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INSIGHTS INTO MYOCARDIAL INFARCTION: PREVALENCE, RISK FACTORS, AND TROPONIN LEVELS IN STEMI AND NSTEMI

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Abstract:

Introduction: Myocardial infarction (MI), or heart attack, remains a significant health concern globally, with ST-elevation myocardial infarction (STEMI) and non-ST-elevation myocardial infarction (NSTEMI) being two distinct subtypes. Understanding the prevalence, risk factors, and troponin levels associated with these subtypes is critical for optimizing patient care and outcomes. This abstract presents insights from a prospective study investigating MI prevalence, risk factors, and troponin levels in STEMI and NSTEMI patients, contributing valuable information to cardiovascular medicine.

Materials and Methods: The study "Insights into myocardial infarction: prevalence, risk factors, and troponin levels in STEMI and NSTEMI patients" which was carried at "Department of Cardiology" at Narayana Hospitals, Nellore, in collaboration with 1440 bedded multidisciplinary teaching hospital.

Discussion: We included 200 patients in our study who are willing to provide the information in which maximum are male 132 (66%) and the rest were females 68 (34%). The study at Narayana Medical College and Hospital analyzed data from 200 myocardial infarction (MI) patients, revealing 70% STEMI and 30% NSTEMI cases. Most patients in both groups were aged 51-60, with males comprising 68.5% in STEMI and 60% in NSTEMI. Troponin levels varied by gender, with common risk factors including hypertension, smoking, alcohol consumption, diabetes mellitus, and obesity. Chief complaints upon admission included chest pain, left shoulder pain, and palpitations. During the study, 5% of patients died, slightly more in the STEMI group. These findings offer insights into MI epidemiology and clinical characteristics.

Conclusion: In conclusion, the data encompassing 200 patients highlights a significant prevalence of ST-elevation myocardial infarction (STEMI) at 70%, with non-ST-elevation myocardial infarction (NSTEMI) accounting for 30%. Major risk factors, including hypertension, smoking, and alcohol consumption, underscore the importance of targeted cardiovascular risk management. Elevated troponin levels, notably in 24 males (17 STEMI, 7 NSTEMI) and 15 females (15 STEMI, 4 NSTEMI), emphasize the gender-specific distinctions in myocardial infarction presentations. This tells us that troponin levels alone are insufficient for diagnosing myocardial infarction (MI); while elevated troponin levels are indicative of myocardial damage, the diagnosis of MI also requires clinical assessment, including symptoms, electrocardiogram (ECG) findings,

and other biomarkers, to confirm the presence of acute myocardial injury and ischemia. This data underscores the need for tailored interventions addressing both prevalent risk factors and distinct gender-related patterns in myocardial infarctions.

Key words: Prevalence, Myocardial Infarction, STEMI, NSTEMI, Risk factors, Troponin levels.

I. Introduction

The main aim to provide comprehensive insights into the epidemiology, risk factors, and diagnostic markers of MI, with a specific focus on the subtypes: ST-elevation myocardial infarction (STEMI) and non-ST-elevation myocardial infarction (NSTEMI).

Myocardial infarction (MI): Myocardial infarction, commonly known as a heart attack occurs when the blood flows, in one of the arteries is reduced or completely blocked. This can happen due to a lack of oxygen supply to the hearts muscle tissue leading to tissue death. The common indication is chest discomfort or soreness that may spread to the shoulder, arm, back, neck or jaw. Typically, this discomfort persists for a few minutes and is localized on the side or in the center of the chest.

ST-elevation myocardial infarction (STEMI): When trans mural myocardial ischemia leads to myocardial damage or necrosis, the condition is known as an ST-elevation myocardial infarction (STEMI). The coronary arteries, main artery, which supplies the heart muscle with blood rich in oxygen and nutrients, was totally stopped in a STEMI. It is typically associated with complete occlusion of a coronary artery, leading to pronounced ST-segment elevation on electrocardiogram (ECG) and necessitating prompt reperfusion therapy.

Non-ST elevation myocardial infarction (NSTEMI): A heart attack known as non-ST elevation myocardial infarction is typified by a partial blockage of a coronary artery, which lowers blood flow to the heart muscle. The diagnosis of non-ST elevation myocardial infarction (NSTEMI) is more difficult because it does not show a distinct pattern on the ECG. Prompt medical attention and action are necessary to stop further heart damage.

Understanding the prevalence, risk factors, and troponin levels associated with both STEMI and NSTEMI is crucial for optimizing patient care and outcomes. By examining the epidemiological landscape and identifying modifiable risk factors, healthcare providers can implement targeted preventive strategies to reduce the incidence of MI. Additionally, evaluating troponin levels as a diagnostic marker offers insights into myocardial injury severity and guides treatment decisions.

