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Prevalence And Severity Of Mitral Regurgitation Following Acute Myocardial Infarction Admitted To Tertiary Care Hospital In Peshawar

1. Muzamil Hussain
Department of Health and Biological Sciences, Abasyn University, Peshawar.
2. Sahiba Shoaib
Department of Health and Biological Sciences, Abasyn University, Peshawar.
3. Naeem Ullah
Department of Health and Biological Sciences, Abasyn University, Peshawar.
4. Wasif Khan
Lecturer Cardiology, Abasyn University, Peshawar.
Email: imwk48335@gmail.com
5. Adnan Khadim
Coordinator Cardiology, Abasyn University, Peshawar.
Email: adnan.khadim@abasyn.edu.pk
6. Roheela Hikmat
Department of Health and Biological Sciences, Abasyn University, Peshawar.
7. Wasif Khan
Department of Health and Biological Sciences, Abasyn University, Peshawar.
8. Zain Ul Abideen*
Lecturer Cardiology Abasyn University Peshawar
zain.abideen@abasyn.edu.pk

Author Details

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Corresponding E-mails & Authors*:
Zain Ul Abideen*
zain.abideen@abasyn.edu.pk

Abstract

Background: Mitral regurgitation (MR) is a frequent mechanical complication of acute myocardial infarction (AMI) and contributes significantly to morbidity and mortality. Early detection of MR following AMI is essential for timely management and improved clinical outcomes.Objective: To determine the prevalence and severity of mitral regurgitation among patients admitted with acute myocardial infarction at a tertiary care hospital in Peshawar. **Methodology**: A descriptive cross-sectional study was conducted at the Cardiology Department and Coronary Care Unit of Lady Reading Hospital, Peshawar. Data were collected retrospectively from medical records and echocardiography reports of 252 patients diagnosed with AMI. Demographic characteristics, AMI types, risk factors, left ventricular ejection fraction (LVEF), prevalence and severity of MR, and associated complications were analyzed using SPSS version 25. **Results:** Of the 252 patients, 69% were male and 31% were female. The majority of patients (43.3%) were aged 50–59 years. Anterior wall myocardial infarction was the most common AMI type (53.6%). Hypertension (61.9%) and diabetes mellitus

(36.5%) were the leading risk factors. Mitral regurgitation was identified in 234 (92.9%) patients. Regarding severity, mild MR was observed in 53.4%, moderate MR in 36.8%, and severe MR in 9.8% of patients. Heart failure was the most common complication (10.3%), followed by cardiogenic shock and arrhythmias (5.6% each). **Conclusion**: Mitral regurgitation is highly prevalent among patients following acute myocardial infarction, with mild MR being the most frequently observed severity grade. Routine echocardiographic evaluation after AMI is recommended to facilitate early diagnosis, risk assessment, and appropriate management of MR, thereby improving patient outcomes.

Keywords- Acute Myocardial Infarction (AMI), Mitral Regurgitation (MR), Echocardiography, Prevalence, Severity, Left Ventricular Ejection Fraction (LVEF), Heart Failure

Introduction

Cardiovascular diseases (CVDs) remain the leading cause of mortality worldwide, accounting for approximately 20.5 million deaths annually. Among these, ischemic heart disease (IHD) is the most common cause of death and disability, particularly in low- and middle-income countries where the burden continues to rise (World Health Organization [WHO], 2023). Acute myocardial infarction (AMI), commonly known as a heart attack, is a life-threatening manifestation of IHD that results from prolonged interruption of coronary blood flow, leading to irreversible myocardial necrosis. Despite significant advances in early reperfusion therapy and pharmacological management, AMI remains associated with substantial morbidity and mortality due to its acute and long-term complications (Ibanez et al., 2023).

Mitral regurgitation (MR) is one of the most important mechanical complications following AMI. It develops as a consequence of papillary muscle ischemia or rupture, left ventricular remodeling, papillary muscle displacement, or mitral annular dilatation, resulting in incomplete closure of the mitral valve during systole (Varma et al., 2017). The severity of ischemic MR varies from mild to severe and is closely associated with impaired left ventricular function, heart failure, recurrent hospitalization, and increased mortality (Lamas et al., 1997; Grigioni et al., 2001).

The reported prevalence of MR following AMI varies considerably, ranging from approximately 20% to 40%, depending on the timing of assessment, diagnostic criteria, and imaging techniques employed. Although mild MR is the most common presentation, even mild regurgitation has been associated with adverse long-term clinical outcomes, while moderate-to-severe MR significantly increases the risk of heart failure and death (Varma et al., 2017; Khan et al., 2025). Transthoracic echocardiography remains the gold standard for evaluating MR after myocardial infarction because it allows accurate assessment of valve morphology, left ventricular function, and quantitative grading of regurgitation severity.

Pakistan is experiencing a rapidly increasing burden of cardiovascular disease due to the growing prevalence of hypertension, diabetes mellitus, smoking, obesity, and dyslipidemia. Ischemic heart disease is among the leading causes of hospital admissions and mortality in the country (Gul & Naz, 2015). However, limited local evidence is available regarding the frequency and severity of ischemic mitral regurgitation following AMI, particularly in Khyber Pakhtunkhwa. Early identification of MR is essential because it influences prognosis, guides therapeutic decision-making, and may identify patients who require closer follow-up or surgical or percutaneous intervention.

Therefore, the present study was conducted to determine the prevalence and severity of mitral regurgitation among patients admitted with acute myocardial infarction to a tertiary care hospital in Peshawar. The findings of this study will provide valuable local evidence regarding the burden of post-infarction mitral regurgitation and may contribute to improved risk stratification, timely diagnosis, and better clinical management of patients with acute myocardial infarction.

Methodology

This descriptive cross-sectional study was conducted in the Cardiology Department and Coronary Care Unit (CCU) of Lady Reading Hospital, Peshawar, a tertiary care hospital with advanced echocardiography facilities. The study was completed over a period of six months following approval from the Institutional Ethical Review Committee. A sample of 289 patients was calculated using OpenEpi with a 95% confidence level, 5% margin of error, and an estimated prevalence of 25%. Non-probability consecutive sampling was used, and all eligible patients admitted during the study period were included until the required sample size was achieved.

Patients of either gender aged 15–75 years with a confirmed diagnosis of acute myocardial infarction (AMI) and a complete transthoracic echocardiography (TTE) performed within seven days of admission were included. Patients with incomplete medical records, poor echocardiographic images, or age below 15 years were excluded.

After obtaining ethical approval, data were collected through a retrospective review of hospital records and echocardiography reports. Information regarding demographic characteristics, diagnosis of AMI, and echocardiographic findings was extracted using a structured data collection proforma. Mitral regurgitation was assessed according to the American Society of Echocardiography guidelines and classified as mild, moderate, or severe. The collected data were used to determine the prevalence and severity of mitral regurgitation following acute myocardial infarction and to evaluate its association with selected demographic and clinical characteristics.

Results:

Gender wise distribution.

A total of 252 samples were collected with a high majority of men 174(69%) compared to women 78(31%). This distribution aligns with standard global data showing that heart attacks are reported more often in men.

Value	Frequency	Percent	Cumulative Percent
Male	174	69.0%	69.0%
Female	78	31.0%	100.0%
Total	**252**	**100.0%**	

Table 1 Gender Wise Distribution OF AMI.

