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Frequency of Mitral Regurgitation after Acute St-Elevation Myocardial Infarction in Patients Presenting at Lady Reading Hospital

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ABSTRACT

Background: Ischemic mitral regurgitation (IMR) has become a well-known but severe side effect that occurs after acute ST-level span myocardial infarction (STEMI), causing a rise in morbidity levels and poor prognosis. Regardless of the improvement of reperfusion treatment techniques, a considerable proportion of affected patients still develops IMR because of the alteration of left ventricular geometry and abnormalities in local wall motion caused by the ischemia. In this study, the authors sought to establish the prevalence rate of IMR among patients admitted with acute STEMI to lady reading Hospital, Peshawar. Procedures: The study was conducted on a cross-sectional basis in the cardiology Department of Lady Reading Hospital. There were 185 consecutive patients without probability sampling aged between 30 to 75 years with confirmed acute STEMI who were enrolled. Patients with previous mitral regurgitation, rheumatic heart disease, repeated MI, and pregnancy were not included. IT was characterized by means of transthoracic echocardiography with normal morphology of the mitral valve and regional wall movements as a complication of coronary artery disease. The SPSS version 25 was used to analyze data. Relationships with clinical variables were measured using stratification and chi-square testing. Results: Among 185 patients, 70 patients (37.8%) encountered the development of ischemic mitral regurgitation. IMR had significant association with older age of age 60 years and above (p=0.019), female gender (p=0.041), BMI of 25kg/m2 and above (p=0.032), hypertension (p=0.008), and diabetes mellitus (p=0.003). They were not significantly associated with smoking, socioeconomic status or residence. Closure: IMR is a common complication associated with STEMI especially in the older, hypertensive, diabetic, and overweight population. An immediate heart ultrasound assessment and selective treatment of risk factors are needed to enhance the prognosis of STEMI patients.

INTRODUCTION

The prognosis of ischemic mitral regurgitation is worse following an elevated ST-segment myocardial infarction (Ye et al., 2025; Sharma et al., 2022). In both cases, even in situations when mild ischemic mitral regurgitation occurs, the outcome is still poor and gets worse as the problem develops (Nappi, 2024; Tesic et al., 2023). A poor prognosis is indicated by an early incident of ischemic mitral regurgitation after an elevated ST segment myocardial infarction (Ye et al., 2025; Liang & Zhang, 2023). Previously affected patients with a ST segment elevated myocardial infarction usually develop the condition once more (Anghel et al., 2022; Trimarchi et al., 2024). Ischemic mitral regurgitation is a commonly presented mechanical sequelae following a myocardial infarction, and its incidence has been estimated between 20-50% (Murphy & Goldberg, 2022; Boudoulas et al., 2023). Reduced blood flow after a heart attack can create a moderate degree of mitral regurgitation as well (Heusch, 2022; Huang et al., 2023).

In other instances, this regurgitation can be fully alleviated. Ischemic mitral regurgitation is often linked to a myocardial infarction and ischemia of the left ventricle, which offers mechanical and corpuscular support to the mitral valve (Kumar et al., 2022; Huang et al., 2023). The time of returning the blood flow has a significant impact on the extent of myocardial necrosis, on the preservation of the left ventricular functionality, as well as on the prevention of the left ventricular remodeling (Leancă et al., 2022; He et al., 2025). The outcome between the disease severity of ischemic mitral regurgitation and cardiac functionality has been established (Malagoli et al., 2022; Simpson et al., 2022). Myocardium that is viable in the context of myocardial infarction is detected in patients, which inhibits or exacerbates mitral regurgitation and minimizes left ventricular remodeling (Falcão-Pires et al., 2024; Babes et al., 2022). It has been confirmed that administering thrombolysis at the first occurrence of

increasing the ST segment in the case of myocardial infarction significantly decreases the incidence of severe ischemic mitral regurgitation and regional left ventricular remodeling (Bansal et al., 2024; Beyls et al., 2024).

The study indicated a relationship between acute ischemic mitral regurgitation as a result of a heart attack with ST-segment-elevation, other mechanical complications, like ventricular septum rupture, and papillary muscle injury (Venkatram, 2024; Moras et al., 2024). One study showed that incidence of mitral regurgitation post acute ST-elevation myocardial infarction was 37.9%.

Dysfunction or rupture of those structures may occur in the acute ischemic event, causing the insufficient closing of the mitral valve, which triggers the retrograde blood flow movement to the left atrium carried by the left ventricle (Nagele and Flammer, 2022; Geisser and Singh, 2025). Since such specific literature is unavailable in this region regarding this topic, the aim of this research will be to find the prevalence of ischemic mitral regurgitation in patients who present with acute ST-elevation myocardial infarction in lady reading hospital, Peshawar. The outcome of the study is going to be useful to our health care providers in terms of early diagnosis and treatment of ischemic mitral regurgitation which is important to improve patient prognosis and prevent the negative impact of STEMI in cardiac performance.

