

## Anemia is an Independent Risk for Mortality after Acute Myocardial Infarction in Patients with and Without Diabetes

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### Abstract:

**Background:** Anemia is a common comorbidity in patients with acute myocardial infarction (AMI) and has been associated with worse clinical outcomes. Its impact on mortality, particularly in diabetic and non-diabetic populations, remains an area of clinical interest.

**Objective:** This study aimed to evaluate anemia as an independent risk factor for mortality in patients with AMI, stratified by diabetes status.

**Methods:** A retrospective cohort study was conducted on 180 patients with AMI, including 90 diabetic and 90 non-diabetic patients. Anaemia was defined using WHO criteria. One-year mortality and major adverse cardiac events (MACE) were analyzed using logistic regression and Kaplan-Meier survival analysis.

**Results:** Anaemic patients had a significantly higher one-year mortality rate compared to non-anemic patients (28% vs. 12%,  $p=0.014$ ). Among diabetic patients, mortality was 33% in anemic individuals versus 15% in non-anemic individuals. Anemia was identified as an independent risk factor for mortality (OR 2.8, 95% CI 1.3-5.9,  $p=0.007$ ).

**Conclusion:** Anemia is an independent predictor of increased mortality and adverse outcomes in AMI patients, irrespective of diabetes status. Early diagnosis and management of anemia could improve survival rates in this high-risk population.

**Keywords:** Anemia, Acute Myocardial Infarction, Mortality, Diabetes.

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### Introduction

Anemia has long been acknowledged as a serious health concern that can impact people with a wide range of medical conditions [1]. However, it plays a particularly important role as an independent risk factor for death after an AMI, particularly when diabetes and other comorbidities are present. Acute myocardial infarction, also referred to as a heart attack, is a potentially fatal condition in which a blocked coronary artery abruptly deprives the heart muscle of oxygen [2]. The prognosis may worsen if anemia coexists with AMI because it can intensify the oxygen shortage of the heart muscle. Diabetes patients are already at a higher risk for AMI because chronic hyperglycemia can cause vascular complications that can increase arterial stiffness and impair blood flow. By decreasing the blood's ability to carry oxygen, anemia may exacerbate these problems by further depriving cardiac tissues of vital oxygen both during and after an ischaemic episode [3]. Additionally, there are similarities between the two illnesses that can result in endothelial dysfunction, oxidative stress, and an intensified inflammatory state—all of which can have a

substantial impact on the course of events following myocardial infarction [4].

The relationship between anemia and diabetes in the setting of AMI has not been well investigated, even though both variables are recognized separately. It is essential to comprehend how anemia functions as a separate risk factor for death in these situations to create focused therapies that may enhance clinical results in these patient groups at high risk [5,6].

Investigating the function of anemia as a stand-alone risk factor for death in patients with and without diabetes after an acute myocardial infarction is the main goal of this investigation. This study will determine the extent to which anemia affects people with and without diabetes, as well as if its presence increases the risk of death in these patients. The results may help guide therapeutic efforts to increase survival rates following AMI in these specific patient categories and offer insightful information about patient management techniques.

## Materials and Methods

**Study Design and Setting** The research was designed as a retrospective cohort study, conducted at a tertiary care center. The study focused on patients admitted with acute myocardial infarction over the course of one year, from January to December 2019.

**Participants:** A total of 180 patients were enrolled in the study, divided equally into two groups based on their diabetes status: 90 patients with diabetes and 90 without. Within these groups, patients were further assessed for the presence of anemia, defined by WHO criteria (hemoglobin <13 g/dL for men, <12 g/dL for women).

**Data Collection:** Patient data were collected through a comprehensive review of electronic health records. Information extracted included demographics (age, gender), clinical data (comorbid conditions, severity of myocardial infarction), laboratory results, treatment details, and follow-up outcomes.

**Outcome Measures:** The primary outcome measure was mortality within one year following the myocardial infarction. Secondary outcomes included hospital readmission rates and the incidence of major adverse cardiac events (MACE), such as recurrent myocardial infarction, stroke, or revascularization procedures.

**Statistical Analysis:** Data analysis was performed using SPSS. Initial analyses included descriptive statistics to summarize the data. Logistic regression models were used to explore the relationship

between anemia and mortality, adjusting for potential confounders like age, sex, and severity of the myocardial infarction. Survival analysis was conducted using Kaplan-Meier curves, with differences in survival probabilities tested using log-rank tests.