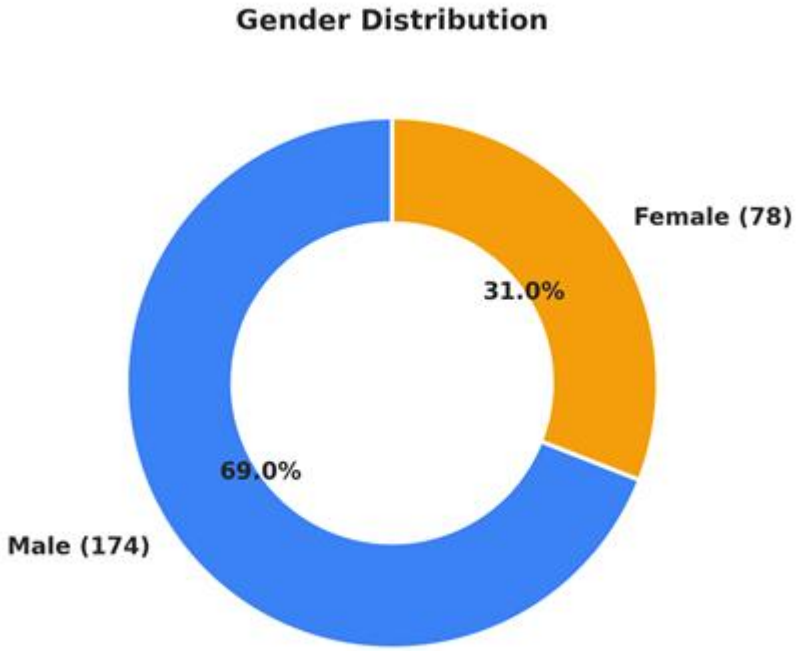

Figure 4.1.1 Gender wise distribution Of AMI.

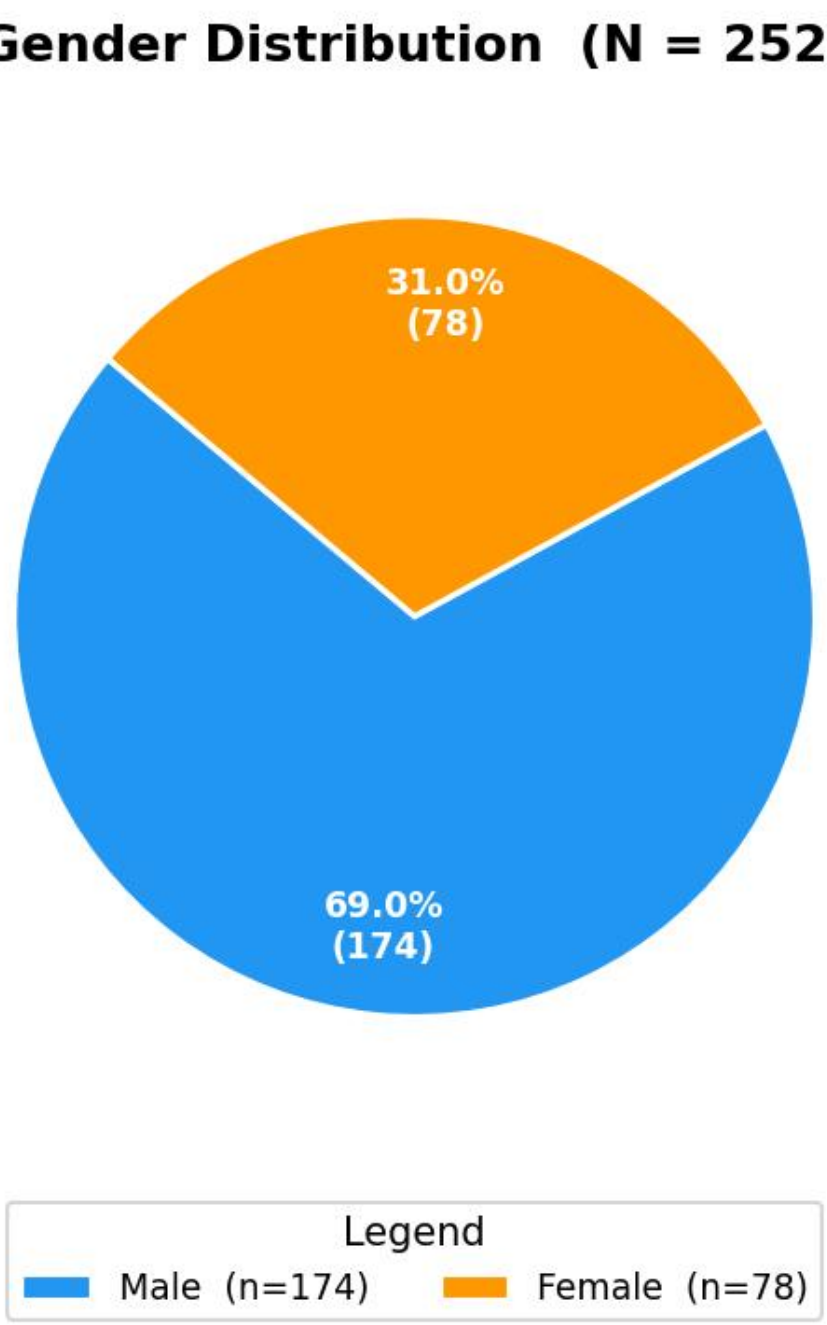

Figure 2 Gender wise distribution of AMI.

Age wise distribution

Most patient in the study are in 50–59 years age group, accounting for 109 (43.3%) cases. Patients aged 60–69 years represented 22.6% of the sample, while those aged 40–49 years accounted for 17.5%. Only 4.4% were younger than 40 years. These findings show that AMI was most common among the people older than 50.

Value	Frequency	Percent	Cumulative Percent
<40	11	4.4%	4.4%

40–49	44	17.5%	21.8%
50–59	109	43.3%	65.1%
60–69	57	22.6%	87.7%
70+	27	10.7%	100.0%
Total	**252**	**100.0%**	

