

## Original Research Article

# Anaemia in acute coronary syndrome: a cross-sectional study

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### ABSTRACT

**Background:** Acute coronary syndromes (ACS) are an imbalance between myocardial oxygen supply and demand, and the presence of anaemia further potentiates this imbalance. The burden of anaemia in patients presenting with acute coronary syndromes (ACS) is significant. Anaemia has the potential to worsen myocardial ischemic insult by decreasing the oxygen content of the blood supplied to the jeopardized myocardium. Present study investigates the prevalence of anaemia in ACS patients attending a tertiary health care institute.

**Methods:** A total of 148 patients with ACS were recruited in the study from July 2018 to October 2018 in Multan institute of cardiology, Pakistan. All patients were subjected to a detailed history and thorough clinical examination and investigations after obtaining informed consent. Patient having any other diseases known to cause anaemia were excluded.

**Results:** Mean age of patients was 49 years. Out of 148, 114 (77%) were males and 34(23%) were females. Prevalence of anaemia was 38% in Male and 58.8% in Female. Among Male, 18.8% were microcytic, 4.54% were macrocytic and 77.27% were normocytic. Among Female, 50% were microcytic and 50% were normocytic. Prevalence of ACS was higher in patients with diabetes and hypertension combined (31%) than in patient with diabetes alone (17.56%) or hypertension alone (21.62%). 13.51% were pure vegetarians while 78.37% were on mixed diet consisting of vegetables+meat+pulses.

**Conclusions:** Higher incidence of anaemia was reported in subjects having acute coronary syndrome. Incidence of anaemia in STEMI patients was greater than NSTEMI and unstable angina patients. Severe form of acute coronary syndrome i.e. STEMI was associated with higher incidence of anaemia.

**Keywords:** Non ST elevation myocardial infarction, Non-vegetarian, ST elevation myocardial infarction, Unstable angina.

### INTRODUCTION

Numerous studies have suggested that the burden of anaemia in patients presenting with acute coronary syndromes (ACS) is significant. Anaemia is associated with a significantly increased prevalence of baseline comorbidities, and a lower use of guidelines-based therapies, and is associated with increasing odds of in hospital mortality.<sup>1-8</sup>

Anaemia has the potential to worsen myocardial ischemic insult by decreasing the oxygen content of the blood supplied to the jeopardized myocardium and by increasing myocardial oxygen demand through necessitating a higher cardiac output to maintain adequate systemic oxygen delivery.<sup>9,10</sup> Mixed comorbidities in anaemic patients may influence their short-term and long term mortality. Anaemia seems to be a significant factor related to improving the long-term survival of ACS

patients. Previous reports have suggested that ACS patients with anaemia have significantly worse in hospital and longer-term total and cardiac mortality outcomes, heart failure, and risk of major bleeding and of reinfarction.<sup>5-7,11-15</sup>

Some studies have reported that, once differences in age or comorbidity burden between anaemic/non-anaemic ACS cohorts are adjusted for, anaemia is no longer an independent predictor of adverse mortality or cardiovascular mortality, although other studies report that the relationship persists.<sup>6,7,15-18</sup> Other studies have reported different relationships between anaemia and cardiovascular (CV) outcomes according to sex, with baseline anaemia independently associated with higher rates of all-cause and cardiac mortality at 30 days and 1 year in men but not in women.<sup>7</sup>

Present study investigates the prevalence of anaemia in ACS patients attending tertiary health care institute named Multan institute of cardiology.

**METHODS**

**Study design and setting**

This cross sectional study was carried on patients of Acute Coronary Syndrome admitted in a tertiary care hospital named Multan institute of cardiology from July 2018 to December 2018. Ethical issues were addressed according to institutional review board. All the participants were informed about the targets of the research and the methods of the study.

**Inclusion criteria**

A case of acute coronary syndrome.

