Analysis Of Risk Factors Of ST Segment Elevation Myocardial Infarction In Young Patient

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- **Abstract:**

Background - ST- member elevation myocardial infarction (STEMI) in youthful cases is a growing concern with unique threat factors. This study aims to exhaustively assess the threat factors associated with STEMI in individualities under 55 times of age.

Methods - A retrospective analysis of clinical records and life data was conducted for a cohort of youthful STEMI cases. Traditional threat factors similar as hypertension, diabetes, and smoking were estimated alongside arising factors, including genetics and psychosocial variables.

Results - The study linked a diapason of threat factors contributing to STEMI in the youthful, with inheritable tendencies and domestic history playing a significant part. life- related threat factors, including smoking and rotundity, remained substantial contributors. specially, psychosocial factors like habitual stress were also linked as applicable threat rudiments.

Conclusion - This analysis underscores the multifaceted nature of threat factors in youthful STEMI cases. relating and understanding these factors is essential for acclimatized forestallment strategies and bettered clinical operation. Comprehensive care should consider inheritable, life, and psychosocial aspects to alleviate STEMI threat in the youngish population.

Keywords -   ST- segment elevation myocardial infarction, threat factors, youthful cases, genetics, life, psychosocial factors.

- **Background :**

Frequently elderly populations are more prone, to experiencing infarctions while younger individuals tend to have an occurrence of this condition. However there has been an increase in the incidence of infarctions in recent years. The way acute myocardial infarction develops and progresses in individuals is likely different from what's observed in the elderly population. In this study our goal was to analyze the risk factors associated with ST elevation infarction (STEMI) specifically in young patients(1).

While the prevalence of infarction (AMI) is decreasing in developed nations it still remains a significant cardiovascular issue worldwide. China being one of the developing countries globally has seen an increase in fatalities caused by AMI. In countries a notable portion of hospitalizations due to AMI involves adults. This could be attributed to the rising occurrence of risk factors for disease among this age group, such, as smoking, hypertension, dyslipidemia and diabetes(2).
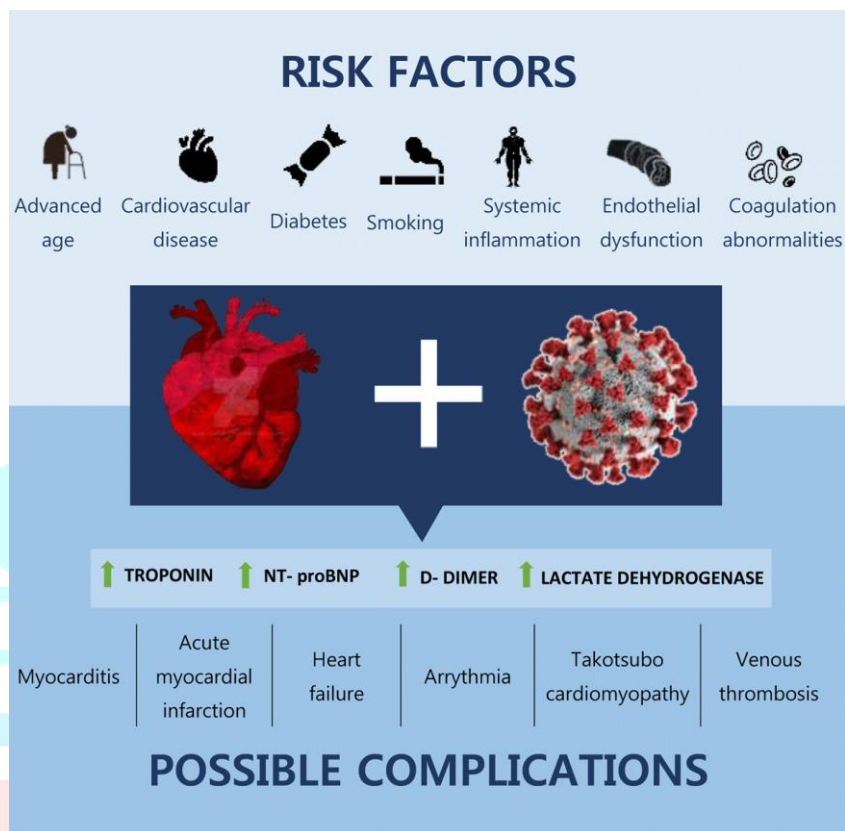

Fig 1: Risk factors for cardiovascular involvement of COVID-19 and possible complications(3).

