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# EPIDEMIOLOGICAL PROFILE OF PATIENTS UNDERGOING PERCUTANEOUS CORONARY INTERVENTION FOR ACUTE CORONARY SYNDROME IN A SINGLE TERTIARY CENTER IN BASRAH, IRAQ.

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Background:
Acute Coronary Syndrome (ACS), including STEMI, NSTEMI, and unstable angina, requires prompt management with tools such as coronary angiography (CA) and percutaneous coronary intervention (PCI). While these strategies are effective globally, there is limited data on the epidemiological profile, presentation, and management of ACS patients in Iraq. Understanding regional differences is essential for improving patient care and clinical decision-making.
Aim:
To assess the sociodemographic, clinical, and procedural characteristics of ACS patients treated with PCI in Basrah, Iraq.
Patients and Methods:
This retrospective cross-sectional study was conducted at Basrah Specialist Cardiac Center from January to June 2024. Data from 388 adult ACS patients (aged ≥18 years) were analyzed, including demographics, comorbidities, clinical presentations, and procedural details such as age, sex, BMI, smoking status, medical history, and left ventricular function.
Results:
The majority of patients were middle-aged to elderly (57.47% aged 50-69 years) with a mean age of 59.11 years, and predominantly male (70.6%). Patients were nearly evenly split between urban (50.8%) and rural (49.2%) residents. High prevalence of cardiovascular risk factors was observed: diabetes mellitus (53.5%), dyslipidemia (49.0%), and untreated hypertension (10.8%). STEMI was the most common diagnosis (64.95%), and PCI was the main treatment modality (54.4%).
Conclusions:
This study underscores the significant burden of cardiovascular risk factors among ACS patients undergoing PCI in Basrah, Iraq. Despite advancements, complications such as pulmonary edema and cardiogenic shock are still encountered, highlighting the importance of early detection and timely intervention to improve outcomes.

Keywords: **Acute Coronary Syndrome**, **Coronary angiography**, **Percutaneous coronary intervention**

## Introduction

Acute Coronary Syndrome (ACS) is classified into three distinct phenotypes – ST-elevation myocardial infarction (STEMI), non-ST elevation myocardial infarction (NSTEMI), and unstable angina. ACS includes a spectrum of coronary artery diseases demanding rapid and precise management strategies. [1] Invasive approaches such as coronary angiography (CA) or percutaneous coronary intervention (PCI) have emerged as cornerstones in the management of ACS, enabling early evaluation of coronary anatomy, identification of lesions, and formulation of fitted treatment plans. [2]

Cardiovascular diseases, specifically ACS, continue to be a leading cause of mortality and health complications worldwide[3] .Recent analyses of mortality trends related to ischemic heart disease (IHD), utilizing data from the World Health Organization and the United Nations, have indicated a decline in IHD mortality rates within high-income nations. However, regions with lower income levels still experience persistently high rates of IHD-related deaths. [4]

In 2016, approximately 17.9 million deaths were attributed to cardiovascular diseases, constituting roughly 31% of all global mortality. Predictions suggest that this figure may rise to 23.6 million deaths by 2030.[5]

The management of ACS involves a comprehensive evaluation of the patient's presentation, including risk stratification utilizing established risk scores such as the Global Registry of Acute Coronary Events (GRACE) risk score. Pharmacological treatments are essential, involving the use of medications like antiplatelet drugs, anticoagulants, and therapies aimed at preventing blood clotting, in cases where appropriate, procedures such as PCI or Coronary Artery Bypass Graft (CABG) surgery may also be evaluated.[6, 7]

An invasive strategy within ACS involves an initial evaluation of coronary anatomy through a procedure known as CA, followed by revascularization via PCI or CABG if deemed necessary.[2] Sometimes, CA and PCI are performed concurrently as a single procedure, depending on the availability of facilities at the admitting hospital and clinical indications.[2]

Despite studies conducted in the Middle East, including data from countries like the United Arab Emirates and Saudi Arabia, there remains uncertainty about their representativeness for regions like Iraq.

Iraq has unique demographics, genetics, and lifestyles that significantly influence the presentation and outcomes of ACS. Our research aims to investigate the baseline clinical and procedural characteristics of patients treated with Percutaneous Coronary Intervention for ACS in Iraq and to investigate the clinical in-hospital outcomes of patients treated with PCI and identify factors that lead to worse outcomes.

