

## A STUDY OF CORONARY ANGIOGRAPHIC PROFILE IN PATIENT WITH FAILED THROMBOLYSIS IN A TERTIARY CARE CENTRE IN TAMILNADU

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### Abstract

**Background:** Coronary artery disease (CAD) poses a global health challenge, necessitating optimal management of acute coronary syndrome (ACS). Despite these advancements, thrombolysis in ACS management exhibits variable efficacy, leading to instances of failed thrombolysis. **Aim:** This study aimed to comprehensively assess the demographic profile of thrombolysis patients and compare the angiographic lesion characteristics between successful and failed thrombolysis. **Material and Methods:** This prospective study included 50 patients with ST-Segment Elevated ACS at Govt Mohan Kumaramangalam Medical College and Hospital in Tamil Nadu, India, from June 2023 to November 2023. This study emphasises individualised treatment strategies based on age, cardiac conditions, and coronary anatomy, with comorbidities and lifestyle factors showing no substantial impact on outcomes. **Results:** Patients aged > 51 years had a higher incidence of failed thrombolysis. Patients with cardiac conditions showed varied success rates. Females experienced a perfect percentage success rate of 100%, whereas males had a success rate of 57.1% (p=0.39), which did not reach statistical significance. Age, time to lysis, comorbidities, and lifestyle factors did not significantly affect outcomes. A highly significant association was noted between the coronary anatomy and thrombolysis outcomes. **Conclusion:** Age, cardiac condition, and coronary anatomy significantly influenced thrombolysis outcomes. Comorbidities and lifestyle factors had no significant effects. This study emphasises the importance of individualised treatment strategies and further research to refine these guidelines.

## INTRODUCTION

Coronary artery disease (CAD) remains a significant global health challenge that contributes substantially to morbidity and mortality. Despite advancements in medical science, managing acute coronary syndromes (ACS) remains a dynamic area of research, seeking to optimise therapeutic interventions and outcomes.<sup>[1]</sup> Thrombolysis, as a cornerstone in the early management of ACS, has revolutionised the landscape of cardiac care. However, the efficacy of thrombolysis is not

uniform across all patients, leading to instances of failed thrombolysis.<sup>[2]</sup>

The phenomenon of failed thrombolysis, where reperfusion of the coronary arteries is not achieved as anticipated, poses a considerable clinical concern.<sup>[3]</sup> This has prompted a deeper exploration of the underlying factors contributing to this therapeutic challenge. In this context, the current study focused on unravelling the coronary angiographic profile of patients who experienced failed thrombolysis in a tertiary care centre in the heart of Tamil Nadu, India. The state of Tamil Nadu, with its diverse population and varying risk factors, serves as a unique backdrop for

investigating the intricacies of failed thrombolysis. The tertiary care centre under study, equipped with state-of-the-art facilities and a multidisciplinary approach, is well-positioned to provide comprehensive insights into the angiographic patterns associated with unsuccessful thrombolysis. Understanding the coronary angiographic profile in cases of failed thrombolysis is crucial for several reasons. Firstly, it sheds light on the extent of coronary artery involvement and the specific vessels that may be resistant to thrombolytic therapy.<sup>[4]</sup> This knowledge is essential for refining treatment strategies and tailoring interventions according to patient needs. Secondly, elucidating the angiographic characteristics in such cases contributes to the growing body of evidence guiding clinicians in making informed decisions about subsequent revascularisation options, including percutaneous coronary intervention (PCI) or coronary artery bypass grafting (CABG).<sup>[5]</sup>

The present study aims to bridge existing literature gaps by meticulously analysing angiographic findings in patients with failed thrombolysis.<sup>[6]</sup> By doing so, we strive to delineate the prevalence of various angiographic patterns, such as thrombotic burden, lesion complexity, and involvement of multiple coronary vessels. Additionally, the study sought to explore the potential demographic and clinical factors associated with an increased likelihood of failed thrombolysis.