Primary percutaneous coronary intervention (PPCI) stands as the preferred reperfusion remedy for acute ST member elevation myocardial infarction(STEMI), and the escalated relinquishment of reperfusion approaches has mainly lowered mortalityrates.in the last 20 times.1 2 still, this enhancement in mortality has remained fairly unchanged over the once decade and ischemic heart complaint(IHD) remains the current leading cause of death encyclopedically(4).

There exists inconsistency in the body of exploration regarding the characterization of youth with respect to unseasonable coronary roadway complaint (CAD) and myocardial infarction (MI). The designation" youthful" encompasses age ranges of ≤ 40, ≤ 45, or ≤ 55 times. Although it seems that ≤ 45 times is the most accepted cut-off when defining youthful in respect to acute MI, although family history of unseasonable CAD frequently refers to MI ≤ 55 times or ≤ 65 times for manly and womanish cousins, independently. Besides the unsettled age description, MI at a youthful age remains a significant problem, particularly in developing countries and the Middle East, that wasn't adequately delved(5).

- **Methods :**

Data was gathered from a successive group of cases progressed 44 or youngish(classified as youthful; total n = 86) and individualities aged 60 to 74 times(classified as senior; total n = 65) who had been diagnosed with ST- member elevation myocardial infarction(STEMI). also, 79 cases belonging to the youthful age group were also included in the study age- matched cases without coronary roadway complaint(CAD), rehabilitated between January 2009 and June 2013(6).

1. **Study population** –

Full details of the GRACE and CONCORDANCE registry styles have been published preliminarily. GRACE and CONCORDANCE employed nearly aligned addition and rejection criteria designed to reflect an unprejudiced population of cases with ACS. In addition to symptoms harmonious with myocardial ischemia, cases were needed to have either ECG changes harmonious with ACS, elevation of serum cardiac biomarkers of myocardial necrosis or proved coronary roadway complaint including STEMI, non – ST - member – elevation myocardial infarction, and unstable angina. To enroll an unselected population, the first 10 - 20 successive eligible cases were signed from each point per month. Hospitals in both registries were named to represent indigenous and metropolitan acute - care installations with and without catheterization laboratory installations(7).
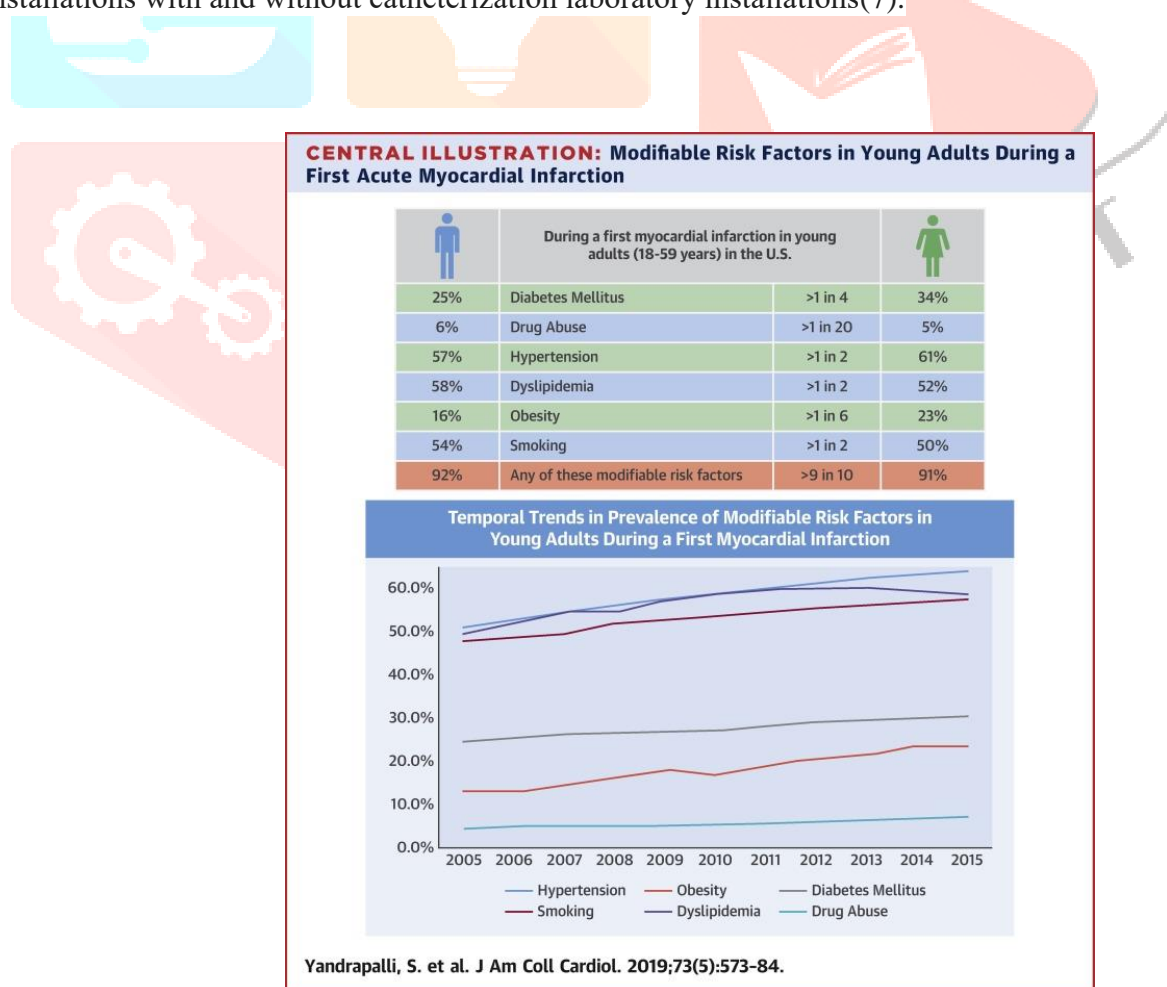