## Materials and Methods

This retrospective cross-sectional record-based study was conducted at Basrah Specialist Cardiac Center from 1st of January, 2024 to 30th of June, 2024 to assess the clinical outcomes of percutaneous coronary intervention (PCI) for acute coronary syndromes (ACS) in Basra, Iraq. The study included 388 patients with ACS, after excluding 12 cases due to incomplete data. Information was collected retrospectively from patient files.

### Sampling and Population

Four hundred patients with ACS were admitted during the study period. Twelve patients were excluded because of incomplete records, resulting in a final sample of 388 patients. Data collection excluded patients admitted outside the study timeframe (before January 1, 2024, or after June 30, 2024). Information from Alsader Teaching Hospital was excluded to maintain the accuracy of statistical analyses, as its significantly different patient numbers could introduce bias and affect data comparability.

### Inclusion Criteria

Patients aged ≥18 years who were diagnosed with ACS and underwent PCI, medical treatment, or coronary angiography (CA) during the study period.

### Official and Ethical Considerations

The official agreement was obtained from the scientific council of the Arab Board of Health Specializations and Ministry of Health and Environment, Basrah Health Directorate, Training and Human Resources Centre – Research Unit (No. 47 dated 17/1/2024) on carrying out this study.

### Data Collection

The extracted data from the patients records includes demographics (age, sex, education, residency), and clinical characteristics (BMI, smoking, alcohol consumption, medical history, left ventricular function (LVF) status, presence of anemia, surgical history, and drug history).

Other data included the distribution of the culprit artery and the distribution of other critical vessels and data regarding complications at the initial presentation of ACS including cardiogenic shock and pulmonary edema. Furthermore, the outcomes of CA were categorized into three groups: optimized medical therapy (OMT), preparation for elective PCI, or preparation for CABG. Health outcomes were classified as either favorable, where patients were discharged without complications, or unfavorable, including events such as death, ischemic stroke, major bleeding (defined as events meeting BARC type 3 or higher), or hemorrhagic stroke.

Statistical Analysis

Data analysis was performed using SPSS version 26. Categorical variables were analyzed using the Chi-square test or Fisher's exact test (when expected counts were <5). A p-value ≤0.05 was considered statistically significant.

## Results

In this study, data from 388 ACS patients were analyzed. **Table I** presents key sociodemographic characteristics of the study patients.

The distribution of age groups shows a predominance in the 50-69 years range, comprising 57.47% of the sample. The mean age of the participants is 59.11 years (22- 90). Males represented (70.6%) of the study population. For educational level, a balanced spread across various levels was seen, with secondary education being the most prevalent (37.63%). The study includes nearly equal representation from urban (50.8%) and rural (49.2%) areas. A high prevalence of smokers (47.42%), while only (3.1%) of the participants were alcohol consumers.

**Table I: Sociodemographic characteristics of studied patients**

| Variable | | No. | Percent |
|---|---|---|---|
| Age groups in years | 20 – 29 | 4 | 1.03 |
| | 30 – 39 | 11 | 2.84 |
| | 40 – 49 | 66 | 17.01 |
| | 50 – 59 | 106 | 27.32 |
| | 60 – 69 | 117 | 30.15 |
| | 70 – 79 | 61 | 15.72 |
| | 80 and more | 23 | 5.93 |

| Age (Range, Mean, Sd) | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|
| | 22 | 90 | 59.11 | 12.21 |

| Sex | Male | 274 | 70.6 |
|---|---|---|---|
| | Female | 114 | 29.4 |
| Education | Illiterate | 30 | 7.73 |
| | Just read and write | 14 | 3.61 |
| | Primary school | 99 | 25.52 |
| | Secondary school | 146 | 37.63 |
| | Higher education | 99 | 25.52 |

| | | | |
|---|---|---|---|
| Address | Urban | 197 | 50.8 |
| | Rural | 191 | 49.2 |
| Smoker | No | 181 | 46.65 |
| | Yes | 184 | 47.42 |
| | Ex-smoker | 23 | 5.93 |
| Alcohol consuming | No | 376 | 96.9 |
| | Yes | 12 | 3.1 |

According to the BMI, 41.5% were obese as demonstrated in **Table II**.

