Vol 4 | Issue 4 | October - December | 2024

ORIGINAL ARTICLE

A CROSS-SECTIONAL STUDY ON THE CLINICAL PROFILE OF PATIENTS WITH SYMPTOMS OF ACUTE CORONARY SYNDROME (ACS) WHO RECEIVED LOADING DOSE AT PRIMARY CARE FACILITIES UNDER IDHAYAM KAPPOM THITTAM SCHEME IN TAMIL NADU, INDIA, 2024

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ABSTRACT

INTRODUCTION : Idhayam Kappom Thittam Scheme is a significant health initiative by Government of Tamil Nadu aimed at providing immediate cardiac care to patients at primary care facilities before referral to higher facilities in-order to prevent mortality due to acute cardiac illness. The study aims to evaluate the clinical outcomes of those patients with symptoms of Acute Coronary Syndrome receiving cardiac loading doses under the scheme. It also seeks to compare clinical outcomes based on time taken for administration of loading dose and time taken to reach higher centres.

METHODS : A secondary data analysis was conducted using data collected from all Health Unit Districts (HUDs) containing the line list of patients with symptoms of Acute Coronary Syndrome (ACS) including chest pain who were referred to higher centers from Primary Health Centers (PHCs) or Health Sub-centers (HSCs) after administration of cardiac loading dose. Data was coded and analyzed using Microsoft Excel and SPSS version 29.

RESULTS : The study analysed 6,493 patients, reporting that 97.7% of the patients remained alive and stable after referral following treatment with a cardiac loading dose at primary care facilities. Only 2.2% of the patients expired while 0.1% died along the route. The average time taken to administer the loading dose was 13.09 minutes, and the average time taken to reach a referral centre was 46.25 minutes. Also, arrival at referral centres within 60 minutes of acute chest pain was associated with higher survival. Other patients with comorbid conditions, including diabetes and coronary artery disease, had higher mortality rates.

CONCLUSION : This study affirms the effectiveness of early cardiac intervention at primary care centres under the Idhayam Kappom Thittam scheme. Giving a cardiac loading dose before referral significantly improved survival rates of patients, especially those who were taken to a facility with advanced care within the first 60 minutes, highlighting areas of success and identifying opportunities for improvement, contributing to the enhancement of more such programs and policies in Tamil Nadu and India.

KEYWORDS : Chest pain, Loading dose, Referral time, Myocardial infarction

INTRODUCTION

Cardiovascular diseases (CVDs), particularly Acute Myocardial Infarction (AMI), represent one of the leading causes of morbidity and mortality worldwide, with approximately 17.9 million deaths annually attributed to CVDs, according to the World Health Organization. Low- and middle-income countries bear a disproportionate share of this burden, accounting for over 75% of these deaths. India, in particular, faces a significant challenge, where ischemic heart disease, including acute Myocardial Infarction (MI), is a major contributor to mortality, with an estimated incidence rate of 64.37 per 100,000 people and only about 60% of patients receiving timely treatment.[2]

In developing countries, healthcare systems often face constraints in managing the growing prevalence of Non-Communicable Diseases (NCDs) such as CVDs due to limited resources and infrastructure.[2] Strengthening Primary Health Care (PHC) systems is crucial for both preventing and managing these diseases, as PHC services are essential for early detection, risk factor management, and providing long-term care.[2] However, in many developing countries, PHC facilities are ill-equipped to handle the rising burden of cardiovascular diseases, including MI, which increases the pressure on secondary and tertiary healthcare services.[3]

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One critical determinant of outcomes in MI cases is the time it takes for patients to seek medical attention. In developing countries, pre-hospital delays are often attributed to a combination of factors such as lack of awareness of symptoms, socio-economic barriers, and inadequate Emergency Medical Services (EMS).[4] Timely intervention is essential for improving survival rates in acute MI cases, as early treatment—such as the administration of thrombolytics or Percutaneous Coronary Intervention (PCI)—significantly reduces mortality6. The lack of well- organized EMS in many low-resource settings contributes to these delays, leading to poorer outcomes for patients.[5]