CENTRAL ILLUSTRATION: Modifiable Risk Factors in Young Adults During a First Acute Myocardial Infarction

	During a first myocardial infarction in young adults (18-59 years) in the U.S.		
25%	Diabetes Mellitus	>1 in 4	34%
6%	Drug Abuse	>1 in 20	5%
57%	Hypertension	>1 in 2	61%
58%	Dyslipidemia	>1 in 2	52%
16%	Obesity	>1 in 6	23%
54%	Smoking	>1 in 2	50%
92%	Any of these modifiable risk factors	>9 in 10	91%

Temporal Trends in Prevalence of Modifiable Risk Factors in Young Adults During a First Myocardial Infarction

Hypertension — Obesity — Diabetes Mellitus
Smoking — Dyslipidemia — Drug Abuse

Yandrapalli, S. et al. J Am Coll Cardiol. 2019;73(5):573-84.

Fig 2: central illustration: modifiable risk factors in young adults during a first acute myocardial infarction(8).

2. Ethics statement-

Ethical concurrence for this study was granted by the ethics commission at the Third Central Hospital of Tianjin. The study protocols misbehave with the ethical guidelines of the protestation of Helsinki. All subjects handed informed concurrence.

3. Subjects –

This retrospective disquisition encompassed the analysis of 86 consecutive individualities in the immature age group(18 – 44 times old) diagnosed with ST- member elevation myocardial infarction(STEMI), named from a pool of 2460 cases with acute myocardial infarction(AMI) who were enrolled between January 2009 and June.2013 at The Third Central sanitarium of Tianjin. A cohort of 79 individualities in the youthful adult order, falling within the same age type, and making consecutive visits to the sanitarium within the identical timeframe, were included as the control group. Coronary heart complaint was barred in this group by coronary angiography. An fresh group of 65 successive old cases (60 – 74 times of age) with STEMI were included for comparison(1).

4. Inclusion criteria –

Cases included in the study were diagnosed with STEMI, defined by the typical rise and fall of cardiac labels of myocardial necrosis with at least one of the following : i) symptoms of ischemia; ii) echocardiogram changes reflective of new ischemia($\geq$0.1 mV in two or further standard leads, $\geq$0.2 mV in two or further conterminouspre-cordial leads, or a new left pack branch block); iii) 12 h after symptoms, situations of creating kinase and its isoform(CKMB) were doubly the normal upper limit or a troponin position was increased to the standard of MI(according to the normal original laboratory value). All cases had complete medical records and had experienced coronary angiography(1).

5. Exclusion criteria –

Cases with the ensuing conditions were barred natural heart complaint, cardiomyopathy, myocarditis, Takayasu's arteritis or vascular dysplasia; coronary roadway embolism; AMI secondary to aortic analysis, severe aorta stopcock stenosis, myocardial hypertrophy, and history of AMI without substantiation from angiography showing narrowing of the coronary highways(9).

6. Data collection and definition –

Data collection and delineations Case demographics, previous medical history, clinical characteristics, cardiac catheterisation data, inpatient mortality and complications were attained from the National University Hospital CCU database, which captures data from all cases admitted to the CCU for STEMI and planned for or passed PPCI. Case comorbidities included both pre-existing conditions and conditions that were recently diagnosed during the STEMI admission. issues after discharge and follow- up data were attained from the sanitarium electronic medical records and mortality at 30 days and at 1 time were recorded. STEMI was defined in agreement with the fourth universal description ofMI.16 Cases progressed lower than 50 times old were defined as the ' youthful STEMI ' group while cases progressed 50 times and aged were defined as the ' aged STEMI ' group(4).