**Table II: Descriptive Statistics of Anthropometric measures of studied patients**

| BMI* | No. | % |
|---|---|---|
| Under-Weight (BMI <18.5) | 1 | 0.3 |
| Normal Weight (BMI 18.5-24.9) | 50 | 12.9 |
| Overweight (BMI 25-29.9) | 176 | 45.3 |
| Obesity Class 1 (BMI 30-34.9) | 123 | 31.7 |
| Obesity Class 2 (BMI 35-39.9) | 29 | 7.5 |
| Obesity Class 3 (BMI >= 40) | 9 | 2.3 |

*BMI was measured according to the WHO classifications.[8]

The result of the baseline patient and procedural characteristics in the study population demonstrated in **Table III**.

Table III : Baseline clinical characteristics of studied patients with acute coronary syndrome

| Clinical Characteristic | | No. | Percent |
|---|---|---|---|
| Hypertension | Yes , on medications | 188 | 48.5% |
| | Yes, not on medications | 42 | 10.8% |
| Diabetes Mellitus | Yes, on medications | 123 | 31.7% |
| | Yes, but not on medication | 32 | 8.2% |
| History of Dyslipidemia | Yes | 190 | 49.0% |
| Cerebrovascular Accident (CVA) | Yes | 28 | 7.2% |
| Renal Impairment | Yes | 32 | 8.2% |
| History of Cancer | Yes | 3 | 0.8% |
| Low Hemoglobin (HB) Level | Yes | 69 | 17.8% |
| Previous Myocardial Infarction | Yes | 18 | 4.6% |
| Previous PCI | Yes | 70 | 18.0% |
| Previous CABG | Yes | 3 | 0.8% |
| History of IHD | Yes | 154 | 39.7% |
| Peripheral Vascular Disease | Yes | 33 | 8.5% |
| History of Heart Failure | Yes | 18 | 4.6% |
| Thrombolytic Before PCI | Yes | 26 | 6.7% |
| Left Ventricular Function (LVF) | 50%-70% | 297 | 76.5% |
| | 41%-49% | 57 | 14.7% |
| | ≤ 40% | 34 | 8.8% |

Overall, patients admitted with ACS exhibit a high comorbid burden and higher cardiovascular risk, including 10.8% who have hypertension but are not on medication. Almost 53.5% have DM. The prevalence of dyslipidemia, cerebrovascular accident (CVA), renal impairment, and cancer was 49.0%, 7.2%, 8.2%, and 0.8%, respectively. Additionally, 17.8% of patients had low hemoglobin levels.

Myocardial infarction, PCI, coronary artery bypass grafting (CABG), ischemic heart disease, and peripheral vascular disease were ranging from 0.8% to 39.7% of the patients. A small percentage had heart failure or prior thrombolysis. Most patients had preserved LV function, with a minority showing moderate to severe impairment.

Most patients were diagnosed with STEMI (64.95%), followed by NSTEMI(26.03%), and a smaller proportion with unstable angina (9.02%). Treatment strategies predominantly included therapeutic PCI (54.4%). Additionally, a notable percentage underwent CA (16.0%). Among those receiving PCI, a significant portion received a single stent (81.04%), with a smaller percentage opting for multiple stents. Follow-up strategies primarily involved Optimal Medical Therapy (56.45%) and Coronary Artery Bypass Graft (CABG) surgery (38.71%).

**Table IV** provides the diagnosis and treatment modalities among the study patients.

**Table IV: Diagnosis and Subsequent Treatment Modalities Among Studied Patients**

| Treatment Modalities | | Frequency | Percent |
|---|---|---|---|
| Diagnosis | NSTEMI | 101 | 26.03 |
| | STEMI | 252 | 64.95 |
| | Unstable Angina | 35 | 9.02 |
| | Total | 388 | 100.00 |
| Management approach | just medical Tx | 115 | 29.64 |
| | PCI Intervention | 211 | 54.38 |
| | underwent Coronary Angiograph without immediate PCI | 62 | 15.98 |
| | Total | 388 | 100.00 |
| PCI procedural characteristics | | | |
| Number Of Stent Used | 1 | 171 | 81.04 |
| | 2 | 35 | 16.59 |
| | 3 | 5 | 2.37 |
| | Total | 211 | 100.00 |
| Outcomes of Coronary Angiogram for Patients who underwent Coronary Angiography without adhoc PCI | OMT | 35 | 56.45 |
| | CABG | 24 | 38.71 |
| | Elective PCI | 3 | 4.84 |
| | Total | 62 | 100.00 |

Among the 211 patients who received PCI, the left anterior descending artery (LAD) was the most frequently identified culprit artery, affecting 105 patients (49.8%). The right coronary artery (RCA) followed closely, identified in 76 patients (36.0%).Less frequently identified culprit arteries included the left circumflex artery (LCX) in 23 patients (10.9%) and the left main stem (LMS) in 7 patients (3.3%).