The aim of the current research is to find out the prevalence of mitral regurgitation after acute ST-elevation myocardial infarction (STEMI) among patients presenting in Lady Reading Hospital. Here, one must distinguish acute STEMI which is characterized by chest pain (Visual Analog Scale >3), possibly in the left arm, jaw, or back, and diagnosis of which is confirmed by electrocardiographic evidence of ST-segment elevation of at least 1 mm (0.1 mV) in leads V2-V3 and 2mm (0.2 mV) in other adjacent leads, measured with respect to the baseline and J-point. Mitral regurgitation is viewed as the causes of patients who present with dyspnea, fatigue, and peripheral edema, and diagnosis is established through the echocardiography that demonstrates normal morphology of the leaflet as well as chords and one or more regional wall motion anomalies, the existence of a significant coronary artery disease to the relevant myocardial territory.

MATERIAL AND METHODS

It is a cross-sectional study that was carried out in the department of cardiology lady reading hospital, Peshawar, from 21st December 2024 to 21st May 2025. The purpose of the study was to clarify the prevalence and clinical correlations of ischemic mitral regurgitation (IMR) in patients with acute ST-segment-elevation myocardial infarction (STEMI).

There were 185 participants in this research. The size of the sample was determined based on the WHO sample size calculator where the prevalence of ischemic mitral regurgitation after STEMI was assumed to be 37.9%, the confidence level was 95%, and the level of error was 7%. Sequential non-probability sampling was used to sample eligible patients.

Inclusion Criteria

- Male and female patients aged between 30 and 75 years
- Diagnosed cases of acute ST-elevation myocardial infarction, as per operational definitions

Exclusion Criteria

- Patients with recurrent myocardial infarction
- Known cases of rheumatic heart disease
- Pregnant patients
- Patients with pre-existing mitral regurgitation

Availability of Ethical Clearance was prior to the study which was obtained through the Institutional review board of Lady reading hospital, and research and training monitoring cell (RTMC) of the College of physicians and surgeons Pakistan (CPSP). All the patients fulfilling the inclusion criteria were proposed to take part in the research and the latter was achieved under the necessity of written informed consent after a proper explanation of the purpose of the research, a potential benefit and harm of participation.

All the patients were evaluated through a pre-designed proforma. Demographic and clinical information such as age, sex, BMI, profession, education, social economic status, and residential history was noted. There was a history of diabetes, hypertension, and smoking. Index acute STEMI was proved in accordance with clinical findings and ECG. Transthoracic echocardiography confirmed the diagnosis of IMR due to the presence of normal mitral valve leaflets and chordal morphology and regional wall motion abnormality consistent with severe coronary artery disease involving the corresponding myocardial territory. Every echocardiographic was conducted in the presence of a consultant cardiologist whose experience in practice was a minimum of five years after fellowship.

Data were entered and analyzed using the IBM SPSS Statistics version 25. A normality test on the numerical variables was done using Shapiro-Wilk test. Continuous measures of age, height, weight and BMI were summarized as the mean standard deviation (SD) of the measure or the median and interquartile range (IQR) of the measure. Categorical variables including gender, ischemic mitral regurgitation, diabetes status, hypertension, smoking status, occupation, education level, social economic status and population of the place of living were represented in terms of frequency and percent. The effect modifiers were controlled by stratification. In the post-stratification comparisons Chi-squared test or Fisher exact test (where required) was applied and a p-value of 0.05 or less was considered as statistically significant. In order to make it easier to interpret results were presented in a form of the tables.

RESULTS

Of the 185 patients with acute ST-elevation myocardial infarction (STEMI), we studied their conditions. The average age of the respondents was 57.3 +/- 10.2 years. The number of male patients amounted to 122(65.9%), whereas the number of female patients was 63 (34.1%). The average BMI equaled 27.6 +/- 4.1 kg/m 2. Comorbidities were common: 102 (55.1%) had hypertension, 94 (50.8) had diabetes, and 88 (47.6) were smoking.

The prevalence of ischemic mitral regurgitation (IMR) was found in 70 patients out of 185 and composed of 37.8%.
The stratified analysis depicted significant relationship between the IMR and the age group (p=0.019), gender (p=0.041), BMI category (p=0.032), hypertension (p=0. 008), diabetes (p=0.003). There has been no meaningful correlation between IMR and smoking habit, education level, level of socioeconomic status, occupation, and house of residence.