7. Outcomes –

In- sanitarium mortality is the primary outgrowth. The secondary issues include a compound of in- sanitarium complications and one- time each- beget mortality. heart failure during the indicator admission and at 6 months. The study indicator date for both in - sanitarium and 6 - month issues was the admission date. The 6 - month MACE was grounded on post discharge events only because not all subjects were suitable to be followed to 6 months.We're continuing active follow- up of cases(10).

8. Angiographic findings and treatment –

due to delays for hospital admittance in some patients, coronary angiography was performed within one month after STEMI via the radial artery using a multifunction catheter or via the femoral artery using the Judkins method. There-results were interpreted by two experienced physician(9).

Coronary roadway stenosis was defined as a lesser than 50 reduction in the lumen periphery of any of the three coronary highways or their primary branches. The malefactor vessel and number of multi-vascular conditions were attained by coronary angiography. Grounded on STEMI operation guidelines, all cases with STEMI entered antipyretics (aspirin and clopidogrel/ ticagrelor), statins, β- blockers, angiotensin- converting enzyme impediments(ACEI), and angiotensin receptor blockers(ARBs) Angiotensin receptor- neprilysin impediments(ARNIs). Follow up Cases who survived and were discharged from the sanitarium were followed up using telephone calls or clinical visits at 30 days, 6, 12, 18, and 24 months. The standard follow up period was11.5 months. Major adverse cardiovascular events(MACE), including death, intermittent myocardial infarction, stroke, rehospitalisation for heart failure, and revivification due to angina, were recorded(2).
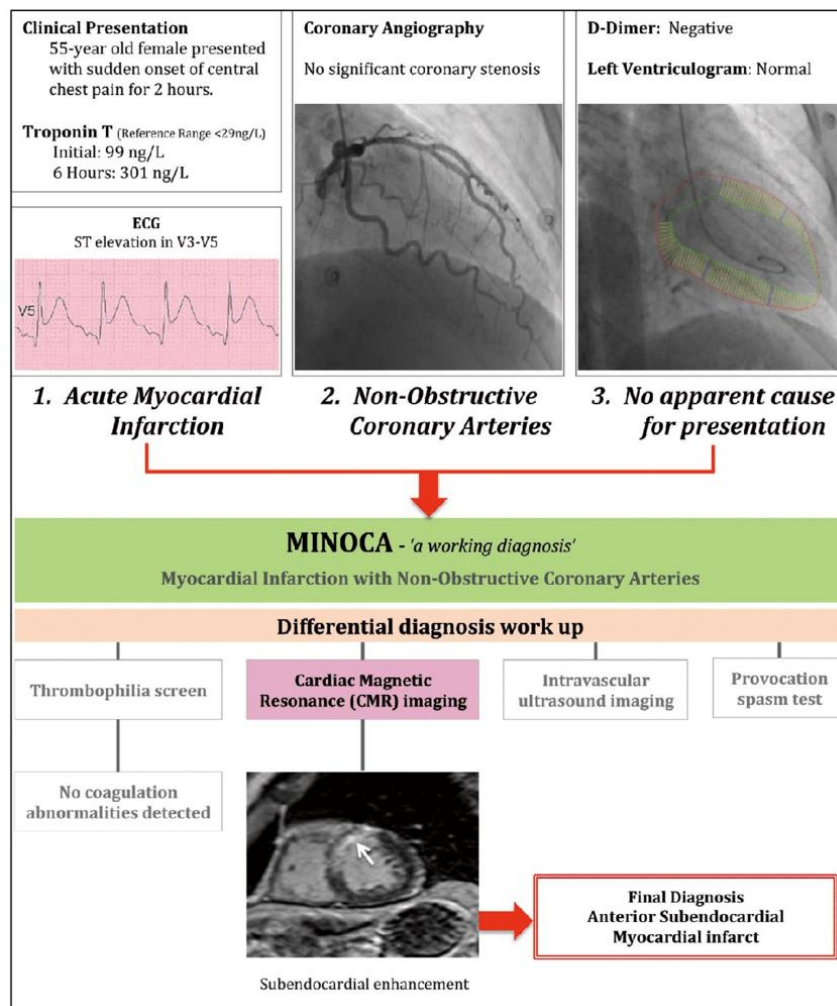

Fig 3: Myocardial infarction with non-obstructive coronary arteries (MINOCA): a case study of a 55-year-old woman with an acute anterior ST-elevation MI presentation(11).