Table 2 Age Wise Distribution OF AMI

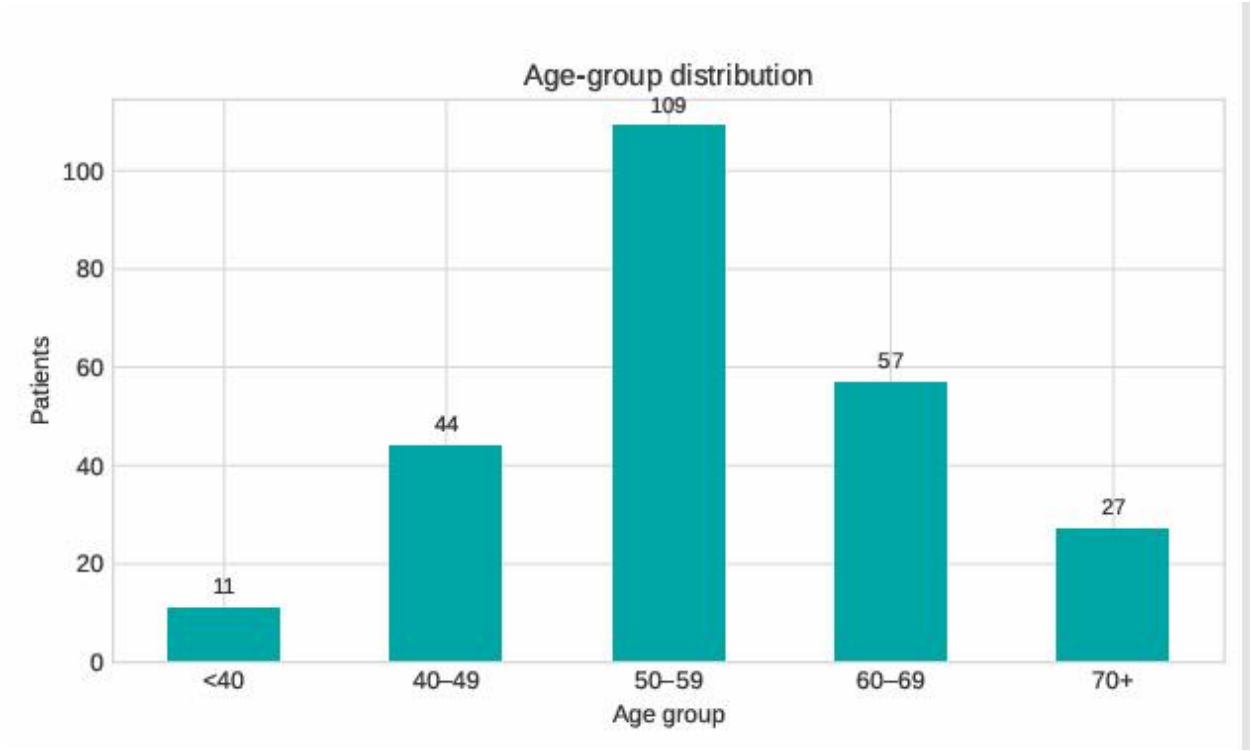

Figure 1 Age Wise Distribution of AMI

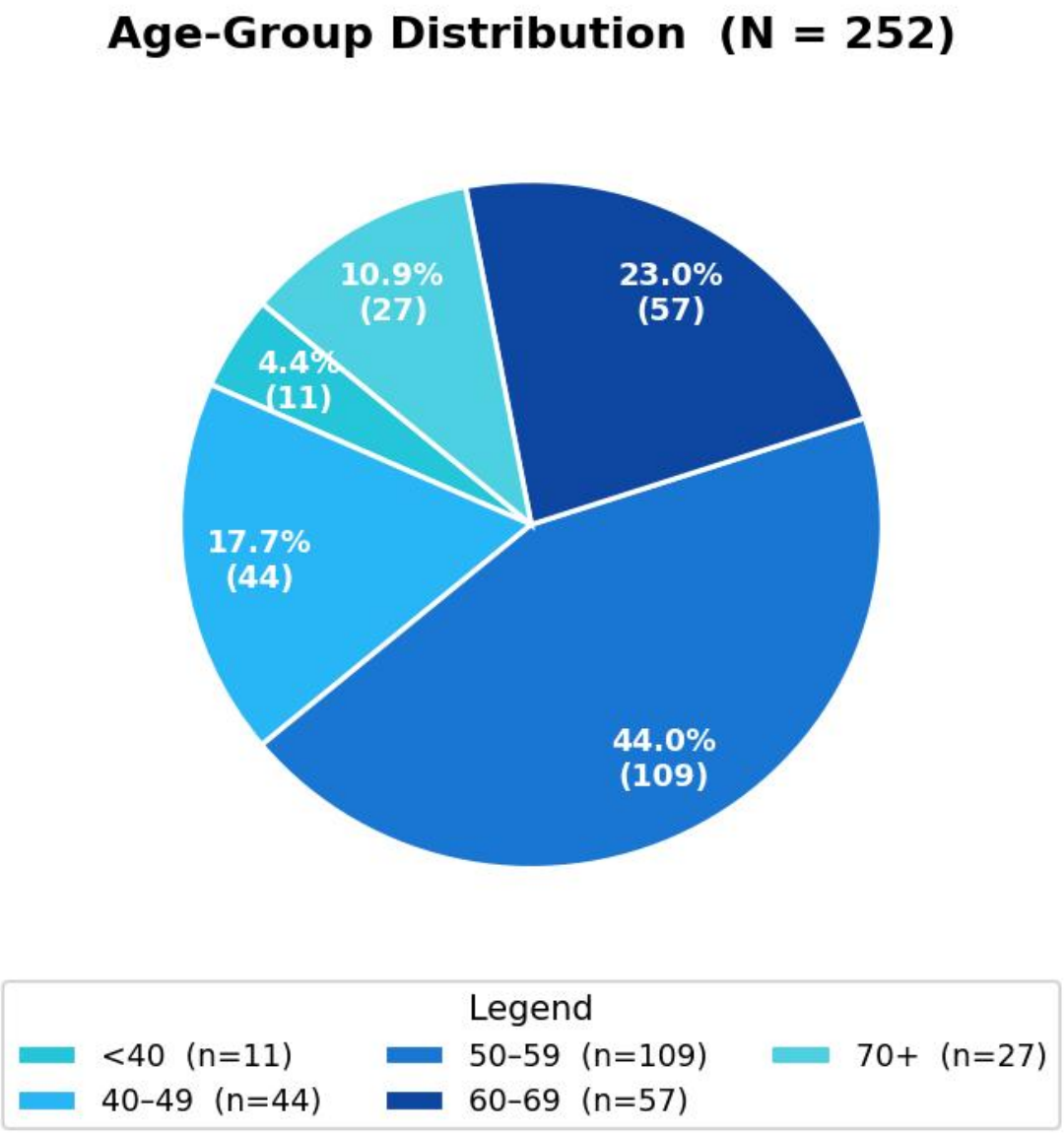

Figure 2 Age Wise distribution of AMI.

AMI types (ECG BASED)

A data collected from 252 patients on the basis of ECG anterior wall myocardial infarction was the most common type occurring in 135(53.6%) patients. Inferior Wall Myocardial Infarction was observed in 60 (23.8%) patients. Lateral Wall MI (LWMI) and Posterior Wall MI (PWMI) accounted for 17.1% and 5.5%, respectively.

Value	Frequency	Percent	Cumulative Percent
AWMI (Anterior Wall MI)	135	53.6%	53.6%
IWMI (Inferior Wall MI)	60	23.8%	77.4%

	43	17.1%	94.5%
PWMI (Posterior Wall MI)	14	5.5%	100.0%
Total	**252**	**100.0%**	

Table 3 AMI types (ECG based)

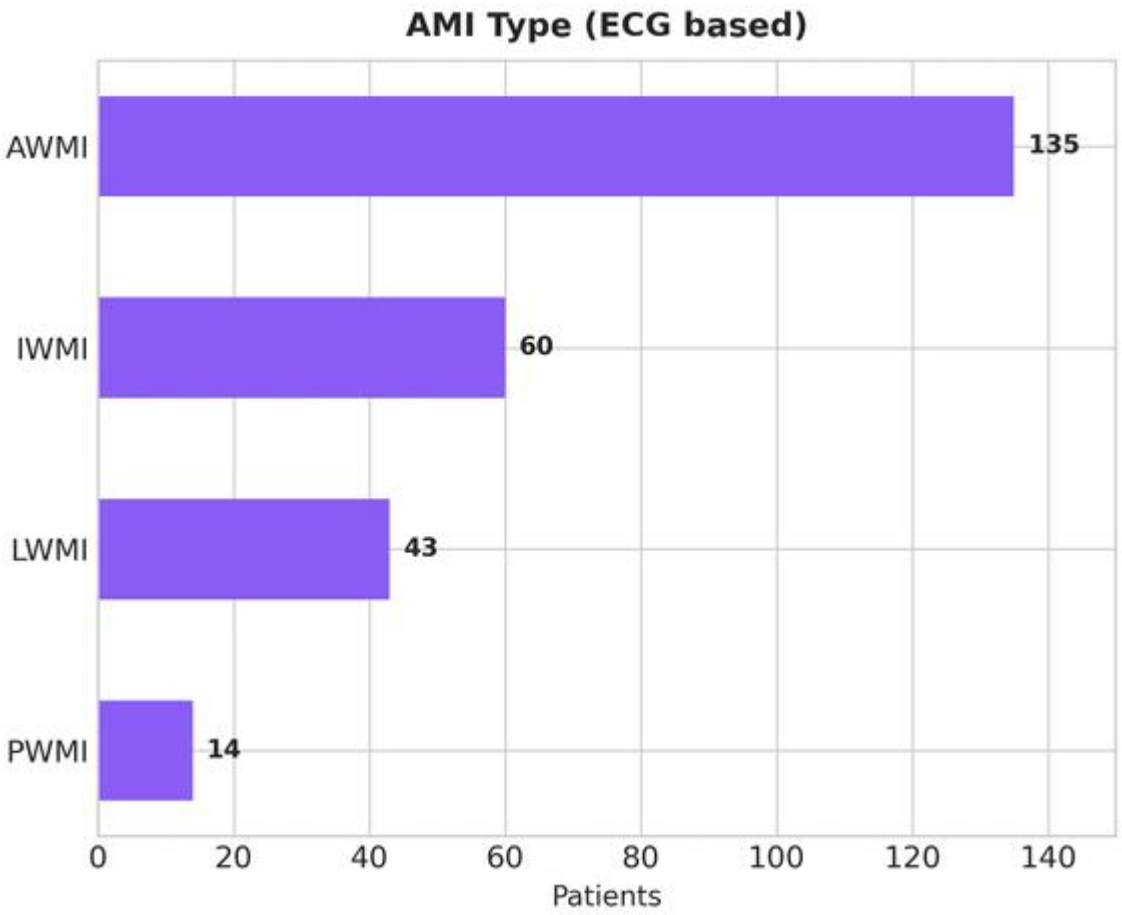

Figure 3 AMI types (ECG based)

