Biological and Clinical Sciences Research Journal
eISSN: 2708-2261; pISSN: 2958-4728
www.bcsrj.com
DOI: https://doi.org/10.54112/bcsrj.v6i6.2291
*Biol. Clin. Sci. Res. J., Volume 6(6), **2025**: 2291*
Original Research Article

Frequency of Acute Ischemic Mitral Regurgitation Among Patients of Acute Inferior ST-Elevation Myocardial Infarction Presenting at Tertiary Care Hospital

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(Received, 28th April 2025, Accepted 8th May 2025, Published 30th June 2025)

Abstract: *Acute ischemic mitral regurgitation is an important mechanical complication of acute myocardial infarction and may worsen hemodynamic status and clinical outcomes. Inferior wall ST-elevation myocardial infarction may particularly affect papillary muscle function, increasing the risk of mitral regurgitation.* ***Objective:*** *To determine the frequency of acute ischemic mitral regurgitation (IMR) among patients of acute inferior ST- elevation myocardial infarction (IW- STEMI) presenting at tertiary care hospital.* ***Methods:*** *This study enrolled 124 patients who were older than 18 years, both male and female, presenting with acute inferior ST-elevation myocardial infarction in the Department of Cardiology, Lady Reading Hospital, Peshawar from 26-January-2025 to 26-April 2025. Those with previous mixed valvular heart disease, pre-existing mitral regurgitation and congenital heart disease were excluded. After standard treatment patients underwent transthoracic echocardiography. Ischemic mitral regurgitation was diagnosed by the presence of reverse flow across the mitral valve. Data was analyzed using SPSS 20.* ***Results:*** *The mean age of 124 patients in the current study was 56.56±10.48 years. Males were 83 (66.9%). Acute ischemic mitral regurgitation was diagnosed in 23 (18.5%) patients. Mild severity of IMR was observed in 15 (65.2%) cases, moderate in 6 (26.1%) and severe in 2 (8.7%) cases. Male gender showed a significant association with IMR (p=0.024).* ***Conclusion:*** *The frequency of acute ischemic mitral regurgitation (IMR) among patients of acute inferior ST- elevation myocardial infarction (IW-STEMI) was 18.5%, majority of the patients had mild IMR 65.2%. Male gender was significantly associated with IMR.*

Keywords: Ischemic mitral regurgitation, inferior wall myocardial infarction, ST-elevation myocardial infarction, echocardiography, vena contracta

[***How to Cite:*** Ullah K, Iqbal MA, Rehmat I, Ullah SF, Shehreyar U, Sami H, Ahmad S. Frequency of acute ischemic mitral regurgitation among patients of acute inferior st-elevation myocardial infarction presenting at tertiary care hospital. *Biol. Clin. Sci. Res. J.*, **2025;** 6(6): 763-765. doi: https://doi.org/10.54112/bcsrj.v6i6.2291

Introduction

Acute coronary syndrome (ACS) is key contributor to cardiovascular adverse outcomes globally regardless of advances within the revascularisation strategies. Among diverse clinical forms of ACS, ST-elevation myocardial infarction (STEMI) is linked to higher risk of complications when the diagnosis or reperfusion is delayed.(1,2) Inferior wall STEMI generally results from the occlusion of right coronary artery and may involve the structures supplying papillary muscles predisposing the patients to acute ischaemic mitral regurgitation (MR) and mitral valve dysfunction. Acute ischaemic MR is recognised as a serious mechanical complication that can worsen clinical outcomes via pulmonary oedema and progressive heart failure if not recognized and managed early.(2,3)
MR occurring following the MI develops due to the papillary muscle ischaemia, left ventricular remodelling or tethering of mitral valve leaflets. Inferior STEMI is associated with the posteromedial papillary muscle dysfunction as this papillary muscle typically receives blood supply from the single coronary artery.(2-4) Acute ischaemic MR may manifest with the subtle clinical signs during early phase of infarction by making the echocardiographic evaluation crucial for timely diagnosis and severity grading. It has been observed that ischaemic MR persistently associated with the adverse outcomes even in the era of primary PCI. MR following the acute MI was independently related to increased mortality and worse ventricular function in patients with coronary intervention.(3-7) Ischaemic MR after STEMI remained associated to worse prognosis regardless of improvements within the reperfusion therapy over last two decades.(8-10) Such findings propose that ischaemic MR remains to represent the clinically significant complication necessitating the early recognition. Pathophysiological process is dynamic and may evolve during the first few days after the infarction due to advanced myocardial stunning and ventricular remodelling.(10,11)

This present study aims to determine the frequency of acute ischaemic MR among the patients presenting with acute inferior STEMI. Identification of this complication at an early stage may improve clinical decision making, optimise management strategies and minimize the risk of heart failure, cardiogenic shock and mortality related to acute MI.