8. Statistical analysis –

Statistical package for social wisdom(SPSS) software, interpretation 22 for Microsoft Windows(SPSSInc., Chicago, IL, USA) was used for data analysis. Categorical data were presented as frequence and probabilities(n()) and correlations among them were anatomized by Chi-square test or Fisher's exact test as applicable. nonstop data were subordinated to normalcy testing using Shapiro – wilk test and(if demanded) visual assessment of histogram plots; and were presented as mean ±(standard divagation) or standard(interquartile range), also were compared using independent samples t- test or Mann – Whitney test as applicable. Retrogression analyses were conducted to identify statistically significant predictors of outgrowth endpoints. A probability p- value ≤0.05 was considered statistically significant(5).

- **RESULT :**

▪ **STEMI profile and treatment times**

All cases entered primary percutaneous coronary intervention, since other treatment modalities were barred from the study. Table 1 presents STEMI profile, treatment time, in- sanitarium events, and discharge data. The maturity of STEMIs were located at the anterior(47.4, n = 36) or inferior(30.3, n = 26) walls. Forty- seven cases(61.8) had STEMI in a single vessel. medicine- eluting stents were most generally fitted (72.7, n = 56), followed by bare-essence stents(11.7, n = 9). Two cases(7.5) failed in the sanitarium; five(6.5) endured cardiac arrest.

Table 1. Young ST-elevation myocardial infarction (STEMI) profile, <u>times to treatment</u>, in-hospital events, and discharge data(12).

variable	n	%
STEMI site, $n = 76$		
Anterior	36	47.4
Inferior	23	30.3
Inferoposterior	6	7.9
Anterolateral	5	6.6
Anteroseptal	2	2.6
Inferolateral	2	2.6
Antero-inferior	1	1.3
Infero-septal	1	1.3
Single vessel, $n = 76$	47	61.8
Multiple vessel, $n = 76$	29	38.2
Stent type, $n = 77$		
Drug-eluting stent	56	72.7
Bare-metal stent	9	11.7
POBA	7	9.1
Angiography only/no flow restriction	5	6.5
In-hospital events, $n = 77$		
Death	2	7.5
Arrest	5	6.5
Bypass graft	1	1.3
Intra-aortic balloon pump	1	1.3
Reinfarction	0	0.0
Bleed	0	0.0
Stent thrombosis	0	0.0

Times to treatment		Median, IQR[b]
Door to ECG	77	5.0, (2.0, 8.0)
Door to balloon	71	70.0, (54.0, 88.0)
ISHC	71	233.0, (130.0, 467.0)
D in coronary care unit	77	5.0, (4.0, 6.0)
Discharge status, $n = 75$[a]	n	%
To home	75	100.0
Statins	71	94.7
Beta blocker	68	90.7
Clopidogrel	64	85.3
ACE inbitor	53	70.7
Nitrates	15	20.0
Aspirin	9	12.0
Ticagrelor	9	12.0
Angiotensin 2 receptor blocking drug	3	4.0
Warfarin	3	4.0
Antiarrhythmic	2	2.7
Digoxin	2	2.7
Diuretics	2	2.7
Ca channel blocker	1	1.3
Insulin	1	1.3

ACE = angiotensin-converting enzyme; ECG = electrocardiography; IQR = interquartile range; ISHC = Total Ischemic Time; POBA = plain old balloon angioplasty.

a:

   Two of the patients were deceased, the n and% are for the remaining 75.

b:

   First quartile, third quartile.

The median door-to-electrocardiogram time was 5 minutes [standard deviation (SD) = 15.0], and the median door-to-balloon time was 86.5 minutes (SD = 46.4). The average total ischemic time was 377.3 minutes (SD = 343.0). On average, patients spent 7.2 days (SD = 13.4) in the coronary care unit. After excluding 15 outliers, the mean coronary unit stay was 4.4 days (SD = 2.7). Of the surviving patients, 100% ($n = 75$) were discharged to home. The majority were discharged with prescriptions for statins (94.7%, $n = 71$), beta blockers (90.7, $n = 68$), clopidogrel (85.3%, $n = 64$), and angiotensin-converting enzyme inhibitors (70.7%, $n = 53$).