II. Materials and methods

Place of study:

The study "**Insights into myocardial infarction: Prevalence, Risk factors, and Troponin levels in STEMI and NSTEMI patients"** which was carried out in the Department of Cardiology at Narayana Hospitals, Nellore, in collaboration with a 1440 bedded multidisciplinary teaching hospital.

Study Design:

The study was a prospective observational clinical study conducted in the Department of Cardiology of tertiary care teaching hospitals.

Study Population:

This study was conducted in 200 patients who came to the Department of Cardiology of Narayana Medical college and hospital, Chinthareddypalem, Nellore, that fulfill the inclusion criteria during the data collection period was considered as study participants

Study Duration:

The study was conducted for a period of 6 months.

Study criteria:

Patients are considered for the study based on inclusion and exclusive criteria

Inclusion criteria:

1. Individuals diagnosed with myocardial infarction (MI), including both ST-elevation myocardial infarction (STEMI) and non-ST-elevation myocardial infarction (NSTEMI).
2. Age between 41 and 80 years old.
3. Patients presenting with symptoms suggestive of myocardial infarction, such as chest pain, shortness of breath, or other ischemic symptoms.

4. Both male and female participants are included to capture gender-specific patterns.
5. Patients who are willing to give voluntary consent in order to participate in the study.

Exclusion criteria:

1. Patients with a history of previous myocardial infarction.
2. Patients with chronic conditions predisposing them to myocardial injury, such as end-stage renal disease or chronic inflammatory conditions.
3. Specialized population like pediatrics and pregnancy women are excluded and the age group <40 years and >80 years are also excluded from the study.
4. Patients who are not willing to participate in the study are excluded.

Study Material:

1. Patient informed consent form.
2. Patient demographics
3. A specially designed questionnaire to gather additional data.
4. Patient medical records.
5. Ethical approval.
6. Data collection forms

Study Method:

The study was conducted after obtaining permission from the Head of the institution and Head of Department of Cardiology.

The methodology employed in the study outlined involves an **observational clinical study**. This study examines closely the prevalence rates of ST-elevation myocardial infarction (STEMI) and non-ST-elevation myocardial infarction (NSTEMI), alongside identifying major risk factors implicated in their development. Additionally, it also assesses whether troponin levels, as a diagnostic marker, may be applied exclusively as a criterion for diagnosis in myocardial infarction.

To be more specific, this study could be considered a **prospective cohort study**. In a prospective cohort study, researchers follow a group of individuals over time, in this case, patients who are diagnosed with myocardial infarction and are admitted in the Department of Cardiology, are followed up for a period of 6 months and are monitored for the development of cardiovascular events, with specific attention to the prevalence of myocardial infarction, major risk factors such as hypertension, smoking, and alcohol consumption, and variations in troponin levels.

This study allows for the collection of data to observe prevalence, risk factors, and troponin levels in STEMI and NSTEMI patients but does not involve direct intervention or manipulation of variables, making it an observational approach.

Quantitative research involves the collection of numerical data and relies on structured and standardized instruments for measurement. In this case, the data collected would include epidemiological data such as prevalence and risk factors, also numerical values such as troponin levels, demographic information, and potentially other additional medical conditions related to the study, such as the comorbidities which can influence the disease prognosis and management.

Quantitative data collected in this study would then be subjected to statistical analysis to assess patterns, relationships and the significance of observed findings. This approach allows for a systematic and quantitative examination of the prevalence, risk factors, and troponin levels in STEMI and NSTEMI patients.

III. Results

The data from 200 patients reveals a notable predominance of ST-elevation myocardial infarction (STEMI) cases, constituting 70% of the studied population, compared to 30% diagnosed with non-ST-elevation myocardial infarction (NSTEMI). This highlights the significance of ST-elevation as a prevalent form of myocardial infarction in this study. Among these patients, the predominant risk factors observed include hypertension (29%), smoking (23%), alcohol consumption (15%), diabetes mellitus (13%), a combination of smoking and alcohol use (12%), and obesity (8%). The troponin levels are analyzed by comparing the observed values with the normal reference limits. The common reference range for high-sensitivity troponin T (hsTnT) is below 14 ng/L for males and below 10 ng/L for females. Taking the troponin levels into consideration, 17 men diagnosed with STEMI had high troponin levels, indicating significant heart muscle

damage. Similarly, 7 men diagnosed with NSTEMI also exhibited elevated troponin levels, suggesting myocardial injury, despite the absence of ST-segment elevation on an electrocardiogram (ECG). Among women, 11 cases of STEMI and 4 cases of NSTEMI were identified. This suggests that both STEMI and NSTEMI occur in both genders, although potentially in different proportions. Overall, the data provided suggests that troponin levels were elevated in both men and women diagnosed with either STEMI or NSTEMI, indicating myocardial injury in all cases of myocardial infarction, regardless of gender or type of MI. These findings highlight the need for customized interventions targeting risk factors, considering gender-specific patterns in MI presentation.