**Exclusion criteria:**

- Patients of acute coronary syndrome with altered sensorium and disturbed mental state
- Patients of acute coronary syndrome having any other diseases known to cause anaemia like HIV infection, chemotherapeutic agents, malignancy, pancytopenia etc.
- Patients with renal failure, liver failure and respiratory failure
- Patients who did not consent for the study.

All patients satisfying inclusion and exclusion criteria were included in study. A total of 148 patients were studied. Out of 148, 114 (77%) were males and 34(23%) were females. All patients were subjected to a detailed history and thorough clinical examination after obtaining his/her informed consent. Patients were interviewed to obtain information about age, sex, time of diagnosis of acute coronary syndrome, type of medication being used,

compliance and other chronic ailments associated complaints. The data collected was entered and analysed on SPSS v.20.

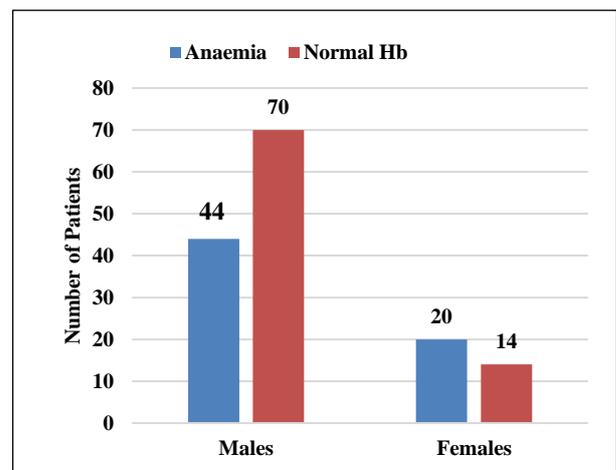
**Investigations**

Electrocardiogram, troponin-T, CK-MB, haemoglobin, total and differential counts, peripheral smear for type of anaemia.

**RESULTS**

Total 148 patients were included in the study who satisfied the inclusion and exclusion criteria. In this study minimum age of patient was 28 years and maximum age was 70 years with mean age of 49 years. Out of 114 male patients, 44 patients (38%) were anaemic while out of 34 female patients, 20 patients (58.8%) were anaemic (Figure 1). There was no addiction history in any of the female patients while 45.6% of male patients were found to be addict of tobacco smoking (Table 1).

Incidence of Acute coronary syndrome was less in females below 40 years of age as compared to males of same age group. Incidence sharply increases in male patients of age groups of 41-50 years and 51-60 years. Incidence of ACS was higher in female patients of age group 51-60 years. Male predominance was found in patients of more than 40 years of age (Figure 2). 13.51% were pure vegetarians while 78.37% were on mixed diet consisting of vegetables +meat + pulses, 4% were on pulses only and 2.7% were on meat only (Table 2). Incidence of ACS was higher is patients with diabetes and hypertension combined (31%) than in patient with diabetes alone (17.56%) or hypertension alone(21.62%) (Table 3). The most common type of anaemia was normocytic normochromic (68.57%) while microcytic anaemia was found in 28.12% of patients and macrocytic anaemia was found in 3.1% (Table 4).



**Figure 1: Gender wise distribution of anaemia in patients with ACS.**

**Table 1: Addiction history of patients.**

Addiction	Male	Female	Total
Tobacco	62 (54.38%)	00	62 (41.89%)
No addiction	52 (45.61%)	34 (100%)	86 (58.10%)
Total	114 (100%)	34 (100%)	148 (100%)