- **Baseline characteristics of the 2,420 patients in the study.**

Overall, 591(24.4) cases in this cohort were aged ≤ 45 times. birth characteristics of the study population are reported in Tables 1 and 2. Men were more likely to be youngish than 45 times at the time of donation than women. Smoking was the most common threat factor and its use was significantly more in youngish MI cases than in aged cases(57 vs 31; p<0.001). Compared with their older counterparts, younger patients tended to have a lower prevalence of hypertension (14.2% vs 28.3%; p<0.001) and diabetes mellitus (13.2% vs 29.7%; p<0.001). There were also sex-based differences in the younger patients: young females were more often diabetic (12.1% vs 27.3%; p<0.009) and hypertensive (13.1% vs 27.3%; p=0.02) compared with their male counterparts. In contrast, smoking was more commonly seen in young males.

Table 2: Baseline characteristics of the 2,420 patients in the study.

Table 1. Baseline characteristics of the 2,420 patients in the study(13).

Empty Cell	Total Patients n=2,420	≤45 yr n=591	>45 yr n=1,829	P-value
Age, mean (SD), yr	54.7 (12.1)	39.2 (5.2)	59.7 (9.1)	<0.001
Female (%)	386 (16.0)	44 (7.5)	342 (18.7)	<0.001
Diabetes (%)	621 (25.6)	78 (13.2)	543 (29.7)	<0.001
Hypertension (%)	601 (24.8)	84 (14.2)	517 (28.3)	<0.001
Dyslipidaemia (%)	59 (2.4)	15 (2.5)	44 (2.4)	0.9
Current smoker (%)	972 (40.2)	336 (57.0)	636 (35.0)	<0.001
Prior PCI (%)	23 (1.0)	7 (1.2)	16 (0.9)	0.5
Prior CABG (%)	6 (0.2)	0 (0.0)	6 (0.3)	0.4

Abbreviations: PCI, percutaneous coronary intervention; CABG, coronary artery bypass graft.

Table 2. Baseline characteristics of young male vs female patients in the study.

Young MI	Male n=547	Female n=44	P-value
Age, mean (SD), yr	39.1 (5.3)	40.7 (4.0)	0.06
Diabetes (%)	66 (12.1)	12 (27.3)	0.009
Hypertension (%)	72 (13.1)	12 (27.3)	0.02
Dyslipidaemia (%)	14 (2.6)	1 (2.3)	1.00
Current smoker (%)	336 (61.4)	0	<0.001
Prior PCI (%)	7 (1.3)	0	1.00

Abbreviations: PCI, percutaneous coronary intervention; MI, myocardial infarction.

▪ **Lipid history versus in-hospital lipid status**

presents across-tabulation of four lipid statuses(overall cholesterol, triglycerides, LDL, and HDL) according to whether cases had a history of the condition or whether first discovery was made at the time of the STEMI event. Of the 60 cases who had no history of hypertension,36.7(n = 22) were diagnosed with hypertension during their STEMI treatment. Elevated LDL and lowered HDL were also enterprises;28.6 and18.8 of those with no history, independently, were diagnosed in sanitarium.

Table 3

Lipid history by hospital profiles(14).

Hospital profile	History of condition			
	No		Yes	
	n	%ª	n	%ᵇ
Cholesterol, $n = 71$				
Elevated	10	14.1	5	7.0
Triglycerides, $n = 71$				
Elevated	7	9.9	4	5.6
LDL, $n = 70$				
Elevated	18	25.7	5	7.1
HDL, $n = 71$				
Low	12	16.9	5	7.0
Not low	52	81.3	2	28.6
Hypertension, $n = 75$				
Yes	22	29.3	8	11.3

HDL = high-density lipoprotein; LDL = low-density lipoprotein.

ªPercent of total sample presenting condition for negative history of condition.

ᵇPercent of total sample presenting condition for positive history of condition.

- **Discussion:**

The prevalence of AMI in youthful individualities was formerly as low as 2- 6,4 but it has been decreasingly rising.14 youthful AMI cases differed from aged AMI cases in several ways Yunyun etal. 12 noted that acute myocardial infarction frequently strikes suddenly in youthful individualities, with utmost of them not encountering any antedating alert signs or symptoms. Prior to its inception, and the original onset constantly results in a substantial infarct size. Zimmerman etal., 21 revealed a pronounced manly ascendance in youthful individualities with AMI, although there's a trend toward myocardial infarction prevalence being original between genders. both relations with adding age. In our meta- analysis, manly cases were predominant among youthful AMI cases, ranging from64.7 to94.8, while the proportion of manly cases sounded to drop in aged AMI cases(15).

In this experimental cross-sectional disquisition, 492 individualities with acute STEMI seeking pPCI treatment at two prominent Egyptian tertiary installations were included. The study uncovered that a considerable proportion of STEMI cases in Egypt involve individualities of a immature age (≤ 45 times), constituting roughly one- fifth of the entire cohort. Manly gender by far represented the maturity in both age groups, but, with a significantly advanced ascendance in the youngish- compared to the aged group. Compared to aged cases, youthful STEMI cases had significantly advanced rates of smoking and family history of unseasonable CAD, while conversely had lower rates of other conventional CAD threat factors similar as diabetes, hypertension and dyslipidemia(5).