Regarding complications, 86.6% (336 patients) did not experience pulmonary edema, while 13.4% (52 patients) did. Similarly, 89.9% (349 patients) did not encounter cardiogenic shock, whereas 10.1% (39 patients) did. **Table V** summarizes the prevalence of pulmonary edema and cardiogenic shock among the study patients.

**Table V: The Prevalence of Pulmonary Oedema and Cardiogenic Shock Among Participants**

| Complications | | No. | % |
|---|---|---|---|
| Pulmonary Oedema | No | 336 | 86.6 |
| | Yes | 52 | 13.4 |
| Cardiogenic Shock | No | 349 | 89.9 |
| | Yes | 39 | 10.1 |
| | Total | 388 | 100.0 |

A significant difference in the distribution of management plans across the diagnoses is summarized in **Table VI** (p = 0.001), with STEMI patients having the highest number of therapeutic PCIs. In terms of outcomes, death was observed only in the NSTEMI and STEMI groups, with a higher incidence in the STEMI group with 6.3% death. Stroke occurrences were minimal and evenly distributed between the NSTEMI and STEMI groups. Where the favorable outcome was most frequent among STEMI patients at a percentage of 90.9 %. Major bleeding events were rare and did not show a significant difference across the diagnoses (p = 0.530).

**Table VI : Clinical Outcomes according to the type of ACS**

| Clinical outcomes | | Diagnosis | | | P- Value |
|---|---|---|---|---|---|
| | | NSTEMI | STEMI | Unstable Angina | |
| Management Plan | Medical treatment | 48, 47.5% | 41, 16.3% | 26, 74.2% | 0.001 |
| | Therapeutic PCI | 31, 30.7% | 179, 71.0% | 1, 2.9% | |
| | Coronary angiography | 22, 21.8% | 32, 12.7% | 8, 22.9% | |
| Outcomes | Death | 4, 4.0% | 16, 6.3% | 0, 0.0% | 0.231 |
| | Ischemic Stroke | 1, 1.0% | 1, 0.4% | 0, 0.0% | 0.707 |
| | Favorable | 96, 95.0% | 229, 90.9% | 35, 100.0% | 0.088 |
| | Major bleeding | 0, 0.0% | 5, 2.0% | 0, 0.0% | 0.255 |
| | Hemorrhagic Stroke | 0, 0.0% | 1, 0.4% | 0, 0.0% | 0.763 |
| Total | | 101 | 252 | 35 | 388 |

**Table (7)** presents the clinical outcomes and duration of hospital stay among patients who underwent PCI. The majority of these patients experienced favorable outcomes, with 93.8% (198 patients) having positive results post-PCI. However, 6.2% (13 patients) experienced non-favorable outcomes. Among these non-favorable cases, the most common complication was death, occurring in 61.5% (8 patients), followed by major bleeding in 30.8% (4 patients), and hemorrhagic stroke (ICH) in 7.7% (1 patient). The duration of hospital stays for these patients ranged from a minimum of 1 day to a maximum of 10 days. The mean hospital stay was 2.33 days with a standard deviation of 1.08 days, and the mode of hospital stay was 2 days.

**Table VII: Clinical Outcomes and Hospital Stay Duration Among Study Patients who Underwent PCI**

| Clinical Outcomes | | | No. | % |
|---|---|---|---|---|
| Is it favorable? | Yes | | 198 | 93.8 |
| Non-favorable outcomes (Complicated) | Death | | 8 | 61.5 |
| | Major bleeding event | | 4 | 30.8 |
| | Hemorrhagic Stroke | | 1 | 7.7 |
| Duration of hospital stay in days | Minimum | Maximum | Mean (Sd) | Mode |
| | 1 | 10 | 2.33 (1.08) | 2 |

**Table VIII** explores the relationship between sociodemographic characteristics and clinical outcomes in patients who underwent PCI.Table 8 shows significant associations between clinical outcomes and age ($p = 0.030$) and education level ($p = 0.007$). Patients aged 30-39 and 50-59 experienced exclusively favorable outcomes, while those aged 60-69, 70-79, and 80 and above had increasing rates of complications and mortality. Education level also showed a significant correlation, where higher education (secondary and higher education ) levels were associated with more favorable outcomes at 97.6% and 94.4%, respectively. However, no significant associations were found for sex, address, smoking status, and alcohol consumption.