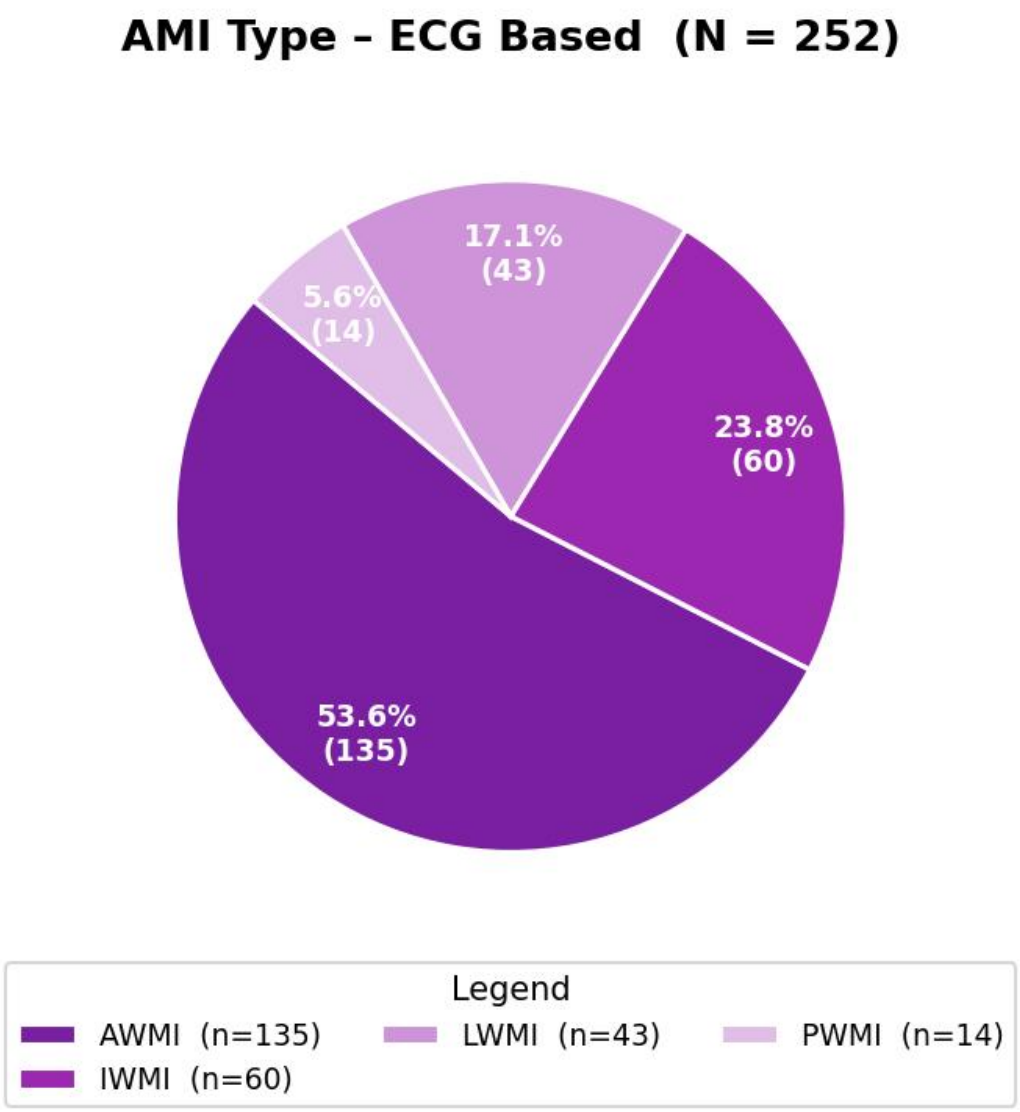

Figure 2 AMI types ECG based.

Risk factors(SPSS multiple response dichotomies group).

A total samples size of 252 patients were collected in which hypertension was the most frequently reported risk factor, present in 156 patients (61.9%). Diabetes mellitus was the second most common risk factor, affecting 36.5% of cases. Smoking, obesity and dyslipidemia were identified in 15.9%, 12.7% and 10.3% of patients, respectively. These findings suggest that hypertension and diabetes were the major contributors to AMI in the study population.

Risk Factor (Variable)	Frequency (N Responses)	Percent of Responses	Percent of Cases (N=252)
Hypertension	156	45.1%	61.9%
Diabetes Mellitus	92	26.6%	36.5%

Smoker	40	11.6%	15.9%
Obesity (BMI ≥ 30)	32	9.2%	12.7%
Dyslipidemia	26	7.5%	10.3%
Total Responses	**346**	**100.0%**	**137.3%**

