

## FREQUENCY OF CARDIOGENIC SHOCK IN PATIENTS PRESENTING WITH NSTEMI AND YOUNGER THAN 45 YEARS OF AGE

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### Contribution

SK conceived the idea and designed the study. Data collection and manuscript writing was done by SK, SK, SN, NR, and FM. All the authors contributed equally to the submitted manuscript.

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### ABSTRACT

**Objective:** The objective of this study was to assess the frequency of cardiogenic shock in patients of younger than 45 years of age presenting with NSTEMI.

**Methodology:** A hospital based Cross sectional study has been conducted in a tertiary hospital of Isra University Hospital, Hyderabad in the Department of Cardiology. This study was started in September 2017 and completed on March 2019 and recruited a total of 321 patients NSTEMI patients having age less than 45 years of either gender to determine the burden of cardiogenic shock during hospitalization. Baseline and clinical data were recorded in a pre-structured questionnaire and analyzed using Statistical Package for the Social Sciences (SPSS) version 21.0.

**Results:** Out of total 321 patients the mean age of admitted NSTEMI patients was  $37.34 \pm 6.19$  years and among them male predominance was prevalent (72.8%, N = 234). The overall burden of cardiogenic shock in our study subjects was 19(5.9%). Male gender, cigarette smoking, diabetes mellitus, chronic kidney disease, and increased mean duration of hospital stay were significantly associated with cardiogenic shock in patients admitted with NSTEMI as compared to patients admitted without cardiogenic shock ( $p < 0.05$ ).

**Conclusion:** Our study shows that overall burden of cardiogenic shock is higher in patients with younger age group when they are diabetic, had underlying chronic kidney disease, and increased duration of hospital stay.

**Keywords:** Young population, cardiogenic shock, NSTEMI, Pakistan

## INTRODUCTION

Cardiogenic shock is a devastating condition associated with decreased cardiac output and signs & symptoms of tissue hypoxia in the presence of adequate intravascular volume. Cardiogenic shock is associated with high number of mortality rates in patients with acute myocardial infarction (MI) ranging from 70% to 90% in developing countries where the advance health care facilities are lacking irrespective of gender and age but burden of this disease is commonly found in patients with age more than 60 years with male predominance along with multiple comorbidities.<sup>1,2</sup>

In the developed countries coronary artery disease is one of the most common causes of morbidity and mortality even in the presence of advanced healthcare facilities. Besides, developed countries developing countries like Pakistan also gain attention by the health care providers due to increase burden of cardiovascular disease and this trend has now been changing because higher burden of myocardial infarction is also seen in young adults from last few decades.<sup>3,4</sup> When coronary artery disease diagnosed before the age of 45 years then it will be labeled as young coronary artery disease underlying having multiple modifiable and non-modifiable risk cardiovascular risk factors associated with different prognosis quality of life.<sup>5</sup>

Higher burden of cardiogenic shock almost more than three folds is observed in patients with acute STEMI (7.5%) than NSTEMI (2.5%)<sup>6</sup> but these patients are older than 45 years of age and the data is not available in patients with NSTEMI younger than 45 years of age that is why this study is planned to determine the burden of cardiogenic shock in patients presenting with baseline diagnosis of NSTEMI.

## METHODOLOGY

A cross sectional hospital-based study was conducted in a tertiary hospital of Isra University Hospital, Hyderabad in the Department of Cardiology. This study was started in September 2017 and completed on March 2019 and recruited a total of 321 patients after carefully assessing the inclusion & exclusion criteria and after taken

approval from ethical committee of the hospital. All the young patients of less than 45 years of age and having age more than 18 years of either gender and those who were admitted in the department of cardiology with a diagnosis of NSTEMI were included in this study after taking informed consent while those who were having age more than 45 years, previous history of myocardial infarction, and cardiogenic shock caused by other reasons than NSTEMI were excluded from the study.