The rate of angiotensin- converting enzyme asset tradition in this study 70.7% was analogous to that among cases of all periods in the first Gulf Registry of Acute Coronary Events study 69%. Still, beta blockers were specified in only 74 of cases, compared with 90.7 in this study. Aspirin was used in 94 of cases, compared with only 12 in this study. still they may also reflect a tendency to concentrate on shorter- term curatives, with increased emphasis on threat- factor reduction among youthful AMI cases. 12% Diabetes and hypertension were more common as the threat factors among the aged MI cases but they were less common in youthful grown-ups in our study, which was seen in earlier studies also(15, 25). A positive family history of IHD had been set up as a significant cause only among the youthful grown-ups as compared to the aged cases in earlier studies (25- 28). Whereas only13.3 of cases had a positive family history of IHD in our study(16).

Regarding gender, it's established that manly coitus frequently dominates experimental registries, and randomized studies concerning CAD. Accessibly, this is because of the defensive goods of womanish coitus hormones against vascular walls inflammation and atherosclerotic during the travail period, with after catch- up after menopause. still, it should be taken into account that the socio- behavioral impacts like heavy smoking, alcohol and occupational stressors tend to be advanced on the males' side, particularly in Middle- Eastern populations. Both of these presumption are particularly valid in our study, to find a manly gender dominance in both age groups, yet with a significantly advanced manly proportion in the youthful(5).

In this study, it was established that age exceeding 45 times, diabetes mellitus, elevated serum creatinine situations, and lowered left ventricular function in pre discharge echocardiograms served as notable pointers for inimical clinical results in the entire cohort of STEMI cases. similarly, hypertension, abnormal lipid biographies, a family history of early onset coronary roadway complaint, and reduced estimated glomerular filtration rate(eGFR) were honored as significant prognostic factors for adverse clinical issues in youthful STEMI cases(aged 45 times or youngish). These resemble findings align with Pablo etal.'s exploration, which delved a cohort of over 19,000 cases and revealed a connection between major adverse cardiovascular events(MACE) during follow- up and dyslipidemia along with a lower left ventricular ejection bit(5).

CONCLUSION:

In conclusion, the analysis of threat factors for ST- member elevation myocardial infarction(STEMI) in youthful cases has exfoliate light on the specific vulnerabilities and contributing rudiments that affect this demographic. It has come apparent that while traditional cardiovascular threat factors play a part, there are unique factors at play in youthful individualities. This includes a high frequency of unhealthy actions like smoking, alcohol consumption, and diets rich in fat, which have been explosively associated with STEMI prevalence in youthful populations. also, the study has underlined the significance of addressing early identification, intervention, and acclimatized forestallment strategies for youthful cases, as they may not parade classic threat factors similar as hypertension or diabetes. Inheritable factors, as well as socioeconomic and psychosocial aspects, can also impact the onset of STEMI in this group. Understanding these threat factors and their interplay is pivotal for healthcare providers and policymakers to develop effective forestallment and operation strategies. By fastening on education, life revision, and access to healthcare for youthful individualities, we can work towards reducing the burden of STEMI in this specific demographic and perfecting their long- term cardiovascular health issues.

BIBLIOGRAPHY:

1. Yunyun W, Tong L, Yingwu L, Bojiang L, Yu W, Xiaomin H, et al. Analysis of risk factors of ST-segment elevation myocardial infarction in young patients. BMC Cardiovasc Disord [Internet]. 2014 Dec 9 [cited 2023 Nov 18];14(1):1–6. Available from: https://bmccardiovascdisord.biomedcentral.com/articles/10.1186/1471-2261-14-179

2. Liang MT, Pang Y, Gao LL, Han LJ, Yao HC. Clinical risk factors and outcomes of young patients with acute ST segment elevation myocardial infarction: a retrospective study. BMC Cardiovasc Disord [Internet]. 2023 Dec 1 [cited 2023 Nov 18];23(1). Available from: /pmc/articles/PMC10353156/

3. Crudo VL, Ahmed AI, Cowan EL, Shah DJ, Al-Mallah MH, Malahfji M. Acute and Subclinical Myocardial Injury in COVID-19. Methodist Debakey Cardiovasc J [Internet]. 2021 [cited 2023 Nov 18];17(5):22–30. Available from: https://journal.houstonmethodist.org/articles/10.14797/mdcvj.1038