## Results

The study found significant differences in mortality rates based on the presence of anemia in patients who suffered from acute myocardial infarction, with and without diabetes. Among the 180 patients studied, 72 were identified with anemia (40%). The one-year mortality rate was considerably higher in anemic patients compared to non-anemic patients (28% vs. 12%,  $p=0.014$ ). Specifically, in the diabetic cohort, anemic patients showed a mortality rate of 33% compared to 15% in non-anemic diabetic patients. Similarly, in non-diabetic patients, those with anemia had a mortality rate of 23%, whereas non-anemic patients had a rate of 9%.

Further analysis using logistic regression adjusted for age, sex, severity of the infarction, and other comorbidities confirmed anemia as an independent risk factor for mortality post-AMI (odds ratio 2.8, 95% CI 1.3-5.9,  $p=0.007$ ). The Kaplan-Meier survival curves also illustrated a significant separation (log-rank  $p=0.006$ ), indicating that anemia was associated with reduced survival rates across both diabetic and non-diabetic groups. The secondary outcomes showed a higher incidence of major adverse cardiac events in anemic patients, reinforcing the impact of anemia on overall cardiovascular risk post-myocardial infarction.

**Table 1: Demographics and Clinical Characteristics**

Characteristic	Total Patients (n=180)	Anemic Patients (n=72)	Non-Anemic Patients (n=108)
Age (mean $\pm$ SD)	65 $\pm$ 12 years	68 $\pm$ 11 years	63 $\pm$ 13 years
Gender (Male)	60%	58%	61%
Diabetes	50%	55%	47%
Severity of MI	Moderate	High	Moderate

**Table 2: Mortality and Major Adverse Cardiac Events (MACE)**

Outcome	Anemic Patients (n=72)	Non-Anemic Patients (n=108)	P-value
Mortality Rate	28%	12%	0.014
MACE	38%	21%	0.022

**Table 3: Mortality by Diabetes Status**

Diabetes Status	Anemic Patients Mortality	Non-Anemic Patients Mortality	P-value
Diabetic	33%	15%	0.010
Non-Diabetic	23%	9%	0.020

**Table 4: Logistic Regression Analysis for Mortality Risk**

Variable	Odds Ratio	95% Confidence Interval	P-value
Anemia	2.8	1.3 - 5.9	0.007

These tables show how anemia impacts the mortality rates among patients with acute myocardial infarction, differentiated further by the presence or absence of diabetes. The increased mortality rates in anemic patients across both diabetic and non-

diabetic groups are evident, with statistical significance indicating the robustness of these findings.

## Discussions

The substantial influence of anemia as a stand-alone risk factor for death in patients with acute myocardial infarction (AMI), both with and without diabetes, is clarified by this study. The results show that within a year after an AMI, anemia is linked to a significantly higher risk of death and significant adverse cardiac events. These findings are in line with the corpus of research that indicates anemia may worsen the prognosis of those experiencing cardiovascular events. Similar trends have also been noted by comparative investigations. Our findings of a 28% death rate in anemic patients are in close agreement with a recent study by Smith et al. (2021) that found that anemic patients with AMI had a 30% increase in one-year mortality compared to their non-anemic counterparts [7,8]. Further corroborating our findings of worsening outcomes in diabetic anemic patients, Johnson and colleagues (2022) study showed that anemia was more harmful in diabetic individuals, increasing the risk of heart failure after AMI [9,10].

By delivering a thorough examination of the effects of anemia in a cohort comprising patients with and without diabetes, our study contributes to the body of literature by advancing our knowledge of how these illnesses interact to affect survival rates after AMI. Furthermore, when treating patients with AMI, the logistic regression analysis emphasizes how crucial it is to take anemia into account as a significant independent risk factor [11,12].

The retrospective nature of our study and the comparatively small sample size are among its drawbacks, which could restrict how broadly the findings can be applied. To confirm these results and possibly investigate the mechanisms behind the elevated risk linked to anemia in patients with AMI, prospective studies are required in the future. To improve clinical outcomes, more studies might potentially assess the advantages of treatment approaches meant to manage anemia in the context of myocardial infarction, especially in patients with diabetes.

## Conclusion

Regardless of whether a patient has diabetes or not, this retrospective cohort study unequivocally shows that anaemia is a significant independent risk factor for increased mortality in individuals who have had an acute myocardial infarction. Compared to non-anemic patients, anaemic individuals showed significantly higher mortality rates and a greater incidence of serious adverse cardiac events within a year. These results highlight how important it is to detect and treat anaemia in patients with AMI as soon as possible to possibly increase survival rates. Clinical practitioners must take into account routine

screening and treatment strategies for anaemia as part of the comprehensive management of patients suffering from acute myocardial infarction, especially those with coexisting conditions like diabetes, given the strong correlation between anaemia and unfavorable outcomes.

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