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Acute Coronary Syndrome in Type 2 Diabetes: Clinical Presentation, Risk Factor Burden, and Gender Disparities in an Iraqi Cohort

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Abstract:

Objective: To characterize the clinical presentation of acute coronary syndrome (ACS) in Iraqi patients with type 2 diabetes (T2DM) and evaluate gender-specific risk factor profiles.

Methods: A hospital-based case series of 105 T2DM patients admitted with ACS to Ibn Sina Teaching Hospital, Mosul (between April 2023–February 2024). Data included demographics, risk factors, ECG, echocardiography, and lipid profiles. Patients were categorized into ST-segment elevation myocardial infarction (STEMI) or non-ST-segment elevation MI/unstable angina (NSTEMI/UA).

Results: STEMI predominated (61.0%, n=64). Females exhibited higher rates of hypertension (63.6% vs. 14.8%), dyslipidemia (86.4% vs. 42.6%), and obesity (59.1% vs. 27.9%) (p<0.001). Heart failure was more frequent in NSTEMI/UA (43.9% vs. 23.1%, p=0.019). Over 50% presented without prior ischemic heart disease.

Conclusions: Iraqi T2DM patients with ACS frequently present with STEMI and extensive ischemia, particularly women with clustered metabolic risks. Gender-tailored prevention and regional screening programs are urgently needed.

Keywords: Acute Coronary Syndrome, Type 2 Diabetes

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Introduction

Cardiovascular disease (CVD) remains the leading cause of mortality in type 2 diabetes (T2DM), accounting for 65–75% of deaths in this population [1]. Acute coronary syndrome (ACS) is a critical manifestation of CVD in T2DM, driven by accelerated atherosclerosis, endothelial dysfunction, and hypercoagulability [2]. Compared to non-diabetics, T2DM patients with ACS face worse outcomes, including higher rates of heart failure and mortality [3].

In Iraq, T2DM prevalence has surged to 25–35% among adults, with suboptimal control of cardiovascular risk factors [4,5]. Regional challenges include delayed diagnosis, limited revascularization access, and cultural barriers to lifestyle modification [6,7]. Gender disparities further complicate ACS management: women often present atypically and experience care delays, while men exhibit higher smoking rates [8,9].

Pathophysiological mechanisms linking T2DM to ACS include chronic hyperglycemia-induced oxidative stress, insulin resistance-driven inflammation, and atherogenic dyslipidemia (elevated triglycerides, low HDL) [10,11]. These factors increase susceptibility to ST-segment elevation myocardial infarction (STEMI) [12]. However, data on ACS patterns in Middle Eastern T2DM populations remain scarce. This study evaluates clinical presentation, risk factors, and gender disparities in ACS among Iraqi T2DM patients.

Methods

Study Design and Setting

A hospital-based case series conducted at Ibn Sina Teaching Hospital, Mosul, Iraq (between April 2023–February 2024). Ethical approval was obtained from the hospital's institutional review board, and informed consent was waived for retrospective data collection.

ParticipantsInclusion criteria:

1. T2DM diagnosis (fasting glucose ≥7.0 mmol/L or random glucose ≥11.1 mmol/L) [13].
2. ACS confirmed by clinical presentation and ECG (STEMI or NSTEMI/UA).

ParticipantsExclusion criteria:

1. Type 1 diabetes or gestational diabetes.
2. Severe renal/hepatic dysfunction.

Variables and Measurements

- **Demographics**: Age, sex, diabetes duration.
- **Risk factors**:
o Hypertension: ≥140/90 mmHg or on antihypertensives.
o Dyslipidemia: LDL ≥2.5 mmol/L, HDL ≤1 mmol/L (male)/≤1.3 mmol/L (female), triglycerides ≥2 mmol/L.
o Obesity: BMI ≥30 kg/m² (weight/height²).
o Smoking: Current or former use.
- **ECG**: 12-lead ECG (Philips PageWriter TC70) interpreted by cardiologists.
o STEMI: ST elevation ≥1 mm (limb leads) or ≥2 mm (precordial leads).
o NSTEMI/UA: ST depression ≥0.5 mm or T-wave inversion.
o **Echocardiography**: LVEF <50% (GE Vivid E95).

Statistical Analysis

Categorical variables expressed as frequencies (%), continuous variables as mean±SD. Chi-square/Fisher's exact tests

compared proportions; logistic regression identified independent predictors of STEMI/NSTEMI. Analyses performed using SPSS v28 (IBM Corp.). *p<0.05* considered significant.

Results:

Table 1: Baseline Demographic and Clinical Characteristics of the Study Population Stratified by ACS Type

Parameter	Total (n=105)	STEMI (n=64)	NSTEMI/UA (n=41)	*p-value*
Age (years)	58.7 ± 7.9	57.2 ± 8.1	60.1 ± 7.3	0.051
Male sex	61 (58.1%)	42 (65.6%)	19 (46.3%)	0.049
Diabetes duration (years)	9.5 ± 6.7	8.9 ± 5.8	10.3 ± 7.2	0.212
First ACS presentation	53 (50.5%)	40 (62.5%)	13 (31.7%)	0.002
Heart failure	33 (31.4%)	15 (23.4%)	18 (43.9%)	0.019

- OR (odds ratio) and CI (confidence interval) derived from logistic regression.
- Males had higher STEMI odds (OR=2.2, 95% CI: 1.01–4.82).
- First-presentation ACS independently predicted STEMI (OR=3.6, 95% CI: 1.6–8.3).