Table 4 Risk Factors of AMI

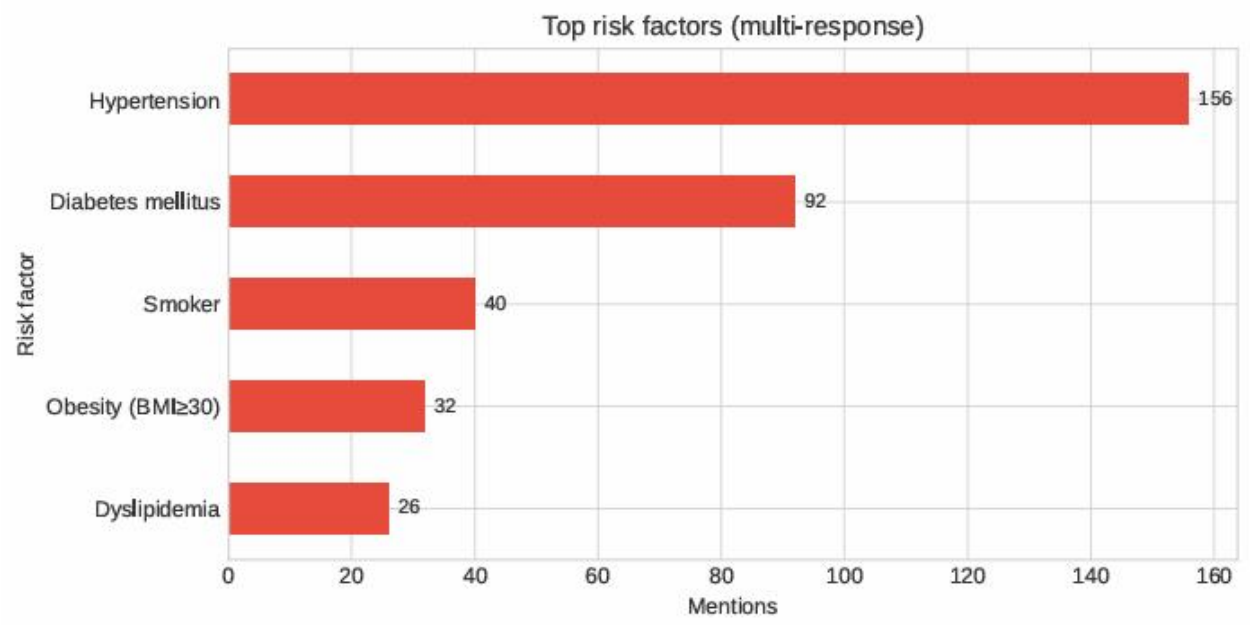

Figure 4.4.1 Risk Factors of AMI

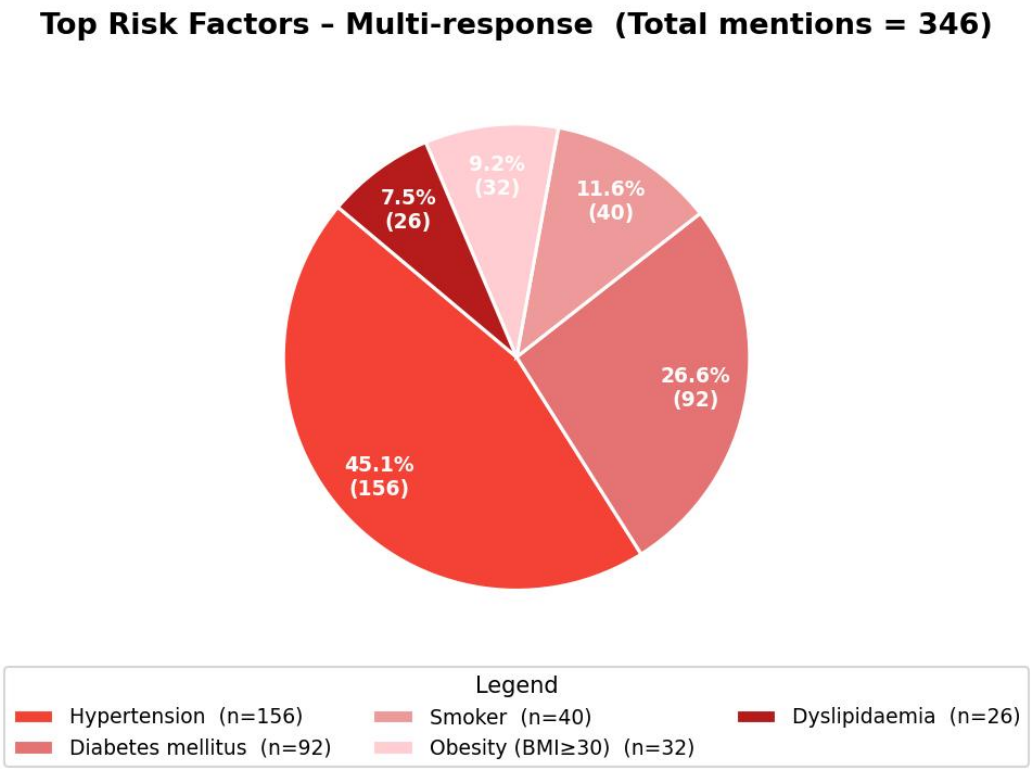

Figure 4 Risk Factors of AMI

LVEF categories.

Nearly half of the patients, 125 (49.6%), had mildly reduced left ventricular ejection fraction (LVEF) of 40–49%. Normal or preserved LVEF (≥50%) was observed in 89 (35.3%) patients. Moderately to severely reduced LVEF (<40%) was found in 38 (15.1%) patients.

Value	Frequency	Percent	Cumulative Percent
≥50% (Normal/Preserved)	89	35.3%	35.3%
40–49% (Mildly Reduced)	125	49.6%	84.9%
<40% (Moderately/Severely Reduced)	38	15.1%	100.0%
Total	**252**	**100.0%**	

Table 5 LVEF Categories.

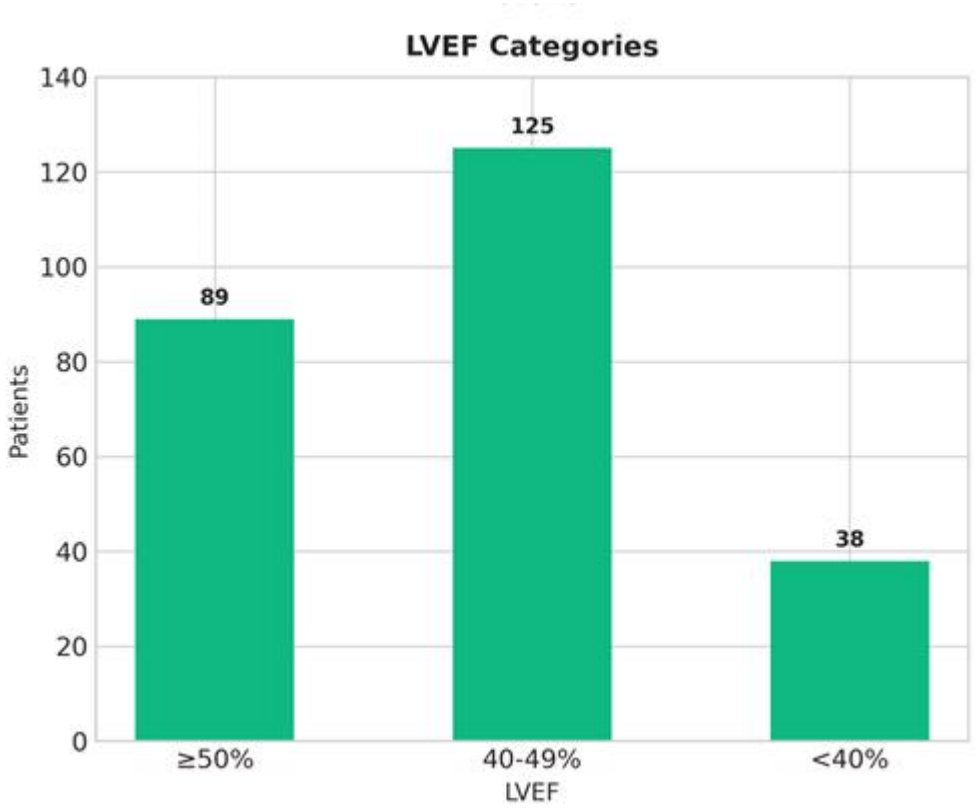

Figure 4.5.1 LVEF Categories

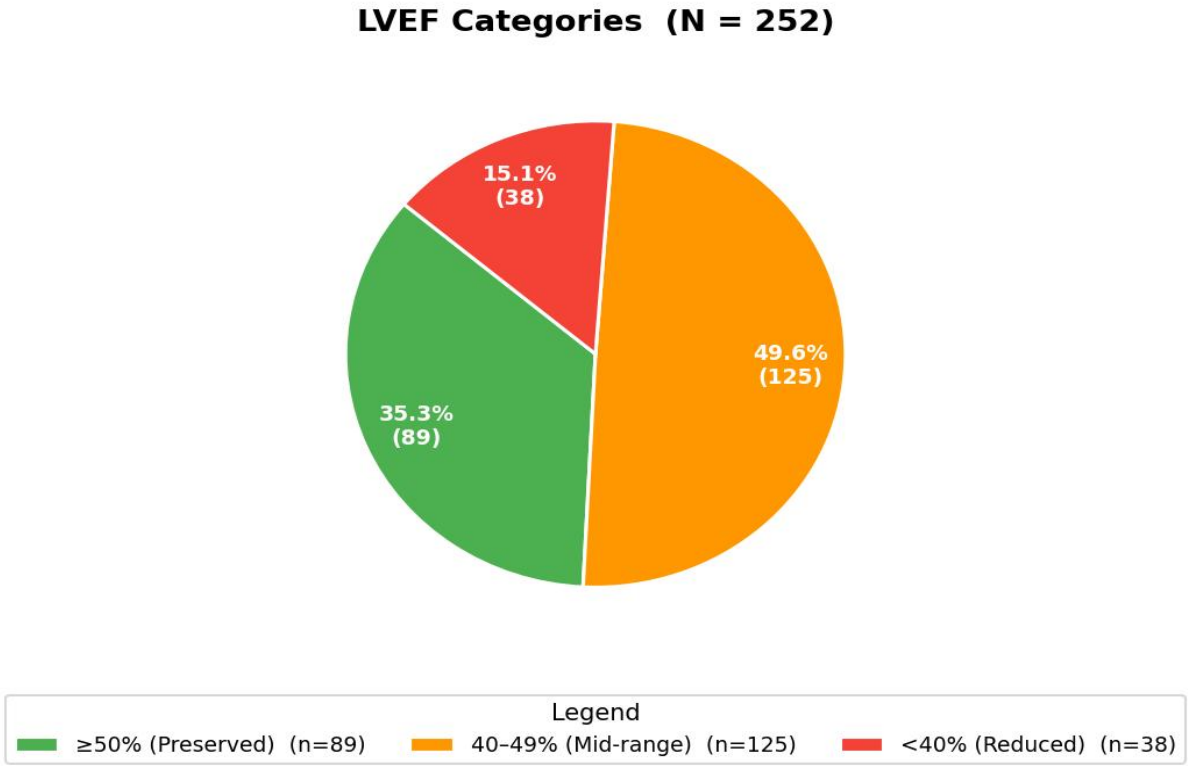

Figure 5 LVEF Categories

Presence of Mitral Regurgitation (MR)

Among a total sample size of 252 patients Mitral regurgitation was present in 234 (92.9%) patients, while only 18 (7.1%) patients had no MR. The high prevalence indicates that MR was a common echocardiographic finding among AMI patients.