One proven early intervention for acute MI is the administration of a cardiac loading dose, i.e., the administration of aspirin, clopidogrel, and atorvastatin in the pre-hospital setting, which has been shown to reduce mortality and improve recovery outcomes.[7] Despite its efficacy, this simple intervention is not widely adopted in many low- and middle-income countries due to gaps in training, awareness, and access to emergency care.[7]

Government of Tamil Nadu had launched an initiative of providing the cardiac loading doses at Primary Health Centers (PHCs)/ Health sub-centers (HSCs) called "Idhayam Kaapom Thittam" program to prevent deaths caused by cardiac illness. The program was launched on June 27, 2023. Patients reporting to the Primary Health Centers PHCs or HSCs with symptoms of acute coronary syndrome will be referred for ECG service, followed by telephonic consultation with the district nodal cardiologist. Following the telephonic consultation, emergency cardiac loading dose drugs containing Aspirin 150mg - 2 tablets, Clopidogrel 75mg - 4 tablets, and Atorvastatin 10mg - 8 tablets, a total of 14 tablets will be provided and the patient will be referred to secondary/tertiary care facilities for further management.[1]

This study aims to evaluate the outcomes of patients who had presented with chest pain and received cardiac loading doses at Primary Health Centers (PHCs) and Health sub-centers (HSCs) under the Idhayam Kappom Thittam Scheme in Tamil Nadu. By targeting early interventions at the PHC level and enhancing public awareness of the importance of timely treatment, the management of acute MI in resource-limited settings can be significantly improved, reducing mortality and alleviating the burden on healthcare systems. The primary objective of this study is to evaluate the clinical outcomes of patients with chest pain who have received cardiac loading doses at PHCs or HSCs before referral to higher centres under the Idhayam Kappom Thittam Scheme in Tamil Nadu between June 2023 and August 2024.

METHODS

This is a cross-sectional study with secondary data analysis of the Idhayam Kappom Thittam program. The data included in this study were the individuals reported with symptoms of Acute Coronary Syndrome (ACS) including chest pain from June 2023 to August 2024 at Primary health centers and Health sub-centers. Permission to conduct this study was obtained from the Directorate of Public Health and Preventive Medicine (DPH&PM), Tamil Nadu. The variables include age, gender, address, co- morbidities, date of reporting of symptoms, details of administration of the cardiac loading dose, referral and investigations like Echo Cardiogram, followed by the patient outcome. Of 9,108 data that was collected, 2615 data were incomplete and were excluded, retaining 6493 data for analysis. All patient data were anonymized to ensure confidentiality. The data were systematically coded and entered into Microsoft Excel. Statistical analysis was performed using SPSS software, version 29. Continuous variables were represented as medians with interquartile ranges (IQR) and categorical variables were presented as frequencies and percentages. Descriptive statistics were used to outline patient demographics and clinical characteristics. Chi-Square test was used to identify associations between co-morbidities, time of arrival at the referral institute, and patient outcomes.

Operational definitions: (1) Time to administer cardiac loading dose: The time taken from the arrival of the patient with symptoms of Acute Coronary Syndrome like acute chest pain to the Primary Health Centers and Health Sub-centers to the administration of the cardiac loading dose. **(2) Time taken to reach the referral institute:** The time taken for the patient to be transferred from the Primary Health Centers and Health Sub-centers to a secondary or tertiary care facility after receiving the cardiac loading dose. **(3) Alive and stable:** Patients who, after being referred to and treated at secondary or tertiary care facilities (either medically or surgically), are now stable and either discharged or under follow-up care. **(4) Expired:** Patients who died after referral and treatment at secondary or tertiary care facilities. **(5) Expired during transit:** Patients who died during transport from the primary care facility to the secondary or tertiary care facility while being referred.

RESULTS

The age and gender distribution of the 6,493 study participants is given in Figure 1. Of the total 6,493 participants, 3,287(50.6%) are within the 45-60 years age group, followed by 2073(32%) over 60 years and 4,248(65.4%) are males.

Figure 2 depicts the distribution of patients with acute chest pain who received cardiac loading doses at PHCs or HSCs, by Health Unit District (HUD).

