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Factors Contributing to Delayed Presentation In ST-Elevation Myocardial Infarction and Implication for In-Patient Outcomes

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ABSTRACT

Introduction: ST-elevation myocardial infarction (STEMI) is a significant cause of mortality and morbidity among patients with ischemic heart disease. Early intervention, such as primary percutaneous coronary intervention (PPCI) or thrombolysis has been shown to improve patient outcomes. However, delayed presentation in STEMI results in larger infarct size and increased complications.

Objectives: This retrospective descriptive study aimed to identify factors contributing to delayed presentation in STEMI and in-patient outcomes.

Methodology: A retrospective descriptive study was conducted. All the STEMI patients who underwent primary percutaneous coronary intervention at National Hospital Kandy from February 2019 to December 2019 were studied.

Results: A total of 243 STEMI patients who underwent PPCI at the National Hospital Kandy from February 2019 to December 2019 were studied. Among the study population, 31.27% were delayed presenters and 68.72% were non-delayed presenters. Atypical chest pain was identified as the main reason for a delayed presentation. Female gender was not associated with delayed presentation, contrary to the findings in other studies. Diabetes mellitus and the location of the culprit lesion did not significantly contribute to delayed presentation in this study group. Complications during hospital stay and average duration of hospital stay were not significantly different between delayed and non-delayed presenters. However, delayed presenters exhibited lower left ventricular ejection fraction on discharge, which is a critical predictor of short and long-term outcomes.

Conclusions: Community awareness programs are essential to minimize pre-hospital delays in STEMI presentation. Early recognition of atypical symptoms, irrespective of gender, and timely intervention are vital for improving outcomes in STEMI patients. Further research is warranted to explore the impact of other risk factors and co-morbidities on the duration of presentation in STEMI patients.

Keywords: ST-elevation myocardial infarction (STEMI), Primary percutaneous coronary intervention (PPCI), Delayed presentation



INTRODUCTION

Cardiovascular disease (CVD) remains one of the leading causes of death globally (1). Up-to-date data regarding the prevalence of CVD is not available in Sri Lanka. ST-elevation myocardial infarction (STEMI) is a leading responsible cause of mortality and morbidity among ischemic heart disease patients.

Early intervention, such as primary percutaneous coronary intervention (PPCI) or thrombolysis has been shown to give the best outcome for STEMI patients. Duration of the ischemia is a major determinant of the infarct size and complications (2). Ignorance of symptoms by patients, ethnicity, female gender and diabetes mellitus are noted as causes for delayed presentation in STEMI in some studies (3,4,5). In addition, analysis of data from the GRACE study revealed there is a significant geographic variation of delayed presentation in STEMI (6,7). However, we are unaware of the situation in Sri Lanka.

Early intervention, either primary PCI or thrombolysis, results in better outcomes for the patient. Intervention following delayed presentation results in adverse outcomes, even after the intervention is done promptly following the first medical contact (8,9,10,11).

The general objective of this study was to identify the factors for delayed presentation in STEMI in Sri Lanka.

METHODOLOGY

Study Design and Setting

A retrospective descriptive study was conducted. All STEMI patients who underwent primary percutaneous coronary intervention at National Hospital Kandy from February 2019 to December 2019 were studied.

Inclusion criteria

The fulfillment of criteria to undergo PPCI according to ESC guidelines. Patients admitted to the hospital 6 hours after the chest pain onset or underwent wire crossing 6 hours after chest pain onset were considered as delayed presenters.

Exclusion Criteria

Rescue PCI and patients who had undergone prior Coronary Artery Bypass Surgery (CABG) were excluded.

Data Collection

Data was collected from bed head tickets, coronary intervention reports and the cardiac catheterization laboratory database.

