# The Young Myocardial Infarction Study of the Western Indians

## YOUTH Registry

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## ABSTRACT

**Background:** Myocardial infarction is among the leading causes of morbidity and mortality in young adults around the world.

**Objectives:** In the YOUTH (Young Myocardial Infarction Study of the Western Indians) registry, we aimed to evaluate risk factor profile and angiographic outcomes of reperfusion therapies of infarct-related artery in young western Indians (≤40 years) having ST-segment elevation myocardial infarction.

**Methods:** A total of 1,179 consecutive patients aged ≤40 years who presented with ischemic heart disease from June 2012 to December 2014 were enrolled in the YOUTH registry. A total of 787 patients with ST-segment elevation myocardial infarction were further evaluated. Categorical data was assessed using chi-square test, whereas continuous data was assessed using Student's *t* test. Regression analysis was performed to investigate the strength of association.

**Results:** In the YOUTH registry, the study population was predominantly male (93%) with tobacco consumption as major prevalent risk factor (49.7%). Of 787 patients, 451 (57.31%) were thrombolyzed, 326 (41.42%) did not receive any reperfusion therapy, and 10 patients (1.27%) underwent primary angioplasty. Younger age, window period <6 h, and lower lipoprotein (a) level were observed in patients with a recanalized infarct-related artery. Regression analysis showed window period of thrombolysis as strongest predictor (odds ratio: 1.790, 95% confidence interval: 1.144−2.802; $p < 0.011$) of successful reperfusion. Patients ($n = 235$) being thrombolyzed in a window period of <6 h, had higher rate of infarct-related artery recanalization (77%) as compared to those with ≥6 h window period (23%). In-hospital mortality was 0.38% ($n = 3$), whereas bleeding complication was noted only in 1 patient.

**Conclusions:** We herewith conclude that acute short-term outcome is favorable in young ST-segment elevation myocardial infarction patients, particularly in those who had received timely thrombolytic therapy. Though tobacco consumption was a major contributor of risk in young adults, prevalence of other risk factors was low in young Western Indians.

Cardiovascular diseases (CVDs) are among the major causes of morbidity and mortality in both developed and developing countries around the world. Globally, ischemic heart disease caused 1.3 million deaths in adults aged 15 to 59 years [1]. CVDs are the leading global cause of death, accounting for 17.3 million deaths per year, a number that is expected to increase more than 23.6 million by 2030 [2], and hence CVD is estimated to be the major health concern all around the world [3]. Globally, CVDs (ischemic heart disease and stroke) were among the top 10 contributors of disability-adjusted life years—a commonly used measure of premature death and disability [4]. In South-East Asia, 7.4 million deaths were due to noncommunicable diseases as compared with 5.7 million deaths related to communicable diseases in the year 2002 [5]. According to the Global Burden of Disease study age-standardized estimates (from 2010), nearly one-quarter (24.8%) of all deaths in India are attributable to CVD [1]. The age standardized cardiovascular death rate of 272 per 1,00,000 population in India is slightly higher than the global average of 235 [6]; adding further details, the age-adjusted CVD mortality rates in men is 349 per 100,000 and 265 per 100,000 in women, which is 2 to 3 times higher than in United States [7]. There has been a considerable rise in mortality due to CVD, which accounted for 27% (95% confidence interval [CI]: 24.7%−28.9%) of deaths in 2013 as compared to only 15% (95% CI: 13.8−15.8) of deaths in 1990 [8]. Also, a significant increase is observed in the

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death rate associated with ischemic heart diseases from 1990 to 2016, showing a percentage change of 54.5% (95% CI: 44.1—66) that, when age-standardized, results into change of 12.0% (95% CI: 4.5—21.3). These results clearly state a shift toward noncommunicable diseases from 1990 to 2016 [9].