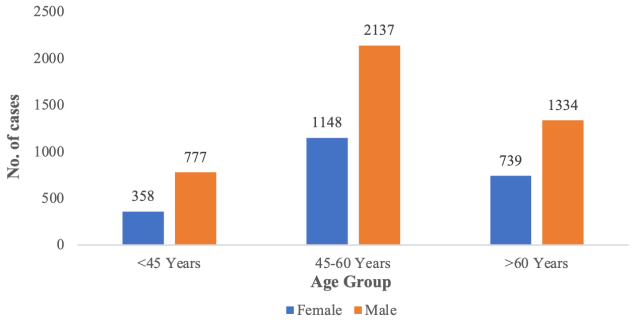

Figure 1. Age and gender-wise distribution of the individuals with Acute Coronary Syndrome (ACS) who received cardiac loading doses at PHCs and HSCs, Tamil Nadu, June 2023 and August 2024 (N=6493)

The clinical characteristics like co-morbidities, symptoms at presentation, diagnosis, and patient outcomes of the study participants are given in Table 1. 2829(43.6%) participants had hypertension and (1396)21.5% of the participants had diabetes. Among the symptoms presented, chest pain was reported by 4964(76.5%) participants followed by palpitations in 708(10.9%). Of the 6,493 individuals who had received cardiac loading dose and referred to higher facilities, 5846(90%) were diagnosed with myocardial infarction while 647(10%) had gastritis. About 97.7% of the patients were alive and stable, 2.2% had died, and a minuscule number of 0.1%, died during transit.

Table 1. Distribution of study participants according to co-morbidities, presenting symptoms, diagnosis and patient outcomes (N=6493), Tamil Nadu, June 2023 and August 2024 (N=6493)

Variables			Frequency (N=6493)	Percentage (%)
1. Hypertension with duration	Present	<1 year	609	9.38
		1-5 years	1491	22.96
		5-10 years	602	9.27
		>10 years	127	1.96
		Total	2829	43.57
	Absent		3664	56.43
2. Diabetes mellitus with duration	Present	<1 year	327	5.04
		1-5 years	653	10.05
		5-10 years	360	5.55
		>10 years	56	0.86
		Total	1396	21.5
	Absent		5097	78.5
3. Symptoms	Chest pain		4964	76.5
	Pain radiating to neck/jaw/arm/shoulder		428	6.6
	Palpitations		708	10.9
	Sweating		306	4.7
	Fatigue		87	1.3
4. Diagnosis at secondary & Tertiary care facilities	Myocardial infarction		5846	90
	Gastritis		647	10
5.Patient outcomes	Alive and stable		6346	97.7
	Expired		143	2.2
	Expired during transit		4	0.1
6. Previous H/O CAD	Present		266	4.1
	Absent		6227	95.9

The time taken to administer the loading dose varied from 5 to 50 minutes with a median (IQR) of 10(5) minutes and the time to reach the referral institute varied from 15 to 90 minutes with a median (IQR) of 45(30) and shown in Table 2

Table 2: Time taken to administer loading dose and time taken to reach referral centres among the individuals with Acute Coronary Syndrome (ACS) who received cardiac loading doses at PHCs and HSCs, Tamil Nadu, June

Variable	Minimum time (in minutes)	Maximum time (in minutes)	Median (IQR)
Time taken to administer loading dose	5	50	10(5)
Time taken to reach referral institute	15	90	45(30)

Table 3 depicts the associations between patient outcomes and comorbidities like diabetes mellitus, duration of diabetes, history of CAD, and time taken to reach the referral institute. Diabetic patients had a mortality of 3.2% versus non-diabetic patients who accounted for 1.9%, and the difference was statistically significant ($p = 0.009$). Patients who had diabetes for more than 10 years had a mortality of 12.5%, while those who had diabetes for less than one year had a mortality of only 1.8% ($p < 0.001$). A previous history of CAD was associated with considerably higher mortality of 6.4% compared to patients who did not have a previous history of CAD, whose mortality rate was 2%. The other critical factor was the time to reach the referral institute; patients who came within 60 minutes had a better survival rate than those delayed by more than 60 minutes with a mortality rate of 6.1 % ($p < 0.001$).