Value	Frequency	Percent	Cumulative Percent
Yes	234	92.9%	92.9%
No	18	7.1%	100.0%
Total	**252**	**100.0%**	

Table 6 Presence Of MR Following AMI.

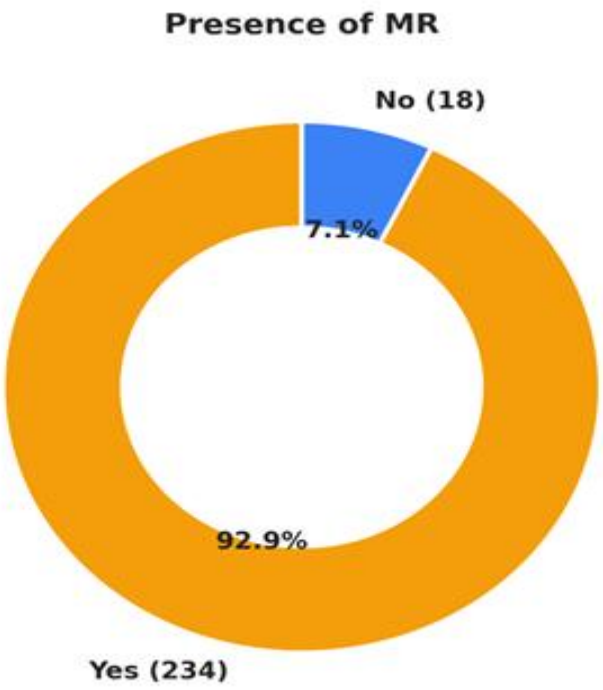

Figure 6 Presence of MR following AMI.

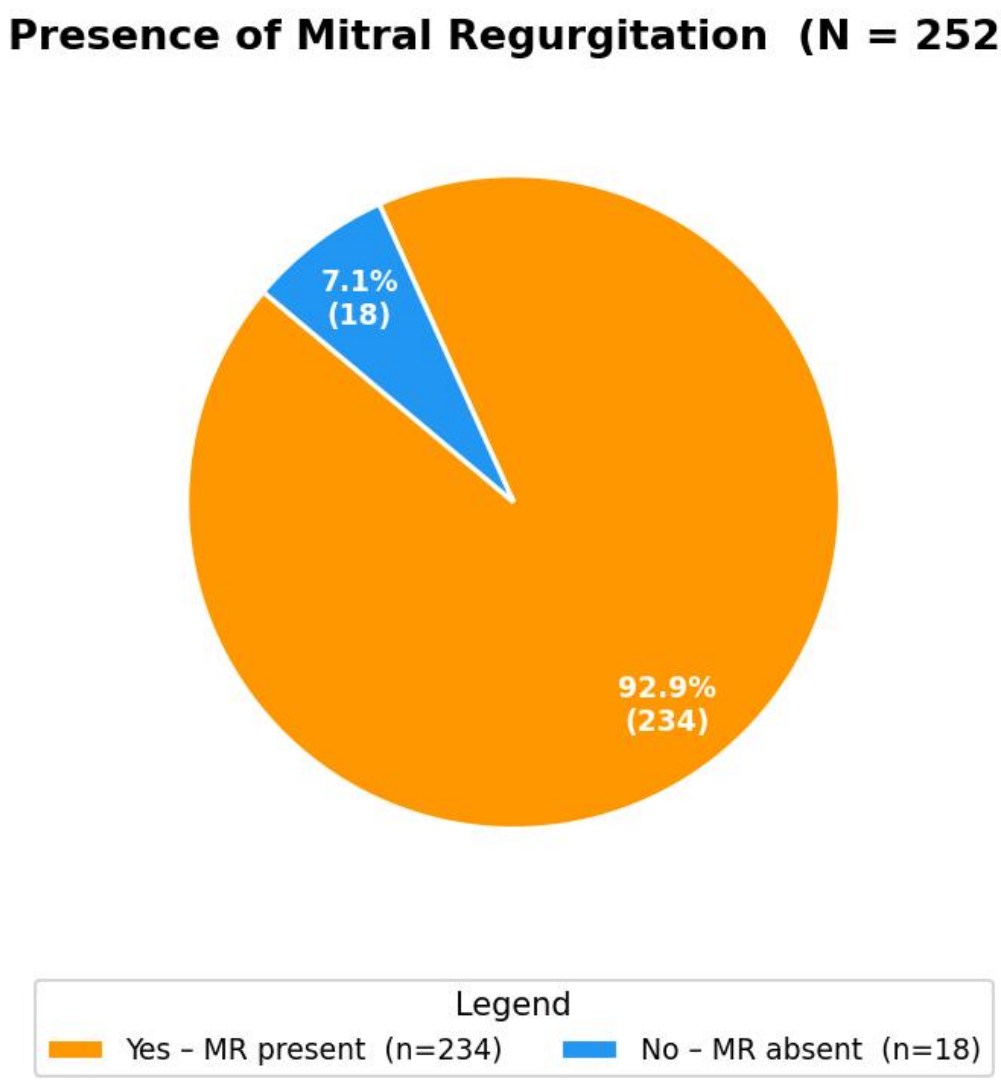

Figure 6 Presence of MR following AMI

Severity of Mitral Regurgitation(MR).

Among a total of 234 patients mild MR observed in 125(53.4%) patients. Moderate MR was present in 86(36.8%) patients, while severe MR was found in 23 (9.8%) patients.

Value	Frequency	Percent	Cumulative Percent
Mild	125	53.4%	53.4%
Moderate	86	36.8%	90.2%
Severe	23	9.8%	100.0%
Total	**234**	**100.0%**	

Table 7 Severity of MR.