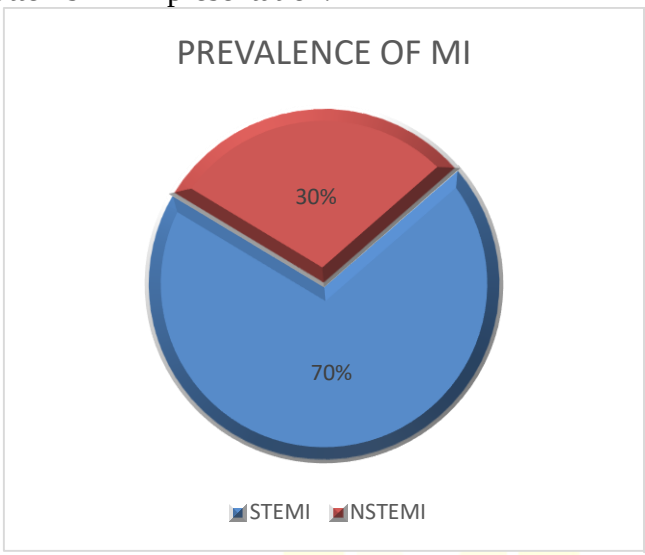

Fig.1 Prevalence of MI

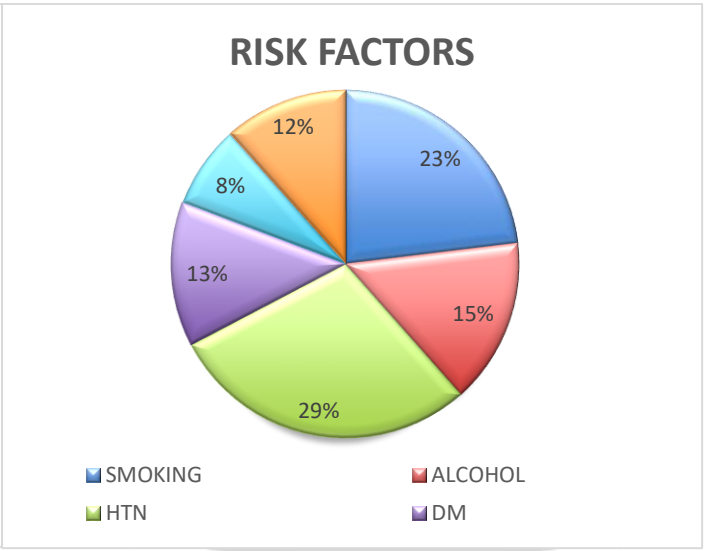

Fig.2 Risk factors

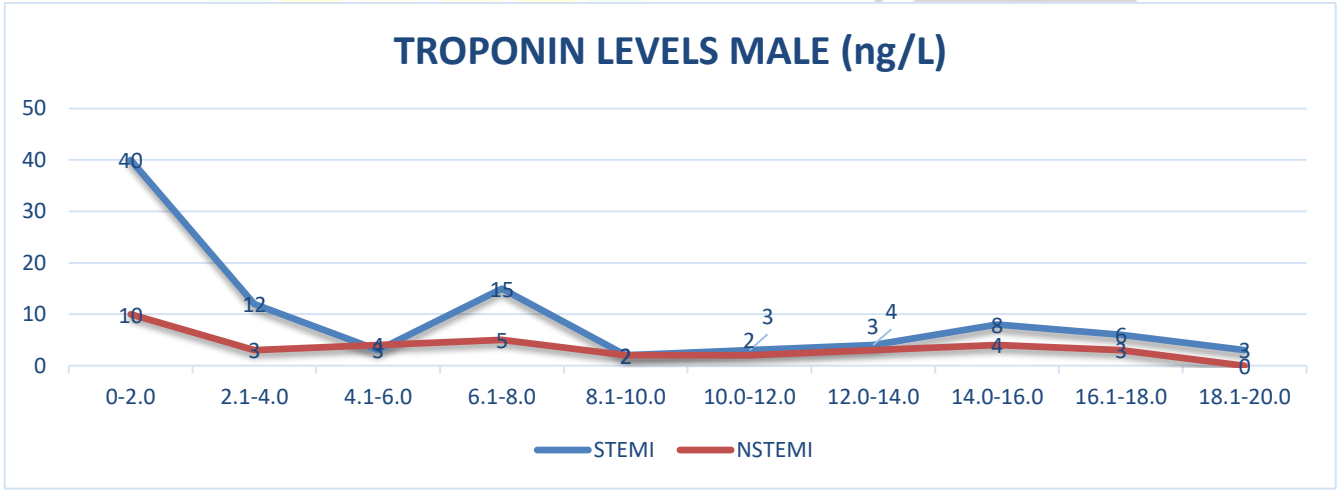

Fig.3 Troponin levels(ng/L) (Males)