Table 1
Baseline Characteristics of Study Population (n = 185)

Variable	Mean ± SD / n (%)
Age (years)	57.3 ± 10.2
Gender	
– Male	122 (65.9%)
– Female	63 (34.1%)
BMI (kg/m^2)	27.6 ± 4.1
Hypertension	102 (55.1%)
Diabetes Mellitus	94 (50.8%)
Smoking Status	88 (47.6%)
Educational Level (≤Secondary)	113 (61.1%)
Occupation (Unemployed/Retired)	79 (42.7%)
Socioeconomic Status (Low)	106 (57.3%)
Urban Residence	121 (65.4%)

Table 2
Frequency of Ischemic Mitral Regurgitation (IMR) in Patients with STEMI

Variable	n (%)
Total Patients	185 (100%)
Ischemic Mitral Regurgitation	70 (37.8%)
No IMR	115 (62.2%)

Table 3
Stratification of IMR with Effect Modifiers

Variable	IMR Present (n=70)	IMR Absent (n=115)	p-value
Age ≥ 60 years	41 (58.6%)	42 (36.5%)	0.019*
Gender (Female)	32 (45.7%)	31 (27.0%)	0.041*
BMI ≥ 25	54 (77.1%)	66 (57.4%)	0.032*
Hypertension	48 (68.6%)	54 (47.0%)	0.008*
Diabetes Mellitus	43 (61.4%)	51 (44.3%)	0.003*
Smoking	36 (51.4%)	52 (45.2%)	0.420
Low Socioeconomic	43 (61.4%)	63 (54.8%)	0.377
Rural Residence	24 (34.3%)	40 (34.8%)	0.943

*p < 0.05 considered statistically significant.

DISCUSSION

It was a cross-sectional study, and the prevalence of ischemic mitral regurgitation (IMR) patients who presented with acute ST -elevation myocardial infarction (STEMI) to a tertiary care cardiac center in Peshawar, Pakistan, was assessed. We concluded that being 37.8 percent, the occurrence of IMR in patients with acute STEMI was in agreement with another study by the international literature that reveals that IMR prevalence is 20-40 percent following STEMI. Such a high burden emphasizes the clinical significance of the early exposure and monitoring of the mitral valve working in the case of acute myocardial infarction.
The pathophysiology of IMR is not straightforward and commonly caused by the changes in the left ventricular geometry and abnormalities of the regional wall motion instead of the intrinsic mitral valve disease. In our research, the team of experts supported echocardiographic assessment, which turned out to diagnose IMR in patients who had normal leaflet, chordal anatomy, but a significant focal wall movement defect. This reinforces the position that IMR in acute STEMI is to a great extent functional and ischemia-dependent.
There were significant relationships identified between IMR and recognized cardiovascular risks including age, gender, BMI, hypertension and diabetes. The increased susceptibility to IMR in older age and gender ID was congruent with the existing literature assuming that structural and functional cardiac remodeling might be even more significant in the specified subgroups. Equally, diabetes and hypertension that lead to myocardial fibrosis, and diastolic dysfunction were significantly prospectively linked with IMR development. Interestingly, smoking status and socioeconomic or residential background did not demonstrate statistically significant correlations, which indicates that there is a definite mechanistic connection between anatomical and metabolism variables and IMR than only lifestyle and environmental conditions.
Clinical implications of our findings are of importance. First, the rate of IMR in patients with STEMI is quite high which stresses the importance of a routine echocardiographic examination to detect the involvement of the mitral valve, particularly in high-risk cases. Second, it may be helpful to specific patient groups with a modifiable risk like diabetes, hypertension, and obesity and stratify them, which can help in early intervention and potentially slow down the course of IMR. Lastly, because IMR is considered a poor prognostic marker, with increased incidences of heart failure, and mortality it should be a part of post-MI care that should be detected and managed early.
The paper does not lack limitations. It is single-centered and thus its applicability to other populations may be restricted. That cross-sectional character also does not allow determining long-term consequences connected with IMR. Further longitudinal studies are justified to determine the course of IMR and its influence on clinical outcomes, such as re-hospitalization, development of heart failure, and survival.
Conclusively, both are important clinical complications of acute ST-elevation myocardial infarction; ischemic mitral regurgitation is the most prevalent. Its older age, female gender, increased BMIs, hypertension, and diabetes association necessitate a keen screening and an all-encompassing management of such patient subgroups. Immediate echocardiographic assessment and active risk factor management have the potential of ameliorating clinical outcomes in patients with positive risk of IMR post-STEMI.

CONCLUSION

In this research, it was found that patients who presented with acute ST-elevation myocardial infarction at Lady Reading Hospital developed ischemic mitral regurgitation in 37.8 percent of cases. Older age, female gender, elevated BMI, the presence of hypertension, and diabetes were also significantly associated with the condition and these are widespread and changeable cardiovascular risk factors.

These results support the necessity of a regular echocardiographic examination of the mitral valve dysfunction during phase acute subordination myocardium infarction, especially in patients at risk. IMR can be recognized in early stages to allow timely interventions to ensure adequate cardiac remodeling and good long-term prognosis. Despite being a single-centre, cross-sectional study, the work suggests important local statistics and proves the necessity of thorough risk appraisal and individualised management in patients with STEMI. However, additional longitudinal studies are needed to understand the development and clinical effect of IMR on the outcomes of post-infarction.

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