Acute NSTEMI was diagnosed based on the universal definition of acute MI<sup>7</sup> consisting of ongoing central chest pain with evidence of changes in ECG supporting of cardiac ischemia along with positive cardiac troponin I or troponin T. Cardiogenic shock was diagnosed based on the clinical definition including systolic blood pressure of less than 90 mmHg for more than 30 minutes with signs of hypoperfusion such as decreased urinary output of less than 30 ml/hour, cool clammy body, altered mental status, and pulmonary capillary wedge pressure (PCWP) of more than 15 mmHg calculating using echocardiogram modality.

A preformed structured questionnaire was used to collect the baseline data such as age, gender, area of residence, marital status, basal metabolic index (BMI), and social class and clinical data such as comorbid conditions, addiction, and outcome variable such as burden of cardiogenic shock in patients with NSTEMI.

We used Statistical Package for the Social Sciences (SPSS) version 21.0 for data entry and analysis. Continuous data such as age in years, BMI, and duration of hospital stay were calculated as mean  $\pm$  SD. Categorical variables such as education status, marital status, area of residence, social class, and burden of cardiogenic shock were calculated as numbers and percentages.

## RESULTS

Out of total 321 patients were analyzed those who fulfilled the inclusion criteria. The mean age of admitted NSTEMI patients was  $37.34 \pm 6.19$  years and among them male predominance was prevalent (72.8%, N = 234) and majority were married (61.6%,

N = 198), resident of urban areas (77.2%, N = 248), and belongs to a middle socioeconomic background (5.2%, N = 174). Table 1.

The most common risk factors among young patients admitted with NSTEMI was cigarette smoking (54.5%, N = 175), hypertension (35.2%, N = 113), dyslipidemia (30.5%, N = 98), diabetes mellitus (28.3%, N = 91), Family History of Premature Coronary Artery Disease (15.5%, N = 50), chronic kidney disease (11.2%, N = 36), and least common was chronic obstructive pulmonary disease (7.4%, N = 24).

**Table 1: Baseline Characteristics of Study Subjects**

Characteristics	NSTEMI (N = 321)
Mean age ± SD	37.34 ± 6.19
<b>Gender</b>	
Male	234 (72.8%)
Female	87 (27.1%)
<b>Marital Status</b>	
Married	198 (61.6%)
Single	123 (38.3%)
<b>Area of residence</b>	
Urban	248 (77.2%)
Rural	73 (22.7%)
<b>Socioeconomic Status</b>	
Low Class	110 (34.2%)
Middle Class	174 (54.2%)
Upper class	37 (11.5%)

Our main objective was to observe the burden of cardiogenic shock in patients admitted with acute NSTEMI having age less than 45 years. The overall burden of cardiogenic shock in our study subjects was 5.9% (N = 19 cases out of total 321).

Male gender, cigarette smoking, diabetes mellitus, chronic kidney disease, and increased mean duration of hospital stay were significantly associated with cardiogenic shock in patients admitted with NSTEMI as compared to patients admitted without cardiogenic shock (p <0.05). Shown in Table 2.

**Table 2: Association of risk factors in young NSTEMI patients developed cardiogenic shock**

Risk Factors	Cardiogenic Shock	p - value
	N = 19	
Mean age ± SD	37.34 ± 6.19	
Hospital Stay - days mean± SD	4.14 ± 1.21	0.001*
<b>Gender</b>		
Male	13 (68.4%)	0.004*
Female	6 (31.5%)	
<b>Marital Status</b>		
Married	11 (57.8%)	0.08
Single	8 (42.1%)	
<b>Area of residence</b>		
Urban	10 (52.6%)	0.12
Rural	9 (47.3%)	
<b>Socioeconomic Status</b>		
Low Class	5 (26.3%)	0.18
Middle Class	11 (57.8%)	
Upper class	3 (15.7%)	
<b>Cigarette Smoking</b>		
Yes	13 (68.4%)	0.01*
No	6 (31.5%)	
<b>Hypertension</b>		
Yes	10 (52.6%)	0.04*
No	9 (47.3%)	
<b>Dyslipidemia</b>		
Yes	12 (63.1%)	0.001*
No	7 (36.8%)	
<b>Diabetes Mellitus</b>		
Yes	10 (52.6%)	0.03*
No	9 (47.3%)	
<b>Family history of coronary artery diseases</b>		
Yes	5 (26.3%)	0.78
No	14 (73.6%)	
<b>Chronic kidney disease</b>		
Yes	16 (84.2%)	0.001*
No	3 (15.7%)	
<b>Chronic obstructive pulmonary disease</b>		
Yes	6 (31.5%)	0.09
No	13 (68.4%)	