Methodology

This descriptive study was conducted in the Department of Cardiology, Lady Reading Hospital, Peshawar from 26-January-2025 to 26-April 2025, after taking ethical approval from the hospital. The study sample size was 124, which was calculated using WHO sample size calculator software with following parameters; confidence interval 95%, absolute precision 6% and Anticipated frequency of acute IMR among patients of acute ST- elevation IWMI 13.3%.(8) Non-probability sampling technique was used.
Patients older than 18 years, of either gender with acute ST- elevation IWMI were included in the study. Acute ST- elevation inferior wall myocardial infarction (IWMI) was defined as presence of severe, central chest pain that is less than 24 hours duration and is not resolved by sublingual nitrate that will be diagnosed by presence of ST- segment elevation of >1mm on ECG and raised troponin- I level (>0.05ng/ml). Patients having previous history of mixed valvular heart disease, pre-existing MR and CHD were excluded.
All the patients gave their written consent to participate in the study. Baseline characteristics including age, gender, smoking status, history of diabetes, history of hypertension, monthly income, area of residence and family history of heart disease were documented. Patient were given treatment for acute ST-elevation IWMI as per standard protocol, patients were admitted in CCU. After 24 hours of CCU admission patients had transthoracic echocardiography that was performed by a consultant

cardiologist having minimum 2 years of experience to diagnose IMR and its severity. Ischemic mitral regurgitation (IMR) was diagnosed by presence of reverse flow across mitral valve using transthoracic echocardiography, it was classified into: Mild = vena contracta width of < 0.3cm, Moderate = vena contracta width 0.3 - 0.69cm, Severe = vena contracta width 0.7cm or more. Patient anonymity and confidentiality was maintained with utmost priority. No personal identifiers such as "patient name or contact details" was included in documentation.

Data analysis was performed using SPSS version 20. The numeric variables (age) was presented as mean ± standard deviation (SD) while frequency and percentages were used for categorical variables (gender, smoking status, history of diabetes, history of hypertension, monthly income, area of residence, family history of heart disease, presence of IMR and severity of IMR). Frequency of IMR was stratified by age, gender, smoking history, history of diabetes and history of hypertension to deal with effect modifiers. Post-stratification chi-square test was used A p-value of ≤ 0.05 was considered as statistically significant.

Results

A total of 124 patients were included in this study. The mean age of these patients was 56.56 years with a standard deviation of 10.48 years. When looking at the gender distribution there were 83 (66.9%) male and 41 (33.1%) female patients (Table 1).

In this study 30 (24.2%) patients were smokers. A history of diabetes was present in 47 (37.9%) patients. Hypertension was present in 43 (34.7%) patients, and family history of disease was reported by 18 (14.5%) patients.

The frequency of acute ischemic mitral regurgitation in the present study was 23 (18.5%) Mild regurgitation was seen in 15 (65.2%) patients. Moderate regurgitation was present in 6 (26.1%) patients. Severe regurgitation was found in only 2 (8.7%) (Table 2).

Gender showed a significant association with Presence of Acute ischemic mitral regurgitation. Among the 23 patients with Presence of Acute ischemic mitral regurgitation 20 (87.0%) were male and only 3 (13.0%) were women (p = 0.024) (table 3)

Table 1: Demographic profile of the patients

Demographics		Frequency	Percentage
Gender	Male	83	66.9%
	Female	41	33.1%
Residence	Rural	55	44.4%
	Urban	69	55.6%
Monthly income	< 80K /Month	80	64.5%
	>= 80K /Month	44	35.5%

Table 2: Frequency and severity of Acute ischemic mitral regurgitation

Presence of Acute ischemic mitral regurgitation & Severity		Frequency	Percentage
Presence of Acute ischemic mitral regurgitation	Yes	23	18.5%
	No	101	81.5%
Severity of Acute ischemic mitral regurgitation	Mild	15	65.2%
	Moderate	6	26.1%
	Severe	2	8.7%