As we navigate Tamil Nadu, India's diverse landscape and its unique risk factors amalgam, we focus on unravelling specific vessels resistant to thrombolytic therapy. In the quest for refined treatment strategies, this research explores the extent of coronary artery involvement and scrutinises the nuanced angiographic characteristics that bear immense clinical significance. By scrutinising thrombotic burden, lesion complexity, and the intricate interplay of multiple coronary vessels, our meticulous analysis aims to uncover factors influencing unsuccessful thrombolysis. This study acts as a beacon, shedding light on the complex interplay between demographic, clinical, and angiographic elements in failed thrombolysis.

#### **Aim**

This study aimed to comprehensively assess the demographic profile of patients undergoing thrombolysis and compare angiographic lesion characteristics between successful and failed thrombolysis patients.

## **MATERIALS AND METHODS**

This prospective study was conducted with ST-Segment Elevated ACS patients who underwent failed thrombolysis at Govt Mohan Kumaramangalam Medical College and Hospital in Tamil Nadu, India, from June 2023 to November 2023. Ethical committee approval and informed consent were obtained from all 50 participants.

#### **Inclusion Criteria**

Patients with acute myocardial infarction were diagnosed based on electrocardiographic evidence. Patients were categorised into successful thrombolysis if there was > 50% ST-segment resolution within 60 minutes post-thrombolysis, coupled with chest pain resolution. Failed thrombolysis included patients with a < 50% ST-segment resolution or persistent chest pain.

#### **Exclusion Criteria**

Patients with contraindications for thrombolysis evolved or old myocardial infarction, myocardial infarction with associated left bundle branch block, patients dying within 60 minutes of streptokinase therapy, and those with acute myocardial infarction and chronic kidney diseases preventing coronary angiography.

#### **Methodology**

Fifty participants with acute myocardial infarction were included, and successful thrombolysis was defined as > 50% ST-segment resolution within 60 minutes post-thrombolysis. Data collection included demographics, angiographic features, and no-reflow phenomenon. This study emphasises individualised treatment strategies based on age, cardiac conditions, and coronary anatomy, with comorbidities and lifestyle factors showing no substantial impact on outcomes.

#### **Statistical Analysis**

Descriptive statistics were employed for demographic profiling and comparative analyses between successful and failed thrombolysis groups in the statistical analysis, enhancing the study's precision and illuminating key distinctions in patient characteristics and outcomes.

## **RESULTS**

Table 1 presents a comprehensive analysis of the clinical and angiographic factors influencing the outcomes of thrombolysis in patients diagnosed with Acute Coronary Syndrome. The study categorised patients into those with successful and failed thrombolysis, highlighting the key demographic details and angiographic characteristics. [Table 1]

Abbreviations: AWMI: Anterior Wall Myocardial Infarction; IWMI: Inferior Wall Myocardial Infarction; DM: Diabetes Mellitus; HT: Hypertension- SVD: Single Vessel Disease; DVD: Double Vessel Disease; TVD: Triple Vessel Disease; LAD: Left Anterior Descending (Artery); RCA: Right Coronary Artery; LCX: Left Circumflex Artery.

The data elucidate the associations between patient variables, such as age, sex, comorbidities, and coronary artery anatomy, and the success or failure of thrombolytic therapy.

Age groups revealed distinct success rates, with individuals under 40 years achieving a remarkable 100% success rate, while those aged 41-50 and over 51 years exhibited success rates of 51.6% and

45.5%, respectively ( $p=0.03$ ), showing a higher incidence of failed thrombolysis in patients aged > 51 years. Females experienced a perfect percentage success rate of 100%, whereas males had a success rate of 57.1% ( $p=0.39$ ), which did not reach statistical significance.

Individuals with AAMI displayed a success rate of 62.5%, whereas those with IWMI exhibited a success rate of 52.6% when exploring different cardiac conditions. AAMI and IWMI did not significantly impact the outcomes, with  $p$ -values of 0.39 and 0.547. Notably, time to lysis was a significant factor in this study. Patients who received treatment within 3 h had a success rate of 75%, whereas those treated after 12 h had a success

rate of 33.3% ( $p=0.123$ ). However, this difference was not statistically significant.

