] also shown smoking was the most common risk factor (46.6%), followed by hypertension (29.02%), dyslipidemia (26.15%) and diabetes mellitus (23.95%). 76 patients fit in the criteria of overweight or obesity. 51 have history of previous CAD of which 8 had been admitted for "major heart attack" but records were unavailable. 42 patients had family history of CAD. This profile showed the importance of early detection and proper control of risk factors and if possible avoidance of factors like smoking or sedentary life style. Chest pain was the most common presenting symptom(86.08%) in this study. Some patients presented with atypical symptoms like abdominal pain, syncope and dizziness. These symptoms were observed mostly in higher age group. This finding was consistent with a comparative study between elderly and non-elderly in India[27]. Sweating, palpitation and dyspnea were also the common presenting symptoms in the study. 28.26% patients presented with anteroseptal wall infarction, 23% were with anterolateral infarction, 19.56% were presented with inferior wall infarction. 13 patients were of combined inferior and lateral wall infarction and 5 patients were of high lateral wall infarction. 159 patients were in Killip class 1, 45 were in class 2, 17 were in class 3 and 7 in class 4 i.e. cardiogenic shock. 19 patients developed complete heart block, most of them presented as inferior wall STEMI. 12 had some other kind of arrhythmias, 10 developed hypotension sometime during treatment and 10 patient died despite treatment.

Conclusion

This observational study on STEMI patients has findings that are consistent with most other studies regarding risk factors, clinical profile and presentations. Majority of patients (62.17%) presented to the hospital within 12 hours of chest pain and presentation with anterior wall MI was the most common. Significant number of patients received thrombolytic therapy. Overall in-hospital mortality was difficult to predict because referred patients didn't turn up to be included in data. From this study, we can draw some valuable points regarding clinical profile of patients with MI. Chest pain was the most common presentation followed by sweating palpitation and dyspnea. A significant no. of patients arrived after 12 hours

which demands the need for raising public awareness and expansion of health and transport services to the remote locations. Also almost all patients had at least 1 risk factor and some had 3 or 4. In some patients, some of the risk factors that should be well controlled with drug like DM or hypertension were either poorly controlled or patients were non compliant with drugs. This issue also needs attention as prevention of risk factors helps prevent mortality and morbidity and also lessen the financial burden over family. This can be done by creating public awareness and explain the importance of risk factor modification.

Limitations

Limitations of this study are small study sample, single centre study and lack of follow up beyond outcome. So the results of this study are difficult to generalise on the large population. Also our centre lacked advance facilities like PCI or angiography that forced the referral of suitable candidates.

References

1. Lopez AD, Mathers CD, Ezzati M, Jamison DT, Murray CJ. Global and regional burden of disease and risk factors, 2001: systematic analysis of population health data. *Lancet*. 2006;367:1747e1757.
2. World Health Organization. Fact sheet: Cardiovascular diseases(CVDs).2017. Available at <http://www.who.int/mediacentre/factsheets/fs317/en/>
3. Lopez AD, Mathers CD, Ezzati M, et al., eds. Global Burden of Disease and Risk Factors. Washington (DC): The International Bank for Reconstruction and Development/The World Bank; 2006. <https://www.ncbi.nlm.nih.gov/books/NBK11812/>.
4. Report on Causes of Death in India, 2001-2003: Office of the Registrar General of India in Collaboration with Centre for Global Health Research. 2009
5. Yusuf S, Reddy S, Ôunpuu S, Anand S. Global burden of cardiovascular diseases Part I: general considerations, the epidemiologic transition, risk factors, and impact of urbanization. *Circ*. 2001;104(22):2746-53.
6. Reddy KS. Cardiovascular diseases in the developing countries: dimensions, determinants, dynamics and directions for public health action. *Pub Health Nutr*. 2002;5(1A):231-7.
7. Reddy KS. Cardiovascular disease in non-western countries. *New Eng J Med*. 2004;350(24):2438-40.
8. Mendis S, Thygesen K, Kuulasmaa K, Giampoli S, Mähönen M, Blackett KN, et al. World Health Organization definition of myocardial infarction: 2008-09 revision. *Int J Epidemiol*. 2011;40(1):139- 46.
9. Eged M, Myocardial infarction in young adults. *Postgrad Med J*. 2005 Dec 1;81(962):741–5. <https://doi.org/10.1136/pgmj.2004.027532>
10. Gupta R, Joshi P, Mohan V, Reddy KS, Yusuf S. Epidemiology and causation of coronary heart disease and stroke in India. *Heart*. 2008 Jan 1;94(1):16e26.
11. 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*. 2008 Apr 26;371(9622):1435e1442.
12. Mohanan PP, Mathew R, Harikrishnan S, et al. Presentation, management, and outcomes of 25 748 acute coronary syndrome admissions in Kerala, India: results from the Kerala ACS Registry. *Eur Heart J*. 2013;34:121e129.
13. Teramoto T, Sasaki J, Ishibashi S, et al. Diagnostic Criteria for Dyslipidemia. *J Atheroscler Thromb*. 2013;20(8):655–60. <https://doi.org/10.5551/jat.17152>
14. Chobanian A V, Bakris GL, Black HR, et al. Seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure.