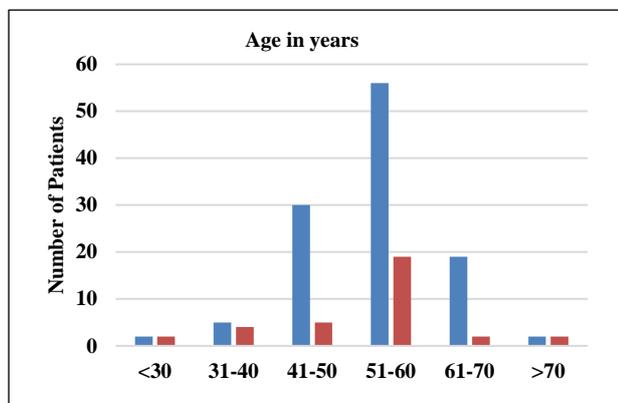
**Table 2: Diet status of patients.**

Diet	Male	Female	Total
Vegetables only	18 (15.78%)	2 (5.88%)	20 (13.51%)
Meat only	4 (3.5%)	0.00	4 (2.7%)
Pulses only	2 (1.75%)	4 (11.76%)	6 (4%)
Mixed Diet	88 (77.19%)	28 (82.35%)	116 (78.37%)
Total	114 (100%)	34 (100%)	148 (100%)

**Table 3: Status of comorbidities in patients.**

Comorbidities	Male	Female	Total
Diabetes alone	24(21%)	2(5.8%)	26(17.56%)
Hypertension alone	20(17.5%)	12(35.2%)	32(21.62%)
HTN + DM	32(28%)	14(41.1%)	46(31%)
Pulmonary disease	6(5.3%)	2(5.8%)	8(5.4%)
No comorbidities	42(36.8%)	4(11.7%)	46(31.08%)
Total	114(100%)	34(100%)	148(100%)

**Figure 2: Prevalence of ACS based on age groups.**



**Table 4: Classification of anaemia in patients on the basis of mean corpuscular volume.**

Types of Anaemia	Male	Female	Total
Microcytic	8(18.18%)	10(50%)	18(28.12%)
Normocytic	34(77.27%)	10(50%)	44(68.75%)
Macrocytic	2(4.54%)	0.00	2(3.1%)
Total	44(100%)	20(100%)	64(100%)

**DISCUSSION**

In addition, the global prevalence of anaemia for pregnant women was 38.2% (95% CI: 33.5-42.6) and for

all women of reproductive age was 29.4% (95% CI: 24.5-35.0). The prevalence of anaemia was 37.7% to 41.5% for non-pregnant women and 38.9% to 48.7% for pregnant women in South-East Asia, Eastern Mediterranean and African Regions. Incidence of anaemia in women of age group 26-40 years 23% and anaemia among elderly was quite higher 15.5% which was much less than incidence of anaemia in ACS patients.<sup>19,20</sup> Normocytic anaemia was the most common type of anaemia in our study, the result was contrary to the study done by Garg et al, in which most common type of anaemia was microcytic hypochromic in 64.5% of patient, followed by dimorphic anaemia observed in 17.5% of patient, then normocytic normochromic anaemia in 13.8%, followed by macrocytic anaemia in 3% patients.<sup>21</sup> In an analysis of 422,855 ACS patients in the Myocardial Ischemia National Audit Project (MINAP) registry in England and Wales, individuals with anaemia, which included 27.7% of the cohort, had a 28% and 31% increased risk of death at 30 days and 1 year, respectively, when compared with non-anaemic ACS patients.<sup>22</sup> There have been some small pilot studies testing different transfusion strategies in ACS patients with anaemia, but the results are mixed. A meta-analysis of 10 studies, most of which were registry studies, a liberal transfusion strategy increased the risk of mortality three-fold in acute MI patients, a risk that remained independent of anaemia status.<sup>22</sup> Our study did not take into account the risk of nosocomial anaemia whereas in some study, nosocomial anaemia in patients with ACS without apparent bleeding is a frequent complication

(25%) and a predictor of mortality and cardiovascular complications during the first year of follow-up.<sup>22</sup>

## ACKNOWLEDGEMENTS

Anaemia is highly prevalent in the ACS setting and is associated with worse outcomes, particularly mortality. Patients suffering from multiple comorbidities has higher incidence of ACS. Due to small sample size and regional variations in our country, other studies are needed to estimate the prognosis of patients with ACS suffering from anaemia.

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