In developing countries, nearly one-half of the total deaths are reported to be CVD-related deaths and occur in people less than 70 years old, whereas in the West, it is only 22%. There is a vast difference in deaths occurring due to stroke in developing and developed countries with reports stating 94% and 6%. respectively [6,10]. At present, it is the number one cause of mortality in the Indian population (irrespective of sex, socioeconomic background, and age) with a higher inclination in the Indian urban populations [11]. South Asian populations have an increased risk and 5- to 10-year earlier onset for acute myocardial infarction (AMI) as compared to Western populations [12]. Acute myocardial infarction at a young age (<40 years) is characterized by low mortality rates, less extensive coronary artery disease (CAD), good residual left ventricular function, and a favorable prognosis [13,14].

However, premature MI in young patients (<40 years) can cause death and disability in the prime of life and the consequences are mostly serious sequelae for the patients, their family, and health systems of the nation, resulting in an increased economic burden [12]. Hence, MI in the young patients, is an important clinical entity because of the associated risk of mortality and long-term morbidity [15]. Identifying the risk factors for premature MI is necessary for risk factor modification and for developing cost-effective primary and secondary prevention strategies in these patients [16]. Epidemiologic studies have shown significantly different clinical characteristics and pathophysiology in these patients, when compared with older patients. In younger population, smoking and family history of ischemic heart disease are more frequently observed risk factors along with lipid abnormalities, especially hypertriglyceridemia and low level of high-density lipoprotein [17]. The increasing prevalence of risk factors in adolescents such as smoking, obesity, and lack of physical activity marks down the protection offered by young age [18]. The INTERHEART (Effect of Potentially Modifiable Risk Factors Associated With Myocardial Infarction) study have identified 9 modifiable risk factors (smoking, hypertension, diabetes mellitus, waist-to-hip ratio, dietary patterns, physical activity, alcohol consumption, plasma apolipoproteins, and psychosocial factors) that account for the majority of population-attributable risk in cases of MI [19].

The management strategies for MI includes thrombolytic therapy, primary percutaneous coronary interventions (PCIs), and surgical management. Thrombolytic therapy has been recommended as it is known to reduce mortality and morbidity significantly if provided within 12 h of symptom onset. In ST-segment elevation myocardial infarction (STEMI) patients, fibrinolytics have been reported to reduce mortality regardless of sex and age when administered early [19,20]. In recent years, the frequency of AMI in the younger population is increasing in India, but there is a paucity of data on AMI in young Asian-Indians. Also, these patients have different pathophysiologic profiles, clinical presentations, and varied treatment responses as compared to their older counterparts. Hence, we herewith report results of the YOUTH (Young Myocardial Infarction Study of the Western Indians) registry with an aim to evaluate risk factors profile, angiography features, and factors influencing outcomes in young Indian MI patients.

## MATERIALS AND METHODS

### Study population and setting

A total of 1,179 the young patients (<40 years of age) with ischemic heart disease were admitted at U.N. Mehta Institute of Cardiology and Research Centre, Ahmedabad, Gujarat, India from June 2012 to December 2014. This retro-prospective study was approved and cleared by the Institutional Ethics Committee (UNMICRC/CARDIO/2013/14). Of 1,179, 787 patients having STEMI were enrolled in the YOUTH registry.

### Inclusion criteria

Patients presenting with acute STEMI at the institute or who were referred to the center for further management after receiving primary treatment of STEMI at local center.

### Exclusion criteria

Patients with renal failure, hepatic failure, pregnancy, older age (≥40 years), and malignancy were excluded.

### Collection of data

Demographic data, anthropometric measurements, risk factor evaluation (tobacco consumption in any form, family history of premature CAD, hypertension, diabetes), clinical presentation, mode of reperfusion therapy, and its outcome were collected. Failed thrombolysis was defined as lack of resolution of ST-segment elevation by at least 70% in worst lead, persistence of angina, and/or worsening or lack of improvement in hemodynamics at 90 to 120 min after thrombolysis. Fasting lipid profile, homocysteine level, lipoprotein (a), blood sugar, serum creatinine, and serum electrolytes were evaluated from blood samples. Echocardiography and electrocardiography both were carried out on admission and repeated as per the institute protocol.

### Risk factor definitions

STEMI was considered when new ST-segment elevation at J point in 2 contiguous leads with cut points ≥0.1 mv in all leads other than V2 to V3. For leads V2 to V3, ≥0.25 mV in men <40 years or ≥0.15 mV in women were associated with typical abnormality of cardiac enzymes, either creatine phosphokinase-myocardial band or troponin I.