- Hypertens (Dallas, Tex1979).2003 Dec;42(6):1206–52.
<https://doi.org/10.1161/01.HYP.0000107251.49515.c2>
15. Diagnosis and classification of diabetes mellitus. *Diabetes Care*. 2009 Jan;32 Suppl 1(Suppl 1):S62-7. <https://doi.org/10.2337/dc09-S062>
 16. Joshi P, Islam S, Pais P, Reddy S, Dorairaj P, Kazmi K, et al. Risk factors for early myocardial infarction in South Asians compared with individuals in other countries. *J Am Med Assoc*. 2007;297(3):286-94.
 17. Singh PS, Singh G, Singh SK. Clinical profile and risk factors in acute coronary syndrome. *J Ind Acad of Clin Med*.2013;14(2):130–2.
 18. Hafeez S, Javed A, Kayani AM. Clinical profile of patients presenting with acute ST elevation myocardial infarction. *J Pak Med Assoc*. 2010;60(3):190-3.
 19. El-Menyar A, Zubaid M, Shehab A, Bulbanat B, AlMotarreb A, Suwaidi JA. Prevalence and impact of cardiovascular risk factors among patients presenting with acute coronary syndrome in the Middle East. *Clin Cardiol*. 2011;34(1):51-8.
 20. Mendelsohn ME, Karas RH. The protective effects of estrogen on the cardiovascular system. *New Eng J Med*. 1999;340(23):1801-11.
 21. Yusuf S, Hawken S, Ôunpuu S, Dans T, Avezum A, Lanas F, et al. Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study. *Lancet*. 2004;364(9438):937-52.
 22. Rosengren A, Wallentin L, Simoons M, Gitt AK, Behar S, Battler A, et al. Cardiovascular risk factors and clinical presentation in acute coronary syndromes. *Heart*. 2005;91(9):1141-7.
 23. Woods KL, Samanta A, Burden AC. Diabetes mellitus as a risk factor for myocardial infarction in Asians and Europeans. *Heart*. 1989;62(2):118-22.
 24. Kannel WB, McGee DL. Diabetes and cardiovascular risk factors: the Framingham study. *Circ*. 1979;59(1):8-13.
 25. Jacoby RM, Nesto RW. Acute myocardial infarction in the diabetic patient: pathophysiology, clinical course and prognosis. *J Am Coll Cardiol*. 1992;20(3):736-44.
 26. Misiriya KJR, Sudhayakumar N, Khadar SA, et al. The clinical spectrum of acute coronary syndromes: experience from a major center in Kerala. *J Assoc Physicians India*. 2009 May;57:377–83. <http://www.ncbi.nlm.nih.gov/pubmed/19634283>
 27. Sharma A, Kumar R, Ashotra S, Thakur S. Comparative evaluation of clinical profile, risk factors, and outcome of acute myocardial infarction in elderly and nonelderly patients. *Heart India* 2016;4(3):96-9
 28. Pathak V, Ruhela M. In hospital complications and outcomes in acute ST elevation MI patients at a tertiary care Centre in NorthIndia. *J indian Coll Cardiol*. 2015;5(2):112–8. <https://doi.org/10.1016/j.jicc.2015.02.003>
 29. Seetharama N, Mahalingappa R, GK RK, et al. Clinical profile of acute myocardial infarction patients: a study in tertiary care centre. *Int J Res Med Sci*. 2015 Feb;3(2):412-419. <https://doi.org/10.5455/2320-6012.ijrms20150206>