Table 3. Association between co-morbidities, time taken to reach referral institute and patient outcomes among the individuals with Acute Coronary Syndrome (ACS) who received cardiac loading doses at PHCs and HSCs, Tamil Nadu, June 2023 and August 2024 (N=6493)

Variables		Alive and stable n (%)	Expired n (%)	Total n (%)	Chi square (p value)
Diabetes mellitus	Present	1350 (96.7)	46 (3.3)	1396 (100)	**0.009**
	Absent	4996 (98)	101 (2)	5097 (100)	
Duration of diabetes mellitus	<1 year	321 (98.2)	6 (1.8)	327(100)	**<0.001**
	1-5 years	633 (96.9)	20 (3.1)	653(100)	
	5-10 years	347 (96.4)	13 (3.6)	360(100)	
	>10 years	49 (87.5)	7 (12.5)	56(100)	
Previous H/O CAD	Present	249 (93.6)	17 (6.4)	266(100)	**<0.001**
	Absent	6097 (97.9)	130 (2.1)	6227(100)	
Time taken to reach the referral institute	<60 minutes	5014 (98.8)	60 (1.2)	5074(100)	**<0.001**
	>60 minutes	1332 (93.9)	87 (6.1)	1419 (100)	

(p-value <0.05 is considered statistically significant)

DISCUSSION

This study puts forward the importance of early interventions for acute MI, where facilities are limited. The "Idhyam Kappom Thittam" scheme involves the delivery of cardiac loading dose to patients presenting with acute chest pain or other symptoms of ACS at PHCs or HSCs before referring them to higher centres and has very optimistic results for outcomes. This is very essential as CVDs, especially acute myocardial infarction, is one of the leading causes of death worldwide, responsible for approximately 17.9 million deaths per year, most of which take place in low and middle-income countries.[1]

The cardiac loading dose intervention of administering aspirin, clopidogrel, and atorvastatin has already been shown to decrease mortality and increase recovery rates in acute coronary syndromes.[6,7] The results are consistent with earlier studies that postulated early administration of antiplatelet drugs like aspirin and clopidogrel would obtain a marked improvement in outcomes with patients by reducing the formation of thrombus and limiting myocardial damage.[7] This prehospital intervention is highly critical for efficacy in the setting where access to facilities with advanced healthcare is limited and often is in an underdeveloped state.[6]

Demographics data of the study population indicates that most of the patients were males and aged between 45 to 60 years old. This follows the epidemiological trends globally whereby, men who are into the middle ages form the most common demographic group to suffer acute coronary syndromes than women.[3] Other comorbidities established included hypertension at 43.6% and diabetes at 21.5%. These are well documented to be the risk factors for CVDs including MI, and these impose appreciable risk of adverse outcomes during coronary events.[8] The results that the mortality rate among diabetics (3.2%) was higher than among nondiabetics (1.9%) align with other studies, which have shown that diabetes mellitus worsens the severity of coronary artery disease and impacts survival adversely following MI.[2]

The study also draws attention to the "golden hour" in managing acute MI. The average time taken for the cardiac loading dose was 13.09 minutes, and that taken to transfer the patients to a secondary or tertiary care centre was 46.25 minutes. Such results are of importance because arrival at the referral institute within 60 minutes of ischemia marked a drastically higher survival rate among the affected patients than those who were delayed.[5] Similar findings about delayed treatment beyond the first hour have been seen in previous studies where delays can potentially increase mortality in patients with acute coronary syndrome.[4] All this points to rapid transport with immediate intervention and properly coordinated emergency medical services in rural and semi-urban areas.

Another very important point from the study was the relationship between comorbidities and patient outcomes. It revealed that the patients were exposed to higher levels of mortality. Known diabetics had a significantly higher mortality rate compared to patients who did not have diabetes. Similarly, people with CAD also had a higher death rate. This is in congruence with some published articles as it tends to describe the major risks from both diabetes and CAD in posing a threat for adverse outcomes in acute MI.[8,6] Though this study found no statistically significant association between hypertension and patient outcomes, it is possible that many patients with hypertension were already diagnosed and receiving appropriate treatment, which may have helped reduce its impact on acute MI outcomes.