Statistical Analysis

Continuous variables were presented as mean with Standard Deviation (SD) and categorical variables as percentages. Independent sample t-test was used to compare the quantitative data. Pearson's correlation coefficient was performed to evaluate the correlations. Differences were considered statistically significant when the p-value was < 0.05. The Statistical Package for Social Sciences (SPSS) version 17 was used for all calculations and statistical analyses.

Ethical Clearance

Ethical clearance was received from the ethical review committee of the National Hospital Kandy.

RESULTS

Demographic Data

243 patients underwent primary PCI procedures during the study period. Out of this study population, 81.89% (n=199) were male and 18.10% (n=44) were female.

There were 68.72% (n=167) non-delayed presenters and 31.27% (n=76) delayed presenters. Among delayed presenters, 76.31% (n=58) were males and 23.68% (n=18) were females. Out of non-delayed presenters, 84.43% (n=141) were males and 15.56% (n=26) were females. There is a larger proportion of males in the non-delayed presenters compared to the delayed presenters though there is no statistical significance difference (p=0.128) (Figure 1).

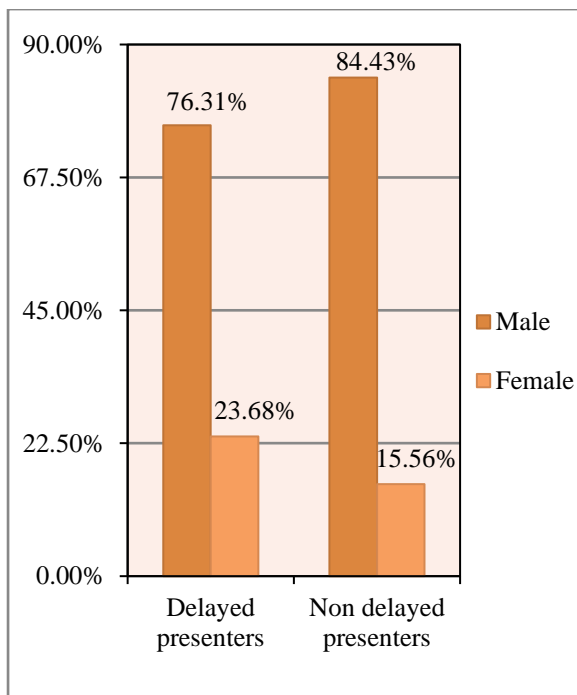


Figure 1. Gender distribution of the delayed and non-delayed presenters

The average age for the delayed presenters was 56.71 years while it was 57.75 years for the non-delayed presenters ($p=0.575$).

Average distances to National Hospital Kandy were 16.56 Km and 15.10 Km respectively for delayed and non-delayed presenters ($p=0.422$).

Table 01: Patient characteristics delayed and non-delayed presenters.

Variable	Delayed presentation	On-time presentation	P-value
Past IHD	7.89% (n=6)	11.97% (n=20)	0.340
Past T2 DM	28.94 % (n=22)	29.94% (n=50)	0.143
Hypertension	26.31% (n=20)	25.14 % (n=42)	0.847
New T2DM	10.52 % (n=8)	0	

STEMI

Most of the patients in delayed and non-delayed groups had anterior STEMI. The distribution of the type of STEMI among the study population is depicted in the following bar chart ($p=0.060$). (Figure 3)