**TABLE 1.** Baseline demographics of the study population

| Variables | | |
|---|---|---|
| STEMI | | 787 (66.75) |
| Male | | 736 (93.5) |
| Female | | 51 (6.5) |
| Age, yrs | | 35.58 ± 4.27 |
| Left ventricular ejection fraction, % | | 41.53 ± 8.92 |
| **Risk factor profile** | | **95% Confidence Interval** |
| Obesity | 35 (4.5) | (0.462–0.532) |
| Family history of premature coronary artery disease | 101 (12.8) | (0.107–0.154) |
| Past history of coronary artery disease | 130 (16.5) | (0.141–0.193) |
| Hypertension | 96 (12.1) | (0.101–0.147) |
| Diabetes | 75 (9.5) | (0.077–0.118) |
| Tobacco consumption | 391 (50.32) | (0.462–0.532) |
| Smoking habit | 304 (39.12) | (0.353–0.421) |
| Total cholesterol | 36 (4.63) | (0.033–0.063) |
| Triglycerides | 113 (14.53) | (0.121–0.169) |
| High-density lipoprotein | 238 (30.63) | (0.271–0.335) |
| Low-density lipoprotein | 46 (5.92) | (0.044–0.077) |
| Lipoprotein (a) | 123 (15.83) | (0.133–0.183) |
| Homocysteine | 187 (24.07) | (0.21–0.269) |
| High sensitivity C-reactive protein | 58 (7.46) | (0.057–0.094) |

Values are n (%) or mean ± SD.
STEMI, ST-segment elevation myocardial infarction.

Hypertension was defined as per JNC 7 (Seventh Report of the Joint National Committee on Detection, Evaluation and Treatment of High Blood Pressure) criteria; diabetes was diagnosed when a patient had classical symptoms of diabetes, random plasma glucose concentration ≥200 mg/dl (11.1 mmol/l), fasting blood sugar ≥126 mg/dl, or postprandial blood sugar ≥200 mg/dl or was receiving anti-diabetic medications. Dyslipidemia was diagnosed according to Adult Treatment Panel III criteria: low-density lipoprotein cholesterol ≥100 mg/dl, total cholesterol ≥200 mg/dl, high-density lipoprotein cholesterol ≤40 mg/dl, and triglycerides ≥150 mg/dl. The cutoff for lipoprotein (a) used is 30 mg/dl and homocysteine >15 μmol/l. Family history of premature CAD was considered when any blood relative (parents and/or siblings) had angina, MI, or sudden cardiac death at age <55 years in male and <65 years in female subjects [21].

## Optimal medical therapy

The medical management strategy was per the published guidelines of the American College of Cardiology/American Heart Association and is briefly described here. Medications were prescribed as follows: aspirin: 81- to 325-mg daily maintained dose; clopidogrel: 75 mg/day for at least 1 year in absence of bleeding; beta-blockers: to all patients without any contraindications; angiotensin-converting enzyme inhibitors/angiotensin receptor blockers: to all patients without any contraindications; statins: to all patients without any contraindications; antidiabetics: as per the diabetes status; and diuretics: included Aldactone if patients had congestive symptoms and/or severe left ventricular dysfunction in presence of contraindications. Risk factor management for diabetes, diet, dyslipidemia, hypertension, obesity, smoking was done as and when required as per the 2013 American College of Cardiology/American Heart Association guidelines [22]. The study participants were predominantly treated with streptokinase (≈99%). The admission and discharge therapies including type and dosage of drugs were also as per American College of Cardiology/American Heart Association guidelines.