4. Tung BWL, Ng ZY, Kristanto W, Saw KW, Chan SP, Sia W, et al. Characteristics and outcomes of young patients with ST segment elevation myocardial infarction undergoing primary percutaneous coronary intervention: retrospective analysis in a multiethnic Asian population. Open Hear [Internet]. 2021 Jan 1 [cited 2023 Nov 18];8(1):e001437. Available from: https://openheart.bmj.com/content/8/1/e001437

5. Samir A, Almahjori M, Zarif B, Elshinawi M, Yehia H, Elhafy M, et al. Characterization of features and outcomes of young patients (< 45 years) presenting with ST-segment elevation myocardial infarction. Egypt Hear J [Internet]. 2023 Dec 1 [cited 2023 Nov 18];75(1):1–8. Available from: https://tehj.springeropen.com/articles/10.1186/s43044-023-00357-2

6. Yunyun W, Tong L, Yingwu L, Bojiang L, Yu W, Xiaomin H, et al. Analysis of risk factors of ST-segment elevation myocardial infarction in young patients. BMC Cardiovasc Disord [Internet]. 2014 [cited 2023 Nov 18];14(1). Available from: https://pubmed.ncbi.nlm.nih.gov/25487289/

7. Vernon ST, Coffey S, D'Souza M, Chow CK, Kilian J, Hyun K, et al. ST-Segment–Elevation Myocardial Infarction (STEMI) Patients Without Standard Modifiable Cardiovascular Risk Factors—How Common Are They, and What Are Their Outcomes? J Am Heart Assoc [Internet]. 2019 Nov 5 [cited 2023 Nov 18];8(21). Available from: https://www.ahajournals.org/doi/abs/10.1161/JAHA.119.013296

8. Yandrapalli S, Nabors C, Goyal A, Aronow WS, Frishman WH. Modifiable Risk Factors in Young Adults With First Myocardial Infarction. J Am Coll Cardiol. 2019 Feb 12;73(5):573–84.

9. Yunyun W, Tong L, Yingwu L, Bojiang L, Yu W, Xiaomin H, et al. Analysis of risk factors of ST-segment elevation myocardial infarction in young patients. BMC Cardiovasc Disord. 2014;14(1).

10. Paul GJ, Sankaran S, Saminathan K, Iliyas M, Sethupathy S, Saravanan S, et al. Outcomes of ST Segment

Elevation Myocardial Infarction without Standard Modifiable Cardiovascular Risk Factors – Newer Insights from a Prospective Registry in India. Glob Heart [Internet]. 2023 [cited 2023 Nov 18];18(1):13. Available from: https://globalheartjournal.com/articles/10.5334/gh.1189

11. Myocardial infarction with non-obstructive coronary arteries (MINOCA):... | Download Scientific Diagram [Internet]. [cited 2023 Nov 18]. Available from: https://www.researchgate.net/figure/Myocardial-infarction-with-non-obstructive-coronary-arteries-MINOCA-a-case-study-of-a_fig2_284209444

12. Callachan EL, Alsheikh-Ali AA, Wallis LA. Analysis of risk factors, presentation, and in-hospital events of very young patients presenting with ST-elevation myocardial infarction. J Saudi Hear Assoc. 2017 Oct 1;29(4):270–5.

13. Alexander T, Kumbhani DJ, Subban V, Sundar H, Nallamothu BK, Mullasari AS. Acute ST-Elevation Myocardial Infarction in the Young Compared With Older Patients in the Tamil Nadu STEMI Program. Hear Lung Circ. 2021 Dec 1;30(12):1876–82.

14. Callachan EL, Alsheikh-Ali AA, Wallis LA. Analysis of risk factors, presentation, and in-hospital events of very young patients presenting with ST-elevation myocardial infarction. J Saudi Hear Assoc [Internet]. 2017 Oct 1 [cited 2023 Nov 18];29(4):270. Available from: /pmc/articles/PMC5623023/

15. Lei L, Bin Z. Risk Factor Differences in Acute Myocardial Infarction between Young and Older People: A Systematic Review and Meta-Analysis. Int J Cardiovasc Sci [Internet]. 2019 Feb 18 [cited 2023 Nov 18];32(2):163–76. Available from: https://www.scielo.br/j/ijcs/a/BP5dm6QYZQjy4SwLqX3Br3q/?lang=en

16. Sricharan KN, Rajesh S, Rashmi, Meghana HC, Badiger S, Mathew S. Study of acute myocardial infarction in young adults: Risk factors, presentation and angiographic findings. J Clin Diagnostic Res. 2012;6(2):257–60.