Table VIII: Association Between Sociodemographic Characteristics and Clinical Outcomes in PCI Patients

| Variable | | Outcomes | | | | P - Value |
|---|---|---|---|---|---|---|
| | | Favorable | Major Bleeding Events | Hemorrhagic Stroke | Death | |
| Age groups in years | 30 - 39 | 1 | 0 | 0 | 0 | 0.030 |
| | | 100.0% | 0.0% | 0.0% | 0.0% | |
| | 50 - 59 | 7 | 0 | 0 | 0 | |
| | | 100.0% | 0.0% | 0.0% | 0.0% | |
| | 60 - 69 | 48 | 2 | 0 | 3 | |
| | | 90.6% | 3.8% | 0.0% | 5.7% | |
| | 70 - 79 | 136 | 2 | 0 | 3 | |
| | | 96.5% | 1.4% | 0.0% | 2.1% | |
| | 80 and more | 6 | 0 | 1 | 2 | |
| | | 66.7% | 0.0% | 11.1% | 22.2% | |
| Education | illiterate | 11 | 0 | 1 | 1 | 0.007 |
| | | 84.6% | 0.0% | 7.7% | 7.7% | |
| | Just read and write | 6 | 2 | 0 | 0 | |
| | | 75.0% | 25.0% | 0.0% | 0.0% | |
| | primary school | 48 | 0 | 0 | 4 | |
| | | 92.3% | 0.0% | 0.0% | 7.7% | |
| | secondary school | 82 | 1 | 0 | 1 | |
| | | 97.6% | 1.2% | 0.0% | 1.2% | |
| | higher education | 51 | 1 | 0 | 2 | |
| | | 94.4% | 1.9% | 0.0% | 3.7% | |

There was no significant associations between chronic diseases and clinical outcomes in patients undergoing PCI. This includes dyslipidemia, hypertension, diabetes mellitus, cerebrovascular accidents, renal impairment, history of cancer, and low hemoglobin levels as revealed in **Table (9).**

Table IX: Association Between Chronic Disease and Clinical Outcomes In PCI Patients

| Variable | | Outcomes | | | | P – Value |
|---|---|---|---|---|---|---|
| | | Favorable | Major bleeding events | Hemorrhagic Stroke | Death | |
| Hypertension | No | 85 | 2 | 0 | 5 | 0.150 |
| DM | No | 98 | 3 | 1 | 5 | 0.930 |
| History Of Dyslipidemia | Yes | 85 | 1 | 1 | 5 | 0.382 |
| CVA | Yes | 14 | 0 | 0 | 2 | 0.209 |
| Renal Impairment | Yes | 8 | 0 | 0 | 1 | 0.442 |
| History Of Cancer | Yes | 1 | 0 | 0 | 0 | 0.831 |
| Low HB level | Yes | 26 | 2 | 0 | 1 | 0.215 |

The association between cardiac clinical history and outcomes in patients who underwent PCI is demonstrated in **Table X**.

**Table X: Association of Clinical History and Complication with Clinical Outcomes in PCI Patients**

| Variable | | Outcomes | | | | P Value |
|---|---|---|---|---|---|---|
| | | Favorable | Major bleeding events | Hemorrhagic Stroke | Death | |
| History Of HF | Yes | 3 | 1 | 0 | 1 | 0.032 |
| | | 1.5% | 25.0% | 0.0% | 12.5% | |
| Pulmonary Edema | Yes | 18 | 1 | 0 | 5 | 0.002 |
| | | 9.1% | 25.0% | 0.0% | 62.5% | |
| Cardiogenic Shock | Yes | 15 | 2 | 0 | 6 | 0.009 |
| | | 7.6% | 50.0% | 0.0% | 75.0% | |
| LVF | 50%-70% | 156 | 1 | 1 | 1 | <0.001 |
| | | 78.8% | 25.0% | 100.0% | 12.5% | |
| | 41%-49% | 30 | 3 | 0 | 2 | |
| | | 15.2% | 75.0% | 0.0% | 25.0% | |
| | <=40 % | 12 | 0 | 0 | 5 | |
| | | 6.1% | 0.0% | 0.0% | 62.5% | |