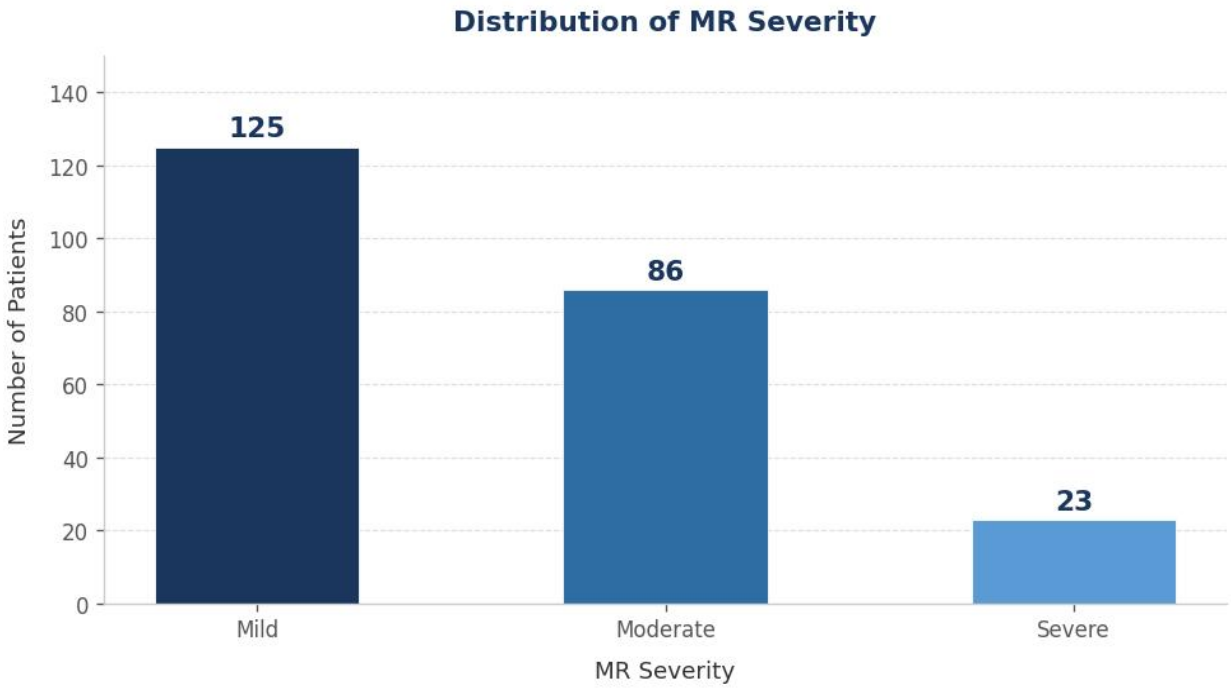

Figure 7 Severity of MR

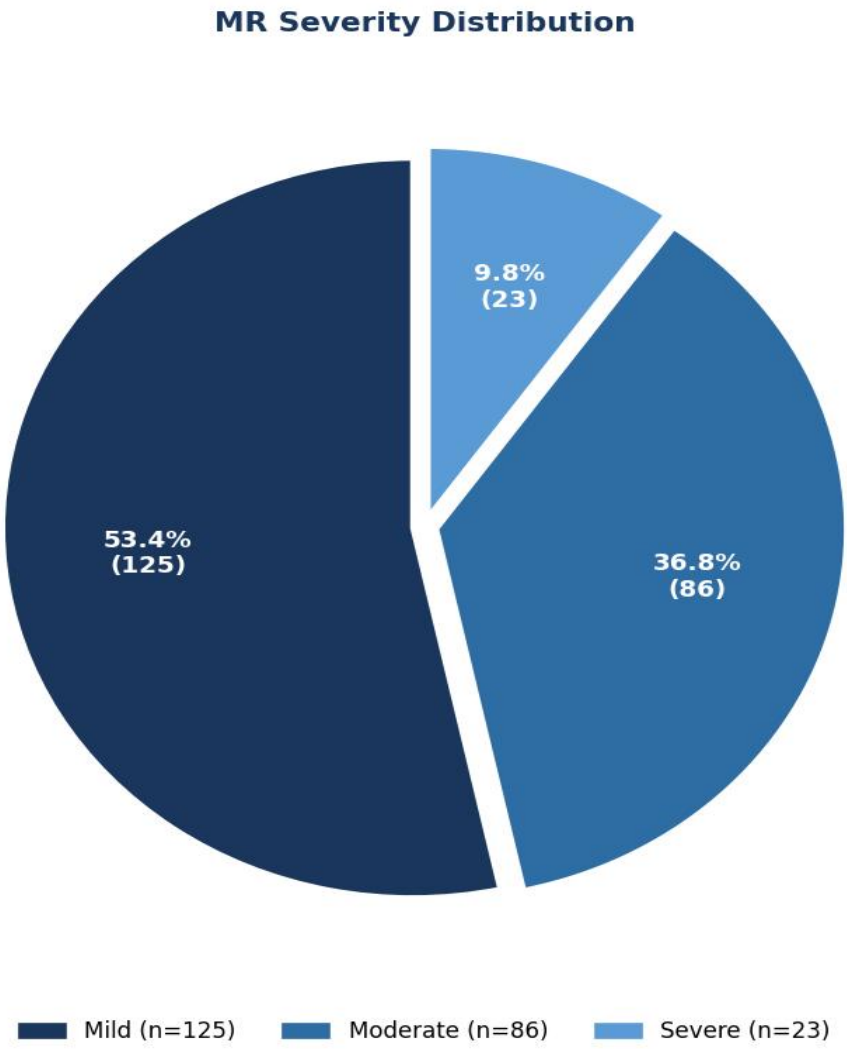

Figure 7 Severity of MR

Recorded Complications

Heart failure was observed in 26(10.3% patients). Cardiogenic shock and arrhythmias were each observed in 14 patients (5.6%). Overall, complications were recorded in 21.4% of the study population.

Complication (Variable)	Frequency (N Responses)	Percent of Responses	Percent of Cases (N=252)
Heart Failure	26	48.1%	10.3%
Cardiogenic Shock	14	25.9%	5.6%
Arrhythmia	14	25.9%	5.6%
Total Responses	**54**	**100.0%**	**21.4%**

Table 8 Recorded Complications Following AMI.

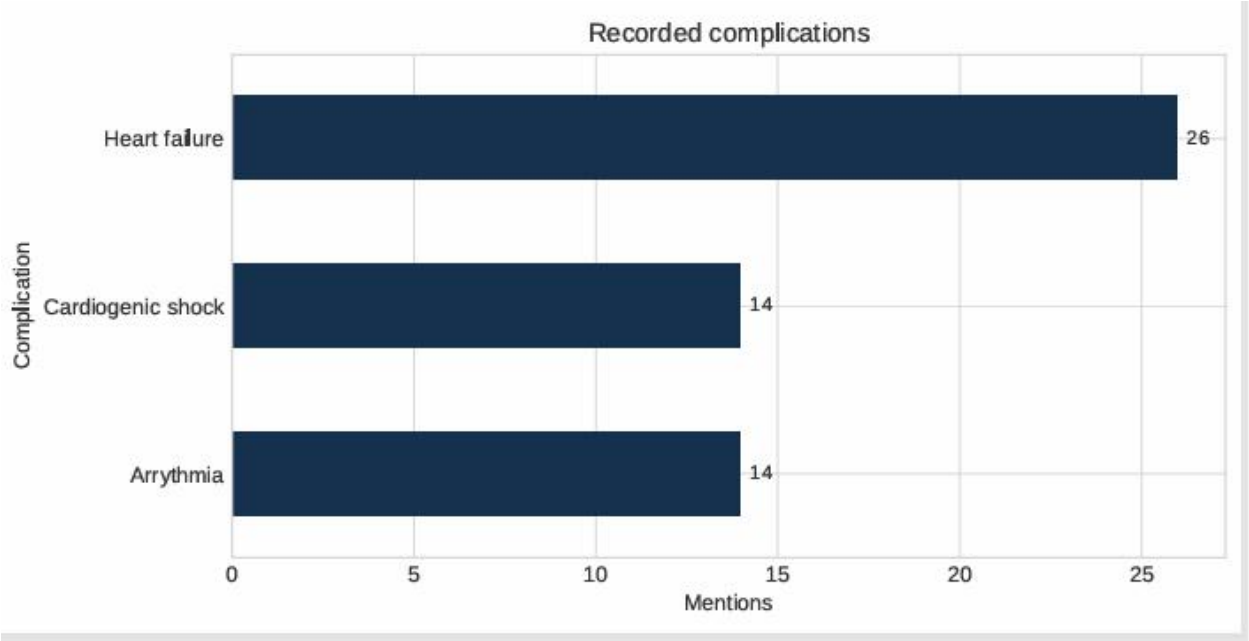

Figure 8 Recorded complications following AMI.

