



Emergency Medicine

ROLE OF HEART SCORE IN THE EVALUATION OF UNDIFFERENTIATED CHEST PAIN

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ABSTRACT Chest pain is a frequent presentation in emergency departments and poses a significant diagnostic challenge. Early identification of patients at risk for acute coronary syndrome (ACS) is essential to improve outcomes while avoiding unnecessary hospital admissions. This prospective observational study evaluated the utility of the HEART score for risk stratification in 100 adult patients presenting with undifferentiated chest pain at the Department of Emergency Medicine, ACS Medical College and Hospital, Chennai. HEART scores were calculated using History, Electrocardiogram, Age, Risk Factors, and Troponin I, and patients were categorized into low- (0–3), intermediate- (4–6), and high-risk (7–10) groups. Demographic characteristics, cardiovascular risk factors, ACS occurrence, and clinical outcomes were analyzed. The majority of patients were aged 46–60 years, and 68% were male. Based on the HEART score, 30% of patients were classified as low risk, 45% as intermediate risk, and 25% as high risk. Hypertension (55%) and diabetes mellitus (48%) were the most prevalent cardiovascular risk factors. ACS was diagnosed in 45% of patients and was significantly associated with higher HEART score categories. Patients with multiple cardiovascular risk factors were more frequently classified as high risk, whereas low-risk patients experienced very few adverse cardiac events. The HEART score proved to be a simple, reliable, and effective bedside tool for risk stratification, facilitating early identification of high-risk patients, supporting the safe discharge of low-risk individuals, optimizing resource utilization, and improving clinical decision-making in the emergency department.

KEYWORDS : Heart Score, Undifferentiated Chest Pain, Acute Coronary Syndrome, Risk Stratification, Emergency Medicine, Troponin I.

INTRODUCTION

Chest pain is a common presentation in the emergency department and poses a significant diagnostic challenge because only a proportion of patients have acute coronary syndrome (ACS). Early identification of high-risk patients is essential to reduce morbidity and mortality, while avoiding unnecessary hospitalization of low-risk individuals that contributes to emergency department overcrowding and increased healthcare costs (Amsterdam et al., 2014; Mahler et al., 2015).

Cardiovascular disease remains the leading cause of mortality worldwide, and the burden of coronary artery disease is increasing in India due to the rising prevalence of hypertension, diabetes mellitus, dyslipidemia, obesity, and tobacco use (World Health Organization, 2023; Prabhakaran et al., 2018). Conventional evaluation using clinical assessment, electrocardiography (ECG), and cardiac biomarkers may not reliably identify patients with early myocardial ischemia, creating the need for accurate risk stratification tools (Thygesen et al., 2018).

The HEART score, based on History, ECG, Age, Risk Factors, and Troponin, is a simple bedside scoring system developed to classify patients into low-, intermediate-, and high-risk categories (Six et al., 2008). Previous studies have demonstrated its ability to predict major adverse cardiac events and facilitate safe discharge of low-risk patients (Backus et al., 2013; Mahler et al., 2015; Laureano-Phillips et al., 2019). However, evidence from Indian emergency departments remains limited. Therefore, this study evaluated the utility of the HEART score for risk stratification of patients presenting with undifferentiated chest pain in a tertiary care teaching hospital.

Aim

To evaluate the utility of the HEART score for risk stratification of patients presenting with undifferentiated chest pain in the Emergency Medicine Department.

Objectives

- * To classify patients into low-, intermediate-, and high-risk categories using the HEART score.
- * To assess the association between HEART score categories, acute coronary syndrome (ACS), and clinical outcomes.
- * To evaluate the usefulness of the HEART score in guiding patient management and disposition decisions in the emergency department.

MATERIALS AND METHODS

A prospective observational study was conducted in the Department of Emergency Medicine, ACS Medical College and Hospital, Chennai, Tamil Nadu, involving 100 adult patients presenting with

undifferentiated chest pain after obtaining informed consent. All patients underwent clinical evaluation, electrocardiography (ECG), and serum Troponin I estimation. The HEART score, based on History, ECG, Age, Risk Factors, and Troponin, was calculated for each patient and used to classify them into low-risk (0–3), intermediate-risk (4–6), and high-risk (7–10) categories. Demographic characteristics, cardiovascular risk factors, HEART score categories, and clinical outcomes were recorded. Statistical analysis was performed using SPSS version 26.0. Continuous variables were expressed as mean $\pm$ standard deviation, categorical variables as frequencies and percentages, and associations were evaluated using the Chi-square or Fisher's exact test. A p-value <0.05 was considered statistically significant.

RESULTS

A total of 100 patients with undifferentiated chest pain were enrolled. Most patients were aged 46–60 years, and males comprised 68% of the study population. Based on the HEART score, 30% of patients were classified as low risk, 45% as intermediate risk, and 25% as high risk.