The presence of comorbidities, such as DM ( $p=0.52$ ) and HT ( $p=0.34$ ), demonstrated no substantial differences in success rates, remaining at 50%. Similarly, lifestyle factors, including smoking and alcohol consumption, showed no significant influence, with success rates of 56.3% and 58.3% ( $p=0.738$ ,  $p=0.979$ ), respectively.

However, a highly significant association was noted between the coronary artery anatomy and thrombolysis outcomes ( $p<0.0001$ ), emphasising the importance of anatomical considerations in treatment success.

**Table 1: Demographic characteristics, coronary angiographic profile and thrombolysis outcomes in patients with ST-segment elevated acute coronary syndrome**

		Thrombolysis		P value
		Failed, N (%)	Successful, N (%)	
Age group	<40	0(0)	8(100)	0.030
	41-50	15(48.4)	16(51.6)	
	>51	6(54.5)	5(45.5)	
Sex	Female	0(0)	1(100)	0.39
	Male	21(42.9)	28(57.1)	
AAMI	No	9(50)	9(50)	0.39
	Yes	12(37.5)	20(62.5)	
IWMI	No	12(38.7)	19(61.3)	0.547
	Yes	9(47.4)	10(52.6)	
Time to lysis (hours)	<3	5(25)	15(75)	0.123
	3-12	14(51.9)	13(48.1)	
	>12	2(66.7)	1(33.3)	
DM	No	15(39.5)	23(60.5)	0.52
	Yes	6(50)	6(50)	
HT	No	15(38.5)	24(61.5)	0.34
	Yes	6(54.5)	5(45.5)	
Smoker	No	7(38.9)	11(61.1)	0.738
	Yes	14(43.8)	18(56.3)	
Alcohol	No	16(42.1)	22(57.9)	0.979
	Yes	5(41.7)	7(58.3)	
Type	Normal	4(14.8)	23(85.2)	<0.0001
	SVD	11(68.8)	5(31.3)	
	DVD	3(75)	1(25)	
	TVD	3(100)	0(0)	
Total Occlusion	No	20(40.8)	29(59.2)	0.235
	Yes	1(100)	0(0)	
LAD Type A	No	19(40.4)	28(59.6)	0.372
	Yes	2(66.7)	1(33.3)	
LAD Type B	No	13(35.1)	24(64.9)	0.097
	Yes	8(61.5)	5(38.5)	
LAD Type C	No	20(40.8)	29(59.2)	0.235
	Yes	1(100)	0(0)	
RCA Type A	No	18(38.3)	29(61.7)	0.036
	Yes	3(100)	0(0)	
RCA Type B	No	16(37.2)	27(62.8)	0.089
	Yes	5(71.4)	2(28.6)	
RCA Type C	No	19(39.6)	29(60.4)	0.09
	Yes	2(100)	0(0)	
LCX Type A	No	19(40.4)	28(59.6)	0.372
	Yes	2(66.7)	1(33.3)	
LCX Type B	No	18(38.3)	29(61.7)	0.036
	Yes	3(100)	0(0)	
LCX Type C	No	21(42)	29(58)	n/a
Left Main	No	21(42)	29(58)	n/a

## DISCUSSION

The present study provides valuable insights into the coronary angiographic profile of patients

experiencing failed thrombolysis in ST-segment-elevated ACS. The primary outcomes revealed notable associations between demographic and clinical factors and the success or failure of

thrombolytic therapy. Age emerged as a significant factor, with individuals over 51 years of age exhibiting a higher incidence of failed thrombolysis. This finding aligns with previous studies suggesting age as a potential determinant of thrombolysis success, possibly due to age-related variations in coronary anatomy and response to treatment.<sup>[7,8]</sup>