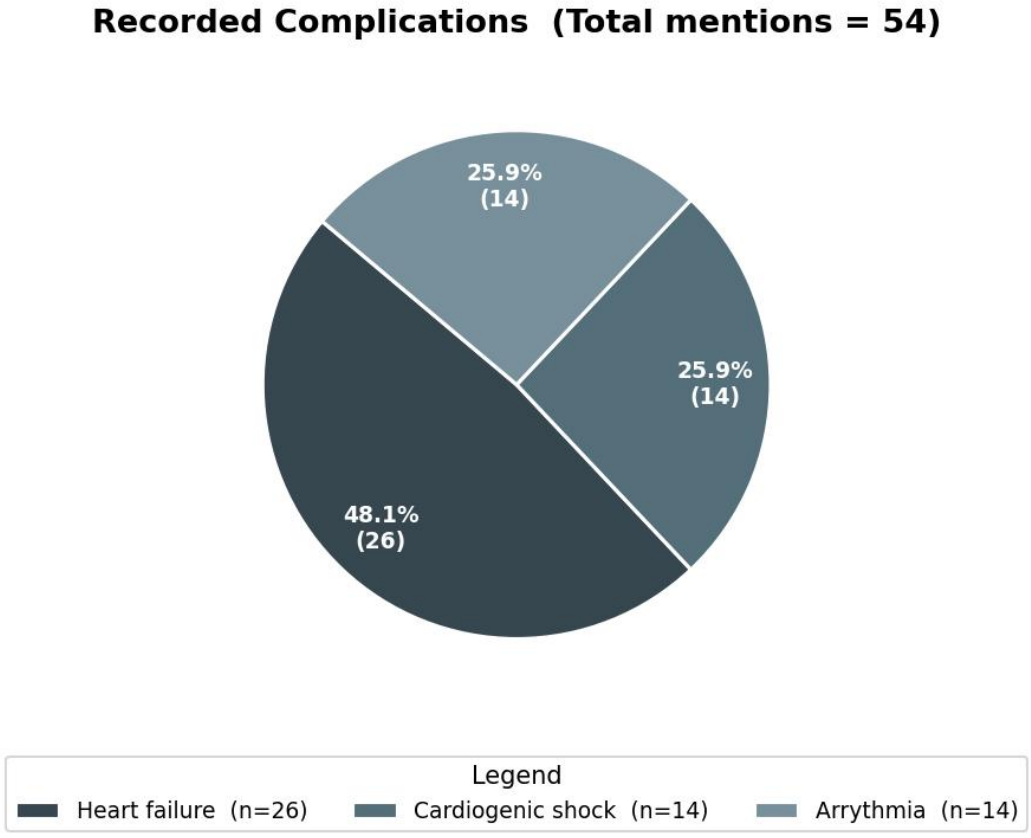

Figure 8 Recorded complications following AMI.

Discussion

The present study was conducted to determine the prevalence and severity of mitral regurgitation (MR) following acute myocardial infarction (AMI) among patients admitted to a tertiary care hospital in Peshawar. The findings revealed that MR was present in 92.9% of patients, with mild MR being the most common form (53.4.0%), followed by moderate (36.8%) and severe MR (9.8%). These results highlight the significant burden of MR among AMI patients and emphasize the importance of routine echocardiographic evaluation after myocardial infarction.

In the current study, males constituted the majority of participants (69%), while females accounted for 31% of the study population. This finding is consistent with previous studies reporting a higher incidence of AMI among males due to greater exposure to cardiovascular risk factors and earlier onset of coronary artery disease.

The age distribution demonstrated that most patients belonged to the 50–59 years age group (43.3%), followed by the 60–69 years age group (22.6%). These findings support existing evidence that the risk of myocardial infarction increases with advancing age because of progressive atherosclerosis and the accumulation of cardiovascular risk factors over time.

Anterior wall myocardial infarction (AWMI) was the most common type of AMI observed in this study, accounting for 53.6% of cases, followed by inferior wall myocardial infarction (23.8%). Similar patterns have been reported in regional and international studies where anterior wall infarctions are frequently associated with larger areas of myocardial damage and poorer cardiac outcomes.

Hypertension was identified as the most prevalent risk factor (61.9%), followed by diabetes mellitus (36.5%). These findings are in agreement with previous literature, which recognizes hypertension and diabetes as major contributors to coronary artery disease and myocardial infarction. Effective control of these modifiable risk factors may reduce both the occurrence of AMI and its complications, including MR.

Assessment of left ventricular function showed that nearly half of the patients (49.6%) had mildly reduced left ventricular ejection fraction (LVEF 40–49%), while 15.1% had moderately to severely reduced LVEF (<40%). Reduced ventricular function following AMI may contribute to ventricular remodeling, papillary muscle dysfunction, and subsequent development of ischemic mitral regurgitation.

The prevalence of MR observed in this study was considerably higher than that reported in many international studies, where rates generally range from 25% to 30%. This difference may be attributed to delayed hospital presentation, extensive myocardial damage, limited access to early reperfusion therapy, and the inclusion of all grades of MR in the current study. Nevertheless, the predominance of mild MR observed in our findings is comparable to previous studies, which reported mild MR as the most frequent severity category among post-MI patients.

Regarding complications, heart failure was the most frequently recorded complication (10.3%), followed by cardiogenic shock and arrhythmias (5.6% each). These complications are well-recognized consequences of both AMI and significant MR, as valvular dysfunction increases volume overload on the left ventricle and may worsen cardiac performance.

Overall, the findings of this study indicate that mitral regurgitation is a common echocardiographic finding following acute myocardial infarction in the local population. Early diagnosis through echocardiography and timely management of underlying ischemia and ventricular dysfunction may help reduce disease progression and improve clinical outcomes. Further multicenter studies with larger sample sizes are recommended to validate these findings and explore long-term prognostic implications of post-infarction mitral regurgitation.

Limitations

The study was conducted at a single tertiary care hospital; therefore, the findings may not be generalizable to the entire population of Pakistan.

The sample size was limited to patients available during the study period, which may affect the external validity of the results.

The cross-sectional study design allowed assessment of prevalence and severity only at a single point in time and could not determine long-term outcomes or causal relationships.

Advanced echocardiographic techniques and cardiac MRI were not utilized, which may have affected the precise quantification of mitral regurgitation severity.

Information regarding treatment modalities, timing of reperfusion therapy, and long-term follow-up outcomes was not included in the analysis.

Recommendations

Routine echocardiographic assessment should be performed in all patients admitted with acute myocardial infarction (AMI) to ensure early detection and grading of mitral regurgitation (MR).

Patients with moderate to severe MR should undergo regular follow-up and comprehensive cardiac evaluation to prevent disease progression and adverse outcomes.

Early reperfusion strategies, including timely PCI or thrombolytic therapy, should be encouraged to minimize myocardial damage and reduce the risk of post-infarction MR.

Healthcare professionals should increase patient awareness regarding the early symptoms of myocardial infarction and the importance of seeking immediate medical attention.

Multidisciplinary management involving cardiologists, echocardiographers, and cardiac rehabilitation teams should be promoted to improve patient outcomes.

Further multicenter studies with larger sample sizes and long-term follow-up are recommended to better understand the prognostic impact of mitral regurgitation following AMI in the Pakistani population.

Conclusion

This study concluded that mitral regurgitation (MR) is a highly prevalent complication among patients admitted with acute myocardial infarction (AMI) at a tertiary care hospital in Peshawar. The majority of patients were male and belonged to the age group of 50–59 years. Anterior wall myocardial infarction was the most common type of AMI, while hypertension and diabetes mellitus were identified as the leading risk factors. Mitral regurgitation was detected in a large proportion of patients, with mild MR being the most frequently observed severity grade, followed by moderate and severe MR. Furthermore, heart failure, cardiogenic shock, and arrhythmias were the most commonly recorded complications.

The findings emphasize the importance of routine echocardiographic assessment in all patients with AMI for the early detection and grading of MR. Early recognition and appropriate management of MR may help reduce complications, improve cardiac function, and enhance overall patient outcomes. Therefore, comprehensive cardiovascular risk management and timely post-infarction evaluation are essential to minimize the burden of MR and its associated adverse consequences in this population.

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