The analysis indicates significant associations between clinical outcomes and history of heart failure ($p = 0.032$), pulmonary edema ($p = 0.002$), cardiogenic shock ($p = 0.009$), and left ventricular function

(p = 0.000). These factors were linked to poorer outcomes, with increased mortality rates. Left ventricular function (LVF) was a strong determinant of outcomes, with patients having LVF of 50%-70% showing more favorable results, while those with LVF ≤40% experienced the highest mortality. No significant associations were found for myocardial infarction, previous PCI, coronary artery bypass grafting, thrombolytic therapy, ischemic heart disease, and peripheral vascular disease.

## Discussion

Acute coronary syndrome is a serious medical illness marked by a variety of symptoms related to the occlusion of coronary arteries[8] . The findings provide an extensive overview of the baseline characteristics, co-morbidities, and clinical outcomes of the ACS patients. As well as shedding light on the most common therapeutic measures used in treating these subsets of patients in Iraq.

The study population had a notable frequency of comorbidities and cardiovascular risk factors, aligning with the typical profiles of individuals afflicted by ACS. Among the patients, 59.3% had hypertension, of which 10.8% were not on any treatment for hypertension. According to Picariello et al. (2011), the prevalence of antecedent hypertension in the Middle East region ranges from (31to 59) %. Moreover, controlled hypertension was seen in 40% of the cases [9] . This finding aligns with a study conducted by Nassr and Forsth (2019) in Iraq, where they observed that only 38.7% of the participants had their blood pressure under control. [10]

Similarly, Diabetes Mellitus was commonly seen among the study participants 53.6% of patients. The distribution of strategies for managing DM demonstrates a diverse approach, with the use of insulin, oral medications, or a mix of both. The same was observed by Stampouloglou (2023) and Zhou et al. (2018) in China [11 ,12]. Although Amen et al. (2020) suggested that only 29.7% of patients with ACS in Iraq had diabetes at the time of presentation. [13]

Similarly, around 50% of the patients (67.4% males and 32.6% females) were afflicted by dyslipidemia, which is somewhat lower than the findings of Muneeb et al. (2022) in Pakistan, who identified a prevalence of dyslipidemia was 83.2% (65.5% in male patients and 34.5% in female patients) with ACS. [14] Moreover, certain comorbidities were less commonly seen, for instance only 7.2% of patients had CVA and 8.2% had renal impairment.

The findings above are consistent with a study conducted by Yadegarfar et al. (2020) that involved a total of 412,809 individuals with ACS. Of these patients, 59.5% had at least one comorbidity, such as hypertension, diabetes, chronic obstructive pulmonary disease, cerebrovascular disease, chronic heart failure, chronic renal failure, or peripheral vascular disease. [15]

The most common diagnosis was ST-elevation myocardial infarction, accounting for 64.9% of cases, which was followed by non-ST-elevation myocardial infarction at 26.03% and unstable angina at 9.02% Interestingly, the incident of STEMI is greater than the published global rates. For example, in a recent study conducted by Akbar et al. (2024), it was shown that STEMI accounts for 38% of individuals who arrive at the hospital with acute coronary syndrome [16] . Also, Basit et al. (2024) concluded that 70% of individuals in the United States with ACS have NSTEMI an incidence rate that exceeds the finding in our study [17] This is because this center is a referral center that does not have an emergency department. The logistics of PPCI in Basrah involve referring patients with STEMI who need PPCI to the Basrah Cardiac Specialist Center, as it's the main intervention center in Basrah. Meanwhile, STEMI and UA are usually managed in CCU in other Hospitals. Nevertheless, our findings closely align with the statistics reported in a local study conducted in Iraq by Allami (2024) where 30.8% of patients had NSTEMI vs. 69.2% of patients suffered STEMI. [18]

The STEMI compared to NSTEMI differs among the Arabic nations due to variations in healthcare systems, population demography, and lifestyle variables. For example, Alhabib et al. (2019) performed research on the Saudi population and discovered that STEMI constituted about 46% of all ACS cases, while NSTEMI accounted for roughly 54%. In this location, the distribution reveals a slightly greater occurrence of NSTEMI in comparison to STEMI [19.] Moreover, Yusufali et al. (2010) conducted research in the UAE using registry data. They found that 55% of cases of ACS were classified as STEMI, while the other 45% were classified as NSTEMI [20]. This indicates a virtually equal incidence of STEMI and NSTEMI among individuals with ACS. Finally, a study conducted in Egypt by Abdelmoneim et al. (2014) revealed that STEMI constitutes around 60% of ACS patients, whereas NSTEMI accounts for the remaining 40%. [21]