## Angiographic profile

Elective coronary angiography was performed through standard femoral or radial artery approach. Further management of patients as per atherosclerotic lesions complexity management of STEMI. Two interventional cardiologists interpreted the angiograms where stenosis of the vessels was defined as diameter reduction of ≥50%. CAD was further categorized into 3 categories as mild (≤50% stenosis), moderate (51%–69% stenosis), and severe (≥70% stenosis). On the basis of number of vessels blocked/affected the patients were classified as having single-vessel disease (SVD), double vessel disease, triple-vessel disease, and left main coronary artery disease. Bias in the study was controlled by following strict inclusion criteria for patient recruitment, reporting angiograms by 2

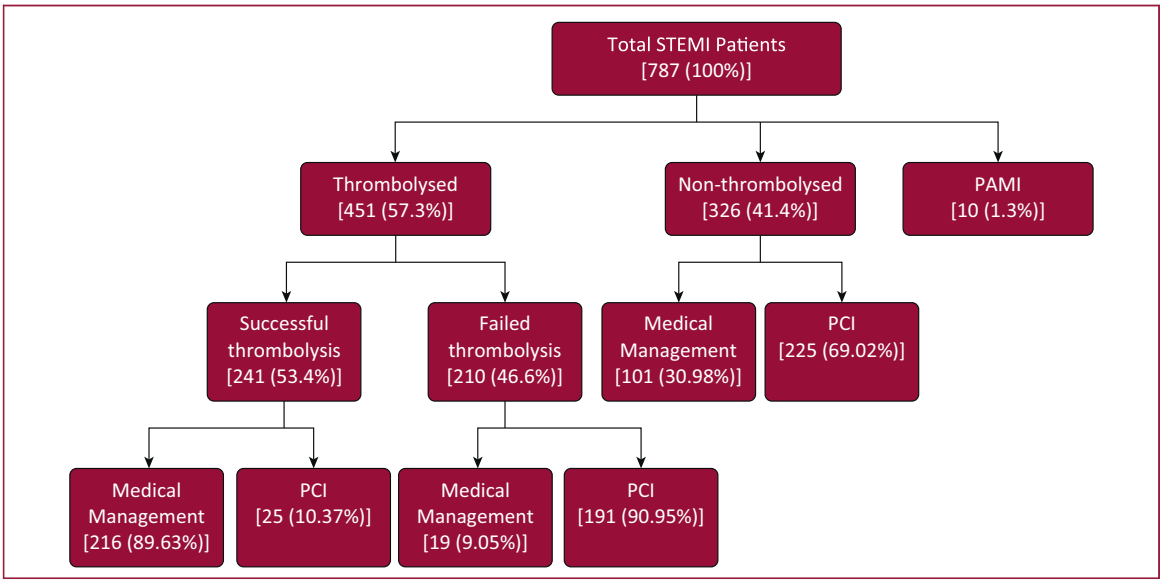


**FIGURE 1. Mode of reperfusion**. PAMI, Primary Angioplasty in Myocardial Infarction trial; PCI, percutaneous coronary intervention; STEMI, ST-segment elevation myocardial infarction.

certified interventional cardiologists, and using the same qualitative comparative analysis software for lesions measurement.

## Assessment of successful reperfusion

Successful reperfusion after fibrinolysis was described by the improvement or sudden relief of chest pain with >70% ST-segment reduction (in the index leads showing the greatest degree of elevation on presentation) in the time period of 90 to 120 min after fibrinolytic therapy and/or presence of reperfusion arrhythmia (e.g., accelerated idioventricular rhythm).

## Statistical analysis

The SPSS version 22.0 (IBM, Armonk, New York) was used for data analysis. Continuous variables were expressed as mean ± SD. Dichotomous variables were expressed as counts and percentages. Bivariate inferential statistical tests —chi-square or Student's *t* test—were performed, whichever was applicable. Multiple linear regression model was applied to measure the strength of particular risk factor in predicting outcome of MI in the young population. All *p* values were 2-sided, and $p < 0.05$ was considered statistically significant.

## RESULTS

The baseline data and risk factor prevalence in the overall population are presented in Table 1. A total of 1,179 young patients with ischemic heart disease were screened, and of those, 787 patients (66.75%) with STEMI were enrolled in the YOUTH registry, whereas 111 patients (9.4%) had non-STEMI and 281 (23.8%) had stable angina. The majority of the patients were male (93.5%), with a mean age of 35.58 ± 4.27 years and body mass index of 23.69 ± 3.95 kg/m$^2$. The prevalence of various risk factors such as a positive family history of premature CAD, past history of CAD, hypertension, diabetes, and tobacco consumption were 12.8%, 16.5%, 12.1%, 9.5%, and 49.7%, respectively. The prevalence of various dyslipidemias is shown in Table 1, with the highest prevalence of high-density lipoprotein abnormality (30.63%). High levels of lipoprotein (a), homocysteine, and high sensitivity C-reactive protein were found in 15.83%, 24.07%, and 7.46% of the population, respectively. The mean left ventricular ejection fraction of the study population was 41.53 ± 8.92.