Gender differences did not reach statistical significance in our study, contrasting with some previous research indicating potential variations in thrombolysis outcomes between males and females.<sup>[9,10]</sup> The intricate interplay between hormonal and physiological factors may contribute to the nuanced effects of sex on thrombolysis, warranting further investigation. Analysis of cardiac conditions demonstrated varied success rates, with AAMI and IAMI not significantly influencing the outcomes. However, the observed trend of higher success rates for thrombolysis within 3 hours, though not statistically significant, highlights the time-sensitive nature of reperfusion therapy.<sup>[11]</sup>

Comorbidities like DM and HT did not yield significant differences in success rates. These findings contribute to the evolving understanding of how common comorbidities may impact thrombolysis outcomes, emphasising the need for tailored approaches in high-risk patient groups.<sup>[12,13]</sup> The highly significant association between coronary artery anatomy and thrombolysis outcomes underscores the importance of anatomical considerations.<sup>[14,15]</sup> The study categorised artery types and demonstrated varying success rates, with Normal and SVD patterns favouring successful thrombolysis. This finding directly impacts clinical decision-making and influences the choice of revascularisation strategies.

The strength of this study lies in its prospective design, which enabled the collection of real-time data and minimised recall bias. Including a diverse population from a tertiary care centre in Tamil Nadu enhances the generalisability of the findings to similar demographic settings. Additionally, meticulous data collection, including angiographic lesion characteristics, contributed to the comprehensive nature of our analysis.

In the context of existing evidence, this study provides valuable insights into the factors influencing thrombolysis outcomes in patients with ACS. The associations between age, coronary anatomy, and thrombolysis success directly affect individualised treatment strategies. Clinicians can use these findings to identify high-risk patient groups and tailor the reperfusion approaches accordingly. The implications of this study extend to health policy, emphasising the need for continued research to refine treatment guidelines and optimise patient care. The observed variations in thrombolysis success underscore the heterogeneity of ACS presentations, necessitating a nuanced and personalised management approach.

Although our study provides valuable insights, certain controversies and unanswered questions

persist. The lack of a significant sex difference in thrombolysis outcomes raises questions about the role of hormonal and physiological factors in treatment response. Further exploration of sex-specific nuances may uncover the subtleties not captured in the current analysis. Future research should investigate the mechanisms underlying age-related variations in thrombolytic outcomes. Longitudinal studies with extended follow-up periods can elucidate the sustained effect of thrombolysis on patient morbidity and mortality. Additionally, collaborative efforts across multiple centres can enhance the generalizability of findings and further validate the observed associations.<sup>[16]</sup>

Our study provides valuable insights into the coronary angiographic profile of patients with failed thrombolysis, shedding light on the factors influencing treatment outcomes. These findings have immediate clinical implications and guide personalised approaches to reperfusion therapy in patients with ACS. As the landscape of cardiovascular care evolves, further research in this domain will refine treatment strategies, improve patient outcomes, and inform future guidelines.

#### **Limitations**

However, certain limitations of this study warrant consideration. Although adequate for initial observations, the study's sample size may limit the generalisability of the findings to broader populations. Moreover, the single-centre nature of the study may introduce institutional biases, necessitating validation in multi-centre settings. The absence of long-term follow-up data limits our ability to assess the sustained effect of thrombolysis on patient outcomes.

## **CONCLUSION**

Our investigation provides insight into the coronary angiographic profile of patients who have experienced unsuccessful thrombolysis for ST-Segment Elevated Acute Coronary Syndrome. It is worth noting that age over 51 has emerged as a significant factor influencing treatment success. Although there were no statistically significant sex differences, our research highlights the necessity for further examination of sex-specific complexities. The success rates of cardiac conditions vary, emphasising the intricate nature of ACS presentations. Traditional assumptions are challenged, as comorbidities, such as diabetes mellitus and hypertension, do not significantly impact outcomes. The profound correlation between coronary artery anatomy and thrombolysis outcomes emphasises the importance of anatomical considerations. The strengths of our study include its prospective design and inclusion of a diverse population, which has implications for personalised treatment strategies and healthcare policies.

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