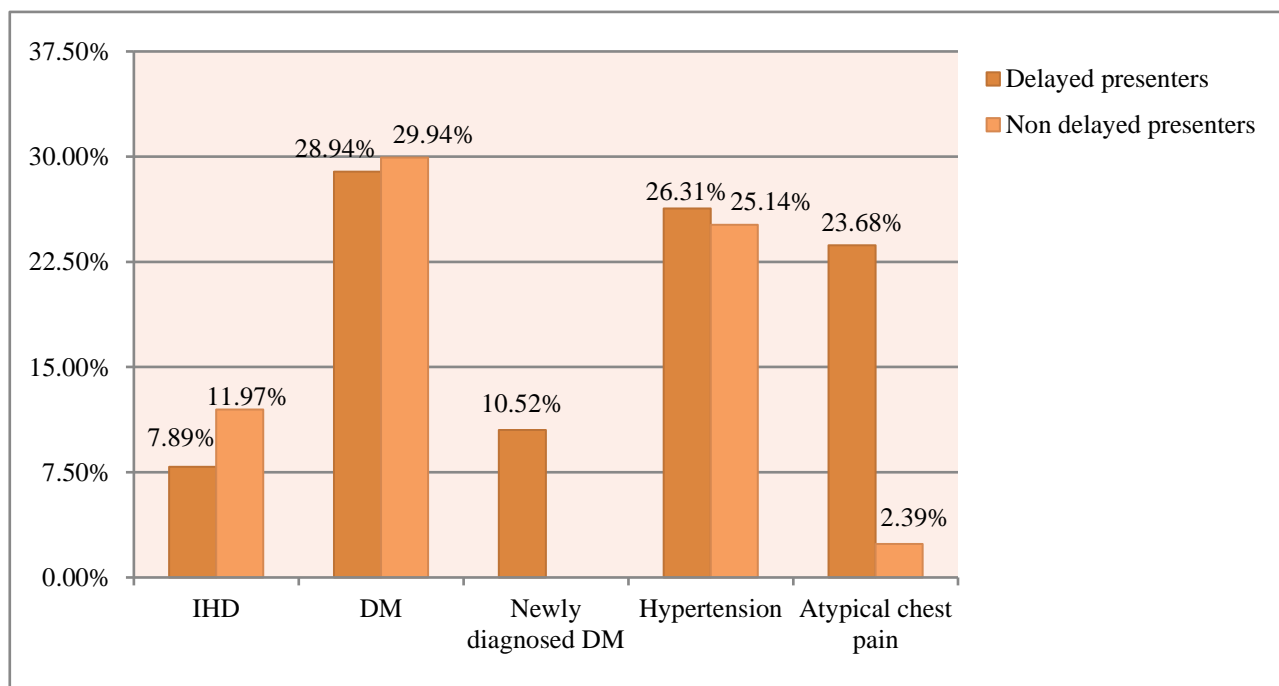


Figure 2. Distribution of the cardiovascular risk factors and symptoms among delayed and non-delayed presenters