Figure 1 describes the mode of reperfusion therapy. Of 787 patients with STEMI, 451 patients (57.3%) received thrombolytic therapy, out of which 241 (53.4%) had successful thrombolysis and 210 (46.6%) had failed thrombolysis. Of 241 patients having successful thrombolysis, 216 patients (89.63%) required medical management in view of recanalized infarct-related artery (IRA) and only 25 patients (10.37%) required revascularization. Among the failed thrombolysis group of 210 patients, the majority required revascularization, 191 (90.95%), and only 19 patients (9.05%) were managed medically due to recanalized IRA and/or nonsignificant (<50% stenosis) CAD. Only 10 patients (1.3%) underwent primary angioplasty as a mode of reperfusion therapy.

Outcomes of thrombolysis in relation to window period are presented in Table 2. The patients who received thrombolytic therapy in <6 h showed signs of successful thrombolysis ($n = 182$; 77.44%), of which 169 (93.37%) required medical management due to patent IRA. In cases of patients receiving thrombolytic therapy in ≥6-h

window, only 59 (27.31%) showed signs of successful thrombolysis, and 47 patients (79.66%) of this group were medically managed and the rest required revascularization therapy. The incidence of failed thrombolytic therapy was observed infrequently (n = 53, 22.55%) in patients being thrombolyzed within 6 h as compared to the patients who were thrombolyzed after 6 h ($n$ = 157, 72.68%).

The registry patients were divided into 2 groups after conventional angiography: group I, who required medical management as on coronary angiography did not reveal significant stenosis; and group II, who required either percutaneous transluminal coronary angioplasty or coronary artery bypass graft after angiography and as per CAD management guideline recommendations.

Table 3 shows comparison of risk factors between medical management and PCI/coronary artery bypass graft groups. The younger age, nondiabetic status, lower lipoprotein (a), higher homocysteine, and shorter window of thrombolysis were observed in the patient group on medical management. The overall mean window of thrombolysis in patients was 5.76 ± 2.98 h, and it was observed to be significantly shorter in group I, the patients on medical management (4.67 ± 2.26 h), than in group II (6.95 ± 3.21 h) patients ($p < 0.0001$). A total of 326 patients (41.96%) did not receive any thrombolytic therapy due to late presentation.

An odds ratio analysis for the risk factors is presented in Table 4. Regression analysis showed window as the strongest predictor of patients directed to medical management in thrombolyzed patients (odds ratio: 1.790; 95% CI: 1.144−2.802; $p < 0.011$).

The incidence of nonsignificant CAD and SVD was 41.17% and 44.73%, which was nearly equivalent in the study population. Double-vessel and triple-vessel disease were found in 9.66% and 4.45%, respectively. Nonsignificant CAD was observed in 324 patients (41.17%). In-hospital mortality was reported in 3 patients (0.38%). Overall, no morbidity was noted in the study cohort except 1 patient (0.13%) requiring blood transfusion.

## DISCUSSION

We herewith report that in young Indian STEMI patients, an old thrombolytic molecule, streptokinase, is quite effective if administered within 6 h of the event. In young patients, the disease is less severe and could be effectively treated with less aggressive treatment modalities.