Percutaneous coronary intervention was the main therapeutic approach, with 54.4% of patients getting the procedure. The prevalence of single stents was 81.04%, which is higher than that of multiple stents:

16.59% for two stents and 2.37% for three stents, suggesting a higher occurrence of focal lesions. Following angiography, the main follow-up treatments were optimal medical therapy (OMT) and coronary artery bypass graft (CABG) surgery. These techniques were chosen based on the patient profiles and the severity of their condition. These findings align with the results of Kim et al. (2023) in Canada, who observed that the majority of patients had PCI. However, they reported a higher incidence, up to 90%. [22]

LAD was the most often involved artery, accounting for 49.8% of cases, followed by RCA and LCX. The observed distribution aligns with the findings in previous research, which indicate that the LAD is the most often affected site of significant stenosis in individuals with ACS. Some patients required additional surgery on a non-culprit artery, with LCX being the most often treated. This discovery aligns with the research conducted by Ludhwani et al. (2023), which revealed that the LAD is the most often plagued coronary internationally [23]. It is also consistent with the findings from a study conducted in Arabic nations by Ahmad et al. (2022) in Saudi Arabia [24]. Furthermore, indicators for poor outcomes of ACS such as pulmonary edema were seen in 13.4% of cases, whereas 10.1% experienced a cardiogenic shock. Our findings align with the larger set of literature presented by Zanza et al. (2023) who found that among patients with MI, pulmonary edema is one of the most frequent causes of respiratory failure [25].

Also, Iqbal et al. (2023) reported that the mortality rate may reach up to 85% in patients with pulmonary edema. [26]

Regarding the clinical outcomes and duration of hospitalization, the primary aim of the present research, the majority of patients who had PCI exhibited favorable outcomes (93.8%), with a small proportion having complications at a percentage (6.2%) which including death (61.5%), severe bleeding (30.8%), and hemorrhagic stroke (7.7%), suggesting effective clinical management and recovery procedures. These results are favorable when compared to earlier studies, which have shown comparable rates of success and complications in ACS patients treated with PCI. Recent research conducted in Egypt by Etriby et al. (2024) documented a success rate of 90%, which aligns well with our own results [27]. Further research conducted in the Kurdistan region of Iraq by Mohammad et al. (2022) found similar results, with an 80% success rate and patients being discharged home after 24 hours of stay. [28]

There were noticeable differences in the incidence of unfavorable outcomes of PCI,

such as death, severe bleeding episodes, and hemorrhagic stroke, in patients hospitalized with ACS in Iraq compared to those reported in other Middle Eastern countries. For instance, The mortality rate of 3% for patients who underwent PCI recorded in the current study is relatively lower than the rates reported in previous studies conducted on comparable populations. An example is research conducted by AlHabib et al. (2012) in Saudi Arabia, which found that about 5% of patients with ACS who had PCI died while still in the hospital [29]. Similarly, the study conducted by Joury et al. (2018) on the Gulf Registry of Acute Coronary Events revealed that the overall mortality rate across many nations in the Gulf was 6% [30]. The reduced mortality rate observed in our study can be attributed to several factors. Advancements in medical interventions, including improved PCI techniques and more effective medications, have significantly enhanced patient outcomes. Early detection and timely treatment, facilitated by efficient healthcare protocols, have minimized myocardial damage and complications. Comprehensive patient management, adherence to evidence-based guidelines, and robust post-PCI care and rehabilitation programs have further contributed to better survival rates. Additionally, differences in patient demographics, lower prevalence of severe comorbidities, and enhanced public awareness and education about ACS symptoms have likely played a role. Improved healthcare infrastructure and access to advanced medical care in our study setting may also explain the lower mortality rate compared to previous studies

The incidence of major bleeding episodes (1%) for patients who had PCI in our study group is compared to the rates documented in existing literature. As an example, Joury et al. (2018) recorded a substantial rate of severe bleeding, estimated at about 1%, among patients with acute coronary syndrome (ACS) who had percutaneous coronary intervention (PCI) in Saudi Arabia. [30]

Whereas the prevalence of hemorrhagic stroke (0.47%) for the patient who had PCI in our study is somewhat comparable to other studies from around the world. According to research conducted by Lim et al. (2022), the incidence of hemorrhagic stroke in individuals with ACS was around 1.3% (22 cases from1732 patients) in Singapore [31]. The rise in cases seen in their work might potentially be attributed to patient-specific risk factors, the use of anticoagulation, or other confounders that were not captured.