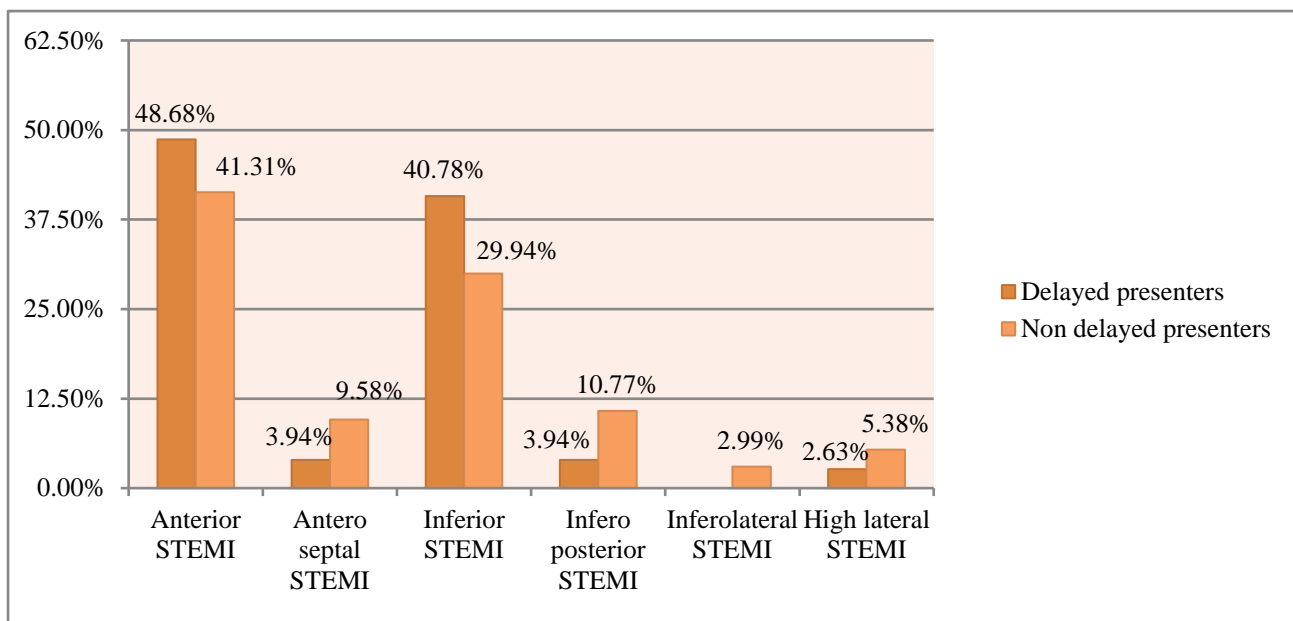


Figure 3. Types of STEMI among delayed and non-delayed presenters

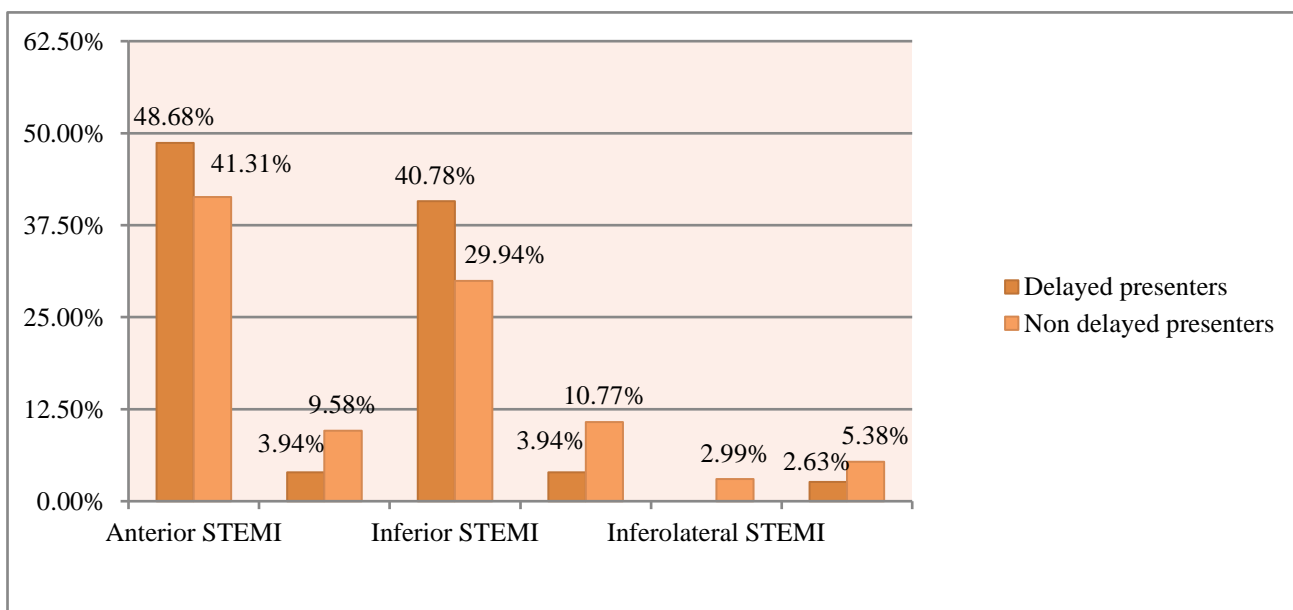


Figure 4. In hospital outcome among delayed and non-delayed presenters

DISCUSSION

The two study populations had similar presence of atherosclerosis risk factors. Some studies have demonstrated a higher percentage of diabetes mellitus among delayed presenters, and it is understandable when considering the silent myocardial infarction (3). However, it was not apparent in our study. Patients with long-standing DM can present with silent myocardial infarction

or with atypical symptoms and may cause a delay in presentation. We didn't analyze the duration of DM in our study population. There were 8 newly diagnosed DM patients, and all were found in the delayed presenter group.