For the past few decades, increased incidences of MI in young adults (<40 years of age) has been observed and the major underlying reasons for that is increased prevalence of risk factors such as hypertension, diabetes, dyslipidemia, smoking, obesity, and sedentary life style. All the major guidelines for CVD reduction have focused on primordial prevention of the above-mentioned risk factors in young adults [10,23]. Though PCI is considered as gold standard treatment modality for AMI, several resource-limited countries still continue to use thrombolytic agents to treat AMI due to unavailability of PCI facilities at local levels. Several studies have also advocated its potential benefits and showed that early transfer of patients to centers followed by administration of thrombolytic agents yields results as good as PCI. It has also resulted in benefits in terms of reduction in 30-day mortality with comparable

**TABLE 2.** Detailed profile of thrombolyzed patients

| | Medical Management | PCI/CABG | Significance |
|---|---|---|---|
| Window <6 h | | | |
| n = 235 | 181 (77.02) | 54 (22.98) | <0.0001 |
| Thrombolysis successful (n = 182) | 169 (93.37) | 13 (7.1) | <0.0001 |
| Failed thrombolysis (n = 53) | 12 (22.64) | 41 (77.36) | <0.0001 |
| Window ≥6 h | | | |
| n = 216 | 54 (23) | 162 (75) | <0.0001 |
| Thrombolysis successful (n = 59) | 47 (79.66) | 12 (20.34) | <0.0001 |
| Failed thrombolysis (n = 157) | 7 (4.46) | 150 (95.54) | <0.0001 |

Values are n (%), unless otherwise indicated.
CABG, coronary artery bypass graft; PCI, percutaneous coronary intervention.

**TABLE 3.** Comparison of profiles of patients on medical management vs. PCI

| Variable | Overall | Medical Management | PCI/CABG | Significance |
|---|---|---|---|---|
| Patients, n | 777 | 335 (43.1) | 442 (56.9) | <0.0001 |
| Age, yrs | 35.58 ± 4.27 | 34.49 ± 4.81 | 36.41 ± 3.61 | 0.000 |
| LVEF, % | 41.53 ± 8.92 | 42.91 ± 8.93 | 40.98 ± 8.78 | 0.000 |
| Obesity | 35 (4.5) | 15 (4.47) | 20 (4.52) | 0.886 |
| Family history of premature CAD | 101 (12.99) | 48 (14.33) | 53 (11.99) | 0.394 |
| Past history of CAD | 130 (16.73) | 52 (15.52) | 78 (17.64) | 0.491 |
| Hypertension | 96 (12.35) | 37 (11.04) | 59 (13.34) | 0.391 |
| Diabetes | 75 (9.65) | 22 (6.57) | 53 (11.99) | 0.015 |
| Tobacco consumption | 391 (50.32) | 167 (49.85) | 224 (50.67) | 0.875 |
| Smoking habit | 304 (39.12) | 141 (42.09) | 163 (36.88) | 0.162 |
| Total cholesterol | 36 (4.57) | 12 (3.58) | 24 (5.43) | 0.298 |
| Triglycerides | 113 (14.53) | 50 (14.92) | 63 (14.25) | 0.873 |
| High-density lipoprotein | 238 (30.63) | 98 (29.25) | 140 (31.67) | 0.118 |
| Low-density lipoprotein | 46 (5.92) | 19 (5.67) | 27 (6.12) | 0.919 |
| Lipoprotein (a) | 123 (15.83) | 40 (11.94) | 83 (18.78) | 0.013 |
| Homocysteine | 187 (24.07) | 98 (29.25) | 89 (20.13) | 0.004 |
| High sensitivity C-reactive protein | 58 (7.46) | 32 (9.55) | 26 (5.88) | 0.074 |
| Window, h | 5.76 ± 2.98 | 4.67 ± 2.26 | 6.95 ± 3.21 | 0.0000 |
| Thrombolysis done | 451 (58.04) | 235 (70.15) | 216 (48.87) | 0.230 |
| Nonthrombolyzed | 326 (41.96) | 101 (30.15) | 225 (50.90) | <0.0001 |

Values are n (%) or mean ± SD, unless otherwise indicated.
LVEF, left ventricular ejection fraction; other abbreviations as in Table 2.