\*significant at 5%

## DISCUSSION

With rising prevalence of coronary artery disease (CAD) worldwide particularly in Pakistan, World Health Organization (WHO) estimates that by the end of 2020, Pakistan will be the cardio-diabetic capital of the globe. CVD tends to be more aggressive and starts manifesting at a younger

age that is why we have focused our study in young groups of patients.<sup>8,9</sup> Prevalence of cardiogenic shock in STEMI is higher than NSTEMI and it is well established in previously conducted studies 7.5% to 2.5%, respectively.<sup>10-12</sup> There are multiple reasons why this burden is higher in STEMI group than NSTEMI because patients with STEMI are more likely to develop left ventricular dysfunction leading to cardiogenic shock but these studies are conducted on a age group more than 45 years and none of the study has been conducted in patients less than 45 years of age. Our study has been conducted in patients admitted with NSTEMI and evaluated for cardiogenic shock particularly among less than 45 years of age and observed higher burden of cardiogenic shock as compared to previous literature that was not confined with age limit. This could be due to lack of advance health care facilities or late seeking of medical attention due to lack of awareness regarding the disease. Further observational studies are needed in this regard to establish the reason behind it.

In our study, the mean age of admitted NSTEMI patients was  $37.34 \pm 6.19$  years and among them male predominance was prevalent (72.8%, N = 234). Multiple studies have confirmed male as a risk factor of coronary artery disease hence the increased burden of males diagnosed with NSTEMI is already well established<sup>13,14</sup> and is attributed to the protective effects of estrogens in preventing atherosclerosis and prevalence of smoking which was much more common amongst male that has been clearly demonstrated in various epidemiological studies. Although, mean age of these patients are quite younger as most of the studies have documented STEMI in young population rather than NSTEMI that is why data on young population admitted with NSTEMI is limited. Histopathological studies have shown that these plaques contain more lipids with relative lack of cellular scar tissue and are present for a shorter period of time or develop more quickly than plaques seen in older patients. These vulnerable plaques are prone to rupture that attributes for more STEMI at younger age than chronic stable angina.<sup>15,16</sup>

In our study we have also compared the common risk factors associated with cardiogenic shock in patients admitted with NSTEMI. Male gender, cigarette smoking, diabetes mellitus, chronic kidney disease, and increased mean duration of hospital stay were significantly associated with cardiogenic shock in patients admitted with NSTEMI as compared to patients admitted without cardiogenic shock ( $p < 0.05$ ). Cardiogenic shock is most

commonly seen in patients with STEMI due to larger area of myocardium damaged but its prevalence is less than the half when compared with patients with STEMI. On the other hands, risk factors associated with cardiogenic shock is almost the similar. In contrast, previously conducted study has shown younger patients were significantly more likely to have Killip class I (81.4%) and even patients with cardiogenic shock were almost the same as ours (6.0% and 5.9%, respectively) in patients with NSTEMI.<sup>17-19</sup>

Unlike earlier series of young patients with STEMI, our study has drawn the data from the general population and makes it possible to quantify the magnitude of risk factors associated with cardiogenic shock in patients with NSTEMI but there is further studies needed to be conducted to on larger scale to draw the scientific conclusion.

## CONCLUSION

Our study shows that overall burden of cardiogenic shock is higher in patients with younger age group when they are diabetic, had underlying chronic kidney disease, and increased duration of hospital stay.

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