Table 1. Demographic Characteristics and HEART Score Risk Categories (n=100)

Factor	Category	Frequency (n)	Percentage (%)
Age	≤ 30 years	8	8.0
	31–45 years	22	22.0
	46–60 years	42	42.0
	>60 years	28	28.0
Sex	Male	68	68.0
	Female	32	32.0
Risk	Low Risk (0–3)	30	30.0
	Intermediate Risk (4–6)	45	45.0
	High Risk (7–10)	25	25.0

Most patients were middle-aged or elderly, with a predominance of males. The majority were classified into the intermediate-risk category according to the HEART score.

Table 2. Distribution of Cardiovascular Risk Factors

Risk Factor	Frequency (n)	Percentage (%)
Hypertension	55	55.0
Diabetes Mellitus	48	48.0
Smoking	38	38.0
Dyslipidemia	42	42.0
Obesity	30	30.0
Family History of CAD	22	22.0

Hypertension was the most prevalent cardiovascular risk factor, followed by diabetes mellitus and dyslipidemia.

Table 3. Number of Risk Factors and HEART Score Risk Category

Number of Risk Factors	Low Risk	Intermediate Risk	High Risk
0–1	20	10	2
2–3	8	25	10
≥4	2	10	13

Patients with multiple cardiovascular risk factors were more likely to be classified into higher HEART score categories.

Table 4. Association Between Individual Risk Factors and ACS Outcome

Risk Factor	ACS (n=45)	Non-ACS (n=55)	p-value
Hypertension	32	23	0.018
Diabetes Mellitus	28	20	0.022
Smoking	22	16	0.041
Dyslipidemia	26	16	0.030
Obesity	15	15	0.284
Family History of CAD	13	9	0.190

Hypertension, diabetes mellitus, smoking, and dyslipidemia were significantly associated with ACS, whereas obesity and family history did not show statistically significant associations.

DISCUSSION

This prospective observational study evaluated the utility of the HEART score for risk stratification in 100 patients presenting with undifferentiated chest pain. The findings demonstrate that the HEART score is a simple and effective bedside tool for identifying patients at varying risk of acute coronary syndrome (ACS).

Most patients were aged 46–60 years, and males constituted the majority of the study population, consistent with previous reports showing a higher prevalence of coronary artery disease among middle-aged men (Backus et al., 2013). The intermediate-risk category comprised the largest proportion of patients, similar to earlier validation studies of the HEART score (Six et al., 2008; Mahler et al., 2015).

Hypertension, diabetes mellitus, and dyslipidemia were the most prevalent cardiovascular risk factors, reflecting the increasing burden of metabolic disorders in India. Patients with multiple cardiovascular risk factors were more frequently classified into higher HEART score categories, indicating the cumulative effect of these factors on cardiovascular risk.

Higher HEART scores were significantly associated with ACS, confirming the score's predictive value. Similar findings have been reported by Backus et al. (2013) and Laureano-Phillips et al. (2019), who demonstrated the HEART score's ability to predict major adverse cardiac events. In contrast, obesity and family history of coronary artery disease were not significantly associated with ACS in the present study.

Low-risk patients experienced very few adverse cardiac events, supporting the use of the HEART score to identify individuals suitable for safe early discharge, while high-risk patients required closer monitoring and intensive management. Owing to its reliance on routinely available clinical parameters, the HEART score can be rapidly applied in busy emergency departments without complex calculations.

The findings support the routine use of the HEART score as a reliable clinical decision-making tool for risk stratification of patients presenting with undifferentiated chest pain. Its implementation may facilitate timely diagnosis, improve patient management, optimize resource utilization, and reduce unnecessary hospital admissions.

CONCLUSION

The present study demonstrates that the HEART score is a simple, reliable, and effective tool for risk stratification of patients presenting with undifferentiated chest pain in the emergency department. It accurately categorized patients into low-, intermediate-, and high-risk groups and showed a significant association with acute coronary syndrome (ACS) and clinical outcomes. Higher HEART scores were associated with a greater burden of cardiovascular risk factors and an increased likelihood of ACS, while low-risk patients experienced very

few adverse cardiac events. These findings support the use of the HEART score for early identification of high-risk patients requiring prompt intervention and safe discharge of selected low-risk individuals. Owing to its simplicity, rapid application, and reliance on routinely available clinical parameters, the HEART score can improve emergency department decision-making, optimize resource utilization, and enhance patient outcomes. **Routine incorporation of the HEART score into emergency department protocols may further standardize clinical assessment, reduce variability in decision-making, facilitate appropriate patient triage, and contribute to more efficient utilization of healthcare resources while maintaining patient safety and quality of care.

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