LIMITATIONS

Outcomes were assessed only during the short period since referral; survival and recurrence of MI events were not observed. Further experiments on a well-designed study and follow-up observations over a longer period may provide an opportunity to understand the scheme's long-term effectiveness.

CONCLUSION

This study affirms the usefulness of early cardiac intervention at primary care centres under the Idhayam Kappom Thittam scheme. Giving a cardiac loading dose before referral significantly improved survival rates of patients, especially those who were taken to a facility with advanced care within the first 60 minutes after arrival. The scheme fills the vacant space concerning emergency care in resource-poor settings as it allows for timely intervention that can minimize myocardial infarction-related deaths.

It stresses the importance of treating acute heart conditions together with other co-morbid conditions such as diabetes and CAD to improve the outcome.

CONFLICT OF INTEREST

None

REFERENCES

1. Thiagarajan P, Jeevagan A, Viswanathan V. Idhayam K A Apom Thittam (Ikt) – A Government Of Tamilnadu Initiative

To Prevent Death Due To Cardiac Illness - A Descriptive Study. 2024;4(2).

2. Haque M, Islam T, Rahman NAA, McKimm J, Abdullah A, Dhingra S. Strengthening Primary Health-Care Services to Help Prevent and Control Long-Term (Chronic) Non-Communicable Diseases in Low- and Middle-Income Countries. RMHP. 2020 May;Volume 13:409–26.

3. Chandrashekhar Y, Alexander T, Mullasari A, Kumbhani DJ, Alam S, Alexanderson E, et al. Resource and Infrastructure-Appropriate Management of ST-Segment Elevation Myocardial Infarction in Low- and Middle-Income Countries. Circulation. 2020 Jun 16;141(24):2004–25.

4. Chowdhury IZ, Amin MdN, Chowdhury MZ, Rahman SM, Ahmed M, Cader FA. Pre hospital delay and its associated factors in acute myocardial infarction in a developing country. Nakamura M, editor. PLoS ONE. 2021 Nov 24;16(11):e0259979.

5. Frampton J, Devries JT, Welch TD, Gersh BJ. Modern Management of ST-Segment Elevation Myocardial Infarction. Current Problems in Cardiology. 2020 Mar;45(3):100393.

6. Ramanujam P, Aschkenasy M. Identifying the Need for Pre-hospital and Emergency Care in the Developing World : A Case Study in Chennai, India. 2007;55.

7. Djarv T, Swain JM, Chang WT, Zideman DA, Singletary E. Early or First Aid Administration Versus Late or In-hospital Administration of Aspirin for Non-traumatic Adult Chest Pain: A Systematic Review. Cureus [Internet]. 2020 Feb 3 [cited 2024 Sep 11]; Available from: https://www.cureus.com/articles/26253-early-or-first-aid-administration-versus-late-or-in-hospital-administration-of-aspirin-for-non-traumatic-adult-chest-pain-a-systematic-review

8. Dalal JJ, Almahmeed W, Krittayaphong R, Nicholls SJ, Soomro K, Yeo KK, et al. Consensus Recommendations of the Asia Pacific Cardiometabolic Consortium on Secondary Prevention Strategies in Myocardial Infarction: Recommendations on Pharmacotherapy, Lifestyle Modification and Cardiac Rehabilitation. J Asian Pac Soc Cardiol. 2023 Jan 20;2:e01.

9. Sidhu NS, Rangaiah SKK, Ramesh D, Veerappa K, Manjunath CN. Clinical Characteristics, Management Strategies, and In-Hospital Outcomes of Acute Coronary Syndrome in a Low Socioeconomic Status Cohort: An Observational Study From Urban India. Clin Med Insights Cardiol. 2020 Jan;14:117954682091889.

10. Pakhare A, Kumar S, Goyal S, Joshi R. Assessment of primary care facilities for cardiovascular disease preparedness in Madhya Pradesh, India. BMC Health Serv Res. 2015 Jun;15(1):408.

11. Sinha PK, Zubair N, Kumar K. A single centre study of clinico-epidemiologic profile, course during treatment and outcome in patients presenting with ST-elevationmyocardial infarction at A.N.M.M.C.H. Gaya, Bihar. Journal of Cardiovascular Disease Research. 2022;(01).