Individuals' hospitalization duration is relatively short, which ranges from (1-10)

days with a mean duration of 2.33 days. The findings of Seto et al. (2018) align with this observation, suggesting that a hospital stay commonly does not exceed 48 hours [32]. Furthermore, Han et al. (2022) linked extended hospitalization periods to increased mortality and complications rates in their severity of the initial illness [33] . Conversely, another study has shown extended durations of hospitalization for patients with ACS who have complications, underscoring the need for continued monitoring and therapy (Thompson et al., 2019)[34].

Significant relationships were found between age, education level, and clinical outcomes in terms of sociodemographic and clinical characteristics. There was an association between higher levels of education and more favorable outcomes, which may be due to improved health literacy and adherence to medical advice. The age of patients played a crucial role, as older individuals had a greater incidence of complications and death. The results align with the wider body of research conducted by Zajacova et al. (2018) and Chesser et al. (2016), which highlight age and education as significant factors influencing clinical outcomes. [35, 36]

Remarkably, characteristics such as sex, address, smoking status, and alcohol intake did not have a significant influence on clinical outcomes. This suggests that these factors may not play a crucial role in predicting short-term outcomes following PCI in patients with ACS. Nevertheless, the absence of statistical significance should be approached with caution, considering that other studies, such as the one conducted by Mohammadi et al. (2021), have emphasized the effect of these factors, notably smoking, on long-term outcomes and the progression of illness [37]. Another study by Matetic et al. (2021) in the United States shows differences in the management and outcomes of MI among the sexes, with women less likely to receive invasive therapies, and more likely to experience adverse outcomes including mortality, major bleeding, and stroke and their finding is not in agreement with our study. [38]

Nevertheless, research conducted by Liu et al. (2019) discovered no significant impact of smoking on the post-intervention outcome, which aligns with our findings. [39]

There were no significant connections observed between the rate of chronic conditions such as hypertension, diabetes, dyslipidemia, CVA, renal impairment, and history of cancer and clinical outcomes following PCI. This suggests that while these factors have a role in the overall risk profile and management complexity, they

may not have a direct impact on short-term procedural outcomes. Nevertheless, there is a noticeable tendency towards unfavorable outcomes for patients who have previously had heart failure, pulmonary oedema, cardiogenic shock, and a decline in left ventricular function. This emphasizes the significance of these characteristics in determining the prognosis of patients. The results of this study align closely with the present research on ACS and PCI (Matheus et al. 2013[40]; Powell-Wiley et al. 2021[41].

Nevertheless, the study offers more understanding of the sociodemographic and clinical variables that impact outcomes, highlighting the complex nature of patient treatment. The documented relationships between academic achievement and clinical outcomes highlight the significance of health education and literacy in enhancing patient prognosis.

The study has several limitations. Firstly, this study was conducted at a single center, which may restrict the generalizability of the findings. The study's retrospective design also relies on potentially incomplete or inaccurate medical records. The sample size may be inadequate and there is a possibility of selection bias.

## Conclusions

This study emphasizes a high rate of comorbidities in patients with acute coronary syndrome, such as diabetes, dyslipidemia, and hypertension. This points towards the need for effectively controlling these underlying diseases to reduce cardiovascular risk. Despite favorable outcomes in most cases, a small proportion of patients faced severe complications, including mortality and significant bleeding. The study also identified older age as one of the factors associated with worse outcomes, suggesting this should be considered when evaluating patient prognosis and treatment plans. Additionally, acute clinical events, particularly pulmonary edema and cardiogenic shock, were strong predictors of poor outcomes underscoring the need for prompt and aggressive treatment of these conditions.

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Work concept and design 1,2,3,4
Data collection and analysis 2,
Responsibility for statistical analysis 2
Writing the article 1,2,3,4
Critical review, 1, 2,3
Final approval of the article 1,2,3

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Each author believes that the manuscript represents honest work and certifies that the article is original, is not under consideration by any other journal, and has not been previously published.
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