Table 3: Stratification of Presence of Acute ischemic mitral regurgitation with demographics and comorbidities

Variables		Presence of Presence of Acute ischemic mitral regurgitation				p value
		Yes		No		
		n	%	n	%	
Age distribution (Years)	< = 45	1	4.3%	12	11.9%	0.287
	> 45	22	95.7%	89	88.1%	
Gender	Male	20	87.0%	63	62.4%	0.024
	Female	3	13.0%	38	37.6%	
Smoking	Yes	8	34.8%	22	21.8%	0.189
	No	15	65.2%	79	78.2%	
History of diabetes	Yes	10	43.5%	37	36.6%	0.541
	No	13	56.5%	64	63.4%	
History of hypertension	Yes	8	34.8%	35	34.7%	0.991
	No	15	65.2%	66	65.3%	

Discussion

The present study was conducted to determine the frequency of acute ischemic mitral regurgitation among patients presenting with acute inferior ST-elevation myocardial infarction. The main finding of this study was that 18.5% of patients had acute ischemic mitral regurgitation. Among these mild regurgitation was the most common, which was seen in 65.2% of patients. Moderate and severe regurgitation were found in 26.1% and 8.7% of cases respectively.

A study from Peshawar reported a 29.4% prevalence of mitral regurgitation in STEMI patients.(12) Another study from Peshawar found a much lower frequency of only 5%.(13) The present study's finding of 18.5% sits between these two studies.

An Iranian study reported that 45% of first-time STEMI patients had ischemic mitral regurgitation with anterolateral wall involvement being the most common territory rather than inferior wall.(14) That study also found that 70% of cases were mild which aligns with the 65.2% observed in the present study. The similarity in mild disease prevalence across different populations suggests that the distribution of severity may follow a consistent pattern regardless of infarct location. A study on NSTEMI patients from Karachi reported a much higher frequency of 57.3%.(15)

The present study found no significant association between acute ischemic mitral regurgitation and most comorbidities such as smoking, hypertension and diabetes mellitus. Age older than 45 years was present in 95.7% of those with acute ischemic mitral regurgitation but this did not reach statistical significance. Smoking diabetes hypertension and family

history of disease all showed non-significance with acute ischemic mitral regurgitation. The only factor that was significant was male gender. Male made up 87.0% of the group with acute ischemic mitral regurgitation.

The lack of association with diabetes and hypertension in this study is in agreement with the findings by Jawaid et al. which also reported no significant links with these comorbidities. Ullah R et al. however did find that hypertension and Killip class greater than two were significantly associated with mitral regurgitation.(12) That study also reported a much higher in-hospital mortality rate of 29.8% with 64.7% of deaths occurring in patients who had mitral regurgitation.

The findings of this study have several practical implications. Acute ischemic mitral regurgitation is not rare in inferior wall STEMI. Clinicians should maintain a low threshold for performing echocardiography in these patients even when the presentation seems uncomplicated. The majority of cases in this study were mild but mild does not mean benign. Patients with even mild regurgitation require close follow-up and optimal medical management including beta-blockers, angiotensin-converting enzyme inhibitors and guideline-directed therapy for heart failure. The significant association with male gender suggests that men presenting with inferior STEMI may represent a higher-risk subgroup deserving particular attention.

Conclusion

From the present study, it is conclude that the frequency of acute ischemic mitral regurgitation (IMR) among patients of acute inferior ST- elevation myocardial infarction (IW- STEMI) was 18.5%, majority of the patients had mild IMR 65.2%. Male gender was significantly associated with IMR.

Declarations

Data Availability statement
All data generated or analysed during the study are included in the manuscript.
Ethics approval and consent to participate
Approved by the department concerned. (309/LRH/MTI)
Consent for publication
Approved
Funding
Not applicable

Conflict of interest

The authors declared the absence of a conflict of interest.

Author Contribution

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Manuscript drafting, Data Collection, Study Design,
MAI (Associate Professor)
Review of Literature, Data entry, Data analysis, and drafting articles.
IR (Postgraduate Resident)
Conception of Study, Development of Research Methodology Design,
SFU (Postgraduate Resident)
Study Design, manuscript review, critical input.
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Conception of Study, Development of Research Methodology Design,

All authors reviewed the results and approved the final version of the manuscript. They are also accountable for the integrity of the study.

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