**TABLE 4.** Odds ratio

| Variable | Odds Ratio | 95% Confidence Interval | | Significance |
|---|---|---|---|---|
| | | Lower | Upper | |
| Age | 1.310 | 0.974 | 1.762 | 0.074 |
| Diabetes | 0.164 | 0.006 | 4.543 | 0.286 |
| Successful thrombolysis | 0.004 | 0.000 | 0.078 | 0.000 |
| Window, h | 1.790 | 1.144 | 2.802 | 0.011 |
| Lipoprotein (a) | 1.009 | 0.970 | 1.050 | 0.650 |
| Apolipoprotein B | 1.055 | 0.741 | 1.502 | 0.765 |
| Total lipids | 0.996 | 0.974 | 1.019 | 0.737 |
| Triglycerides | 1.870 | 0.162 | 21.634 | 0.616 |

bleeding complications with that of PCI [24]. In 1933, Dr. William Tillett discovered the utility of streptokinase as a fibrinolytic agent. Streptokinase is an old, non-fibrin-specific molecule having wide reach in developing countries due to its low cost. STEMI treatment has evolved since an era of streptokinase. Now, fibrin-specific lytic agents—tenecteplase, alteplase, reteplase—and/or primary angioplasty of culprit vessels are considered as gold standard therapy for STEMI. However, due to cost of fibrin-specific lytic agent and/or nonavailability of PAMI (Primary Angioplasty in Myocardial Infarction trial) centers, many patients still receive streptokinase as a reperfusion therapy in case of STEMI. Our study cohort has also received streptokinase and the patients receiving streptokinase in early window did show recanalization of IRA; hence we advocate the theory of "Old is Gold" for young in Asian Indians [24].

We observed a significantly higher probability of revascularization in AMI patients who were thrombolyzed within 6 h of an event because of patent IRA and nonsignificant disease in noninfarct vessels. These patients were more likely to receive optimal medical therapy. Myocardial infarction in younger patients does carry a better prognosis if timely treated [25]. On the other hand, poor control of risk factors carries a significant morbidity and mortality [26,27]. The major area of concern is that 41.96% of total STEMI patients (321 patients) did not receive any reperfusion therapy due to late presentation. The reasons could be [1] the lack of awareness regarding CAD in early age, [2] self-misinterpretation of angina symptoms with gastric problems. Window for thrombolysis is an important factor for recanalization of IRA. In the view of affordability and cost benefits of primary angioplasty versus thrombolysis with streptokinase, the results of timely thrombolysis offer cost benefit therapy in non-PCI-capable centers.

The treatment of AMI changed when several trials reported that thrombolytic agents given within a few hours of infarction improved the outcome [28]. Coronary atherosclerosis begins early in life, but acute STEMI in adults aged <40 years are exceptional. The reasons for such brisk progression of atherosclerosis, leading to myocardial infarction at an early age are still being investigated. The plaque rupture and superimposed thrombus is one of the etiology. Several studies have reported incidence of myocardial infarction in male and female patients in different ratios ranging from 5:1 to 20:1 [12].

The same trend was observed in our study with a ratio of 14.2:1 male to female patients. Overall incidence of diabetes and hypertension was found in 12.4% and 9.7% of the population, respectively, which was in concordance with other studies reporting less common prevalence of risk factors in very young adults [23,25]. Tobacco consumption was found to be among the major risk factors in the study population. The lower incidence of double-vessel disease and multivessel disease favors plaque rupture with superimposed thrombus hypothesis and also suggests less malignant atherosclerosis in this age group in view of predominant SVD.

The study suffers from a limitation of lack of follow-up where detailed follow-up of the study cohort may have provided the valuable insight into patients' condition in both the post medical management and procedures groups. Moreover, the overall prevalence of some of the risk factors was low in the study cohort and therefore the magnitude of their impact may be diluted in the current study. A larger cohort having greater or comparable prevalence of these risk factors may provide more insightful results. Another potential limitation of the study could be that the majority of the thrombolyzed patients were treated with streptokinase and hence outcome of other agents is neglected, which could also be evaluated as an extended arm study from the current study.

## CONCLUSIONS

The acute short-term outcome is favorable in young STEMI patients, particularly in patients who had received timely thrombolytic therapy. The tobacco consumption is a major risk factor in this population where less severe form of the diseases (e.g., SVD) is predominant. However, prevalence of other cardiometabolic risk factors is relatively low. The lack of awareness regarding timely treatment of AMI is area of concern.

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