Our study showed that atypical chest pain was the main reason for a delayed presentation. There was no statistically significant difference concerning gender (p 0.128). However, other studies have

demonstrated that the female gender is associated with delayed presentation as well as delayed care (11,12,13,14).

There was no significant difference concerning the distance to the National Hospital Kandy. Distance to the hospital or the mode of transport were not factors for a delayed presentation in our study. Most of the patients were transferred by ambulance by a peripheral hospital or public ambulance service.

Co-morbid conditions were associated with delayed presentation due to atypical symptoms (15,16). This was not demonstrated in our study. However, conditions such as chronic renal failure were not evaluated and unable to evaluate dyslipidemia due to a lack of data.

On the other hand, the history of ischemic heart disease was not a protective factor against delayed presentation in our study. This was similar to the findings demonstrated in some studies (17). However, a protective effect of the history of ischemic heart disease was found in some studies (3,5). This is because, with previous experience, patients tend to seek medical advice early.

The location of the Culprit artery did not affect the type of presentation (p 0.060) and this was similar to the findings in other studies as well. However, acute STEMI due to occlusion of the circumflex artery resulted in the delayed door-to-balloon time [5]. This was due to the difficulties associated with diagnosing posterior STEMI.

There was no significant difference in complications that occurred during the hospital stay between the two groups (p 0.663). And also, the average duration of the hospital stay was not significantly different. Ejection fraction on discharge was significantly different (p .000) with a severe left ventricular dysfunction occurring in the delayed presenter group. This is one of the major predictors of short and long-term outcomes.

CONCLUSION

Atypical chest pain is the main reason for the delayed presentation in our study. Female gender is not a reason for delayed presentation and delayed care in our study, although this was one of the causes in other studies. Diabetes mellitus and

the location of the culprit lesion were not a cause for a delayed presentation in this study group. The history of ischemic heart disease is not a protective factor against delayed presentation. There was no significant difference in the development of complications during hospital stay among the two groups apart from significantly low left ventricular ejection fraction among delayed presenters. Community awareness programs are necessary to prevent pre-hospital delays in STEMI presentation.

Limitations

Our study was conducted retrospectively. Patients above the age of 75 years were excluded from the study due to difficulty in gathering data. This may have affected the delayed presenter group since the age group has more atypical and delayed presentations. In addition, we did not collect data regarding a few important co-morbid conditions such as chronic renal failure. Further, due to the retrospective nature of the study, collected data regarding smoking and dyslipidemia were limited. We were unable to analyze how different combinations of risk factors affect the duration of the presentation. We did not have the follow-up data regarding follow and complications that occurred following discharge.

Author declaration

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Authors' contributions:

Study concept and design: S.K.G.P.H.K.S., H.S.R.K. and R.M.M.K.A.; Acquisition of data, analysis, and interpretation of data: S.K.G.P.H.K.S. and A.H.M.T.B.A.; Drafting of the manuscript: S.K.G.P.H.K.S.; Study supervision: S.R.J.

Conflicts of interest:

The authors declare that there is no financial or non-financial conflict of interest.

Funding statement:

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Ethics statement:

Ethical clearance was received from the ethical review committee of the National Hospital Kandy. Informed consent will be obtained from the patients after giving adequate details about the study. Before obtaining the consent, the patients will be provided the details regarding the study in the form of an information sheet.

Statement on data availability:

The datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request.

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