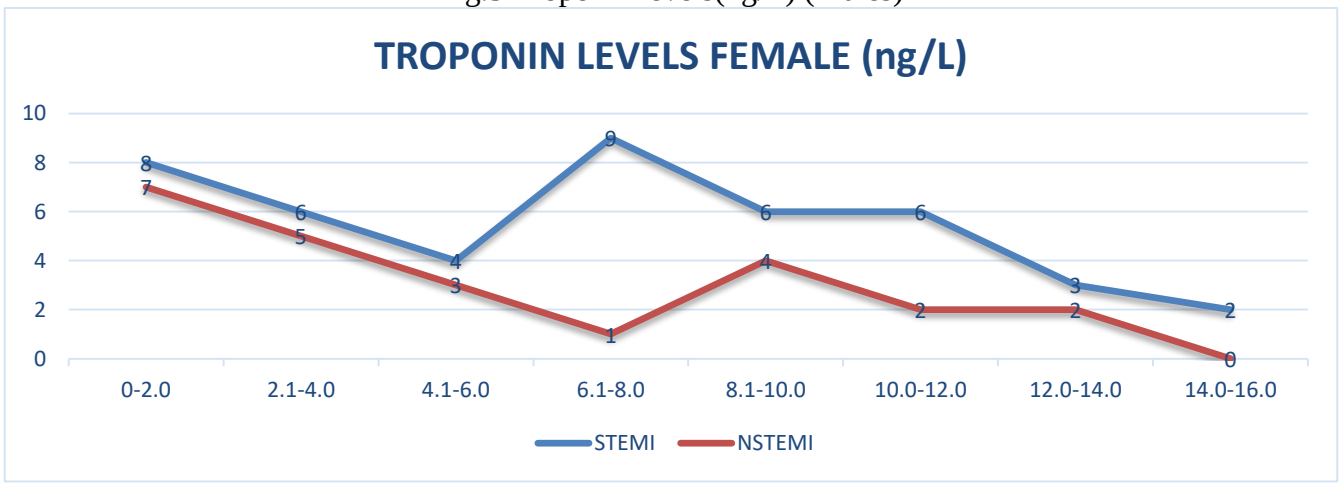

Fig.4 Troponin levels(ng/L) (Females)

IV. Discussion

The study conducted at Narayana Medical College and Hospital analyzed data from 200 patients diagnosed with myocardial infarction (MI), with findings revealing that 70% of cases were ST-elevation myocardial infarction (STEMI) and 30% were non-ST-elevation myocardial infarction (NSTEMI). Age-wise, a higher proportion of patients in both STEMI and NSTEMI groups were aged 51-60, with significant representation across other age groups as well. Male patients constituted a majority in both STEMI (68.5%) and NSTEMI (60%) groups. Comorbidities such as hypertension, diabetes mellitus (DM), and their combinations were prevalent in both types of MI. Troponin levels varied between genders, also these values alone are insufficient for diagnosing myocardial infarction, and common risk factors identified included hypertension, smoking, alcohol consumption, DM, and obesity. Chief complaints upon admission included chest pain, left shoulder pain, and palpitations. During the study period, 5% of patients succumbed to the condition, with slightly more fatalities in the STEMI group compared to NSTEMI. These findings provide valuable insights into the epidemiology and clinical characteristics of MI cases in the study population.

V. Conclusion

In conclusion, our study sheds light on the significant prevalence of ST-elevation myocardial infarction (STEMI) at 70%, with non-ST-elevation myocardial infarction (NSTEMI) comprising 30% of cases. In conclusion, our study, involving 200 patients, sheds light on the significant prevalence of ST-elevation myocardial infarction (STEMI) at 70%, with non-ST-elevation myocardial infarction (NSTEMI) comprising 30% of cases. The identification of major risk factors such as hypertension, smoking, and alcohol consumption underscores the critical importance of targeted cardiovascular risk management strategies. Furthermore, our findings reveal gender-specific distinctions in myocardial infarction presentations, with elevated troponin levels observed in both male (17 STEMI, 7 NSTEMI) and female (15 STEMI, 4 NSTEMI) patients. This highlights the necessity of considering multiple diagnostic factors beyond troponin levels alone for accurate myocardial infarction (MI) diagnosis. While elevated troponin levels indicate myocardial damage, the definitive diagnosis of MI requires comprehensive clinical assessment, including symptomatology, electrocardiogram (ECG) findings, and additional biomarkers, to confirm acute myocardial injury and ischemia. These findings highlight how critical it is to develop customized strategies that target common risk factors and identify gender-specific patterns in myocardial infarction in order to enhance patient outcomes.