As shown in Table 1: Baseline Characteristics, male patients had significantly higher odds of presenting with STEMI compared to females (OR=2.2, p=0.049), suggesting potential underdiagnoses or delayed recognition in women.

Table 2: Distribution of Cardiovascular Risk Factors by ACS Subtype (STEMI vs. NSTEMI/UA)

Risk Factor	STEMI (n=64)	NSTEMI/UA (n=41)	OR (95% CI)	*p-value*
Hypertension	28 (43.8%)	9 (22.0%)	2.7 (1.1–6.6)	0.023
Dyslipidemia	33 (51.6%)	31 (75.6%)	0.3 (0.1–0.8)	0.014
Obesity	22 (34.4%)	21 (51.2%)	0.5 (0.2–1.1)	0.087
Smoking	21 (32.8%)	5 (12.2%)	3.5 (1.2–10.4)	0.017

- *OR adjusted for age and sex.*
- *Hypertension and smoking independently predicted STEMI (p<0.05).*

According to Table 2: Risk Factor Distribution by ACS Type, hypertension and smoking were significantly associated with STEMI presentation (p<0.05), reinforcing the importance of controlling these modifiable risk factors.

Table 3: Gender-Based Differences in Cardiovascular Risk Factor Prevalence among T2DM Patients with ACS

Risk Factor	Male (n=61)	Female (n=44)	OR (95% CI)	*p-value*
Hypertension	9 (14.8%)	28 (63.6%)	0.1 (0.03–0.3)	<0.001
Dyslipidemia	26 (42.6%)	38 (86.4%)	0.1 (0.04–0.3)	<0.001
Obesity	17 (27.9%)	26 (59.1%)	0.3 (0.1–0.6)	0.001

Risk Factor	Male (n=61)	Female (n=44)	OR (95% CI)	*p-value*
Smoking	25 (41.0%)	1 (2.3%)	30.6 (3.9–239.2)	<0.001

OR reflects female vs. male risk factor prevalence.

Females had higher odds of clustered metabolic risks (≥3 factors: OR=10.2, 95% CI: 3.1–33.8).

As demonstrated in Table 3: Gender Differences in Risk Factors, metabolic risk clustering (hypertension, dyslipidemia, and obesity) was notably higher among females, underscoring the need for gender-specific prevention strategies.

Discussion

This study highlights three key findings:

1. STEMI Predominance: Over 60% of Iraqi T2DM patients presented with STEMI—double the rate in European registries [14]. This contrasts with the global shift toward NSTEMI dominance, attributed to improved primary prevention [15]. Delayed care-seeking (>4 hours pre-hospital delay in Iraq) and undiagnosed ischemia likely contribute [16].

2. Gender Disparities: Females exhibited 4.3-fold higher hypertension and 2.1-fold greater obesity rates, consistent with global trends of metabolic risk clustering in diabetic women [17]. Postmenopausal estrogen loss exacerbates insulin resistance and endothelial dysfunction [18]. Conversely, smoking—a key STEMI driver—was male-predominant (41% vs. 2%), aligning with Iraqi cultural norms [19].

3. First-Presentation ACS: Half of the cohort lacked prior ischemic heart disease, underscoring gaps in primary prevention. Despite guidelines, <40% of Iraqi diabetics receive statins or aspirin [20]. Heart failure was more frequent in NSTEMI/UA (43.9%), likely reflecting chronic microvascular dysfunction [21].

Regional Context: Compared to Saudi Arabia (45% STEMI) and Egypt (50%) [22,23], Iraq's 61% STEMI rate highlights urgent need for public health interventions targeting glycemic control and hypertension.

Limitations: Absence of cardiac biomarkers and angiographic data. Single-center design limits generalizability.

Clinical Implications

The findings of this study emphasize the urgent need for gender-sensitive risk assessment in diabetic patients presenting with ACS in Iraq. The predominance of STEMI and the high prevalence of undiagnosed ischemia at first presentation suggest critical delays in screening and risk stratification. Specifically:

• Women with T2DM should undergo routine metabolic screening for hypertension, dyslipidemia, and obesity—even in the absence of classical ischemic symptoms—to enable early cardiovascular risk modification.

• Men with T2DM, particularly smokers, represent a high-risk subgroup for STEMI and should be prioritized for aggressive smoking cessation programs and early intervention strategies.

• Primary care physicians should implement structured risk assessment tools for diabetic patients to detect silent ischemia and prevent first-time ACS presentations.

This tailored approach could bridge the current gaps in prevention and significantly improve cardiovascular outcomes in the Iraqi diabetic population.

Conclusions

1. Iraqi T2DM patients with ACS frequently present with STEMI and extensive ischemia.

2. Hypertension, dyslipidemia, and obesity cluster in women, necessitating gender-specific prevention.

Recommendations

1. Implement community-based programs for BP/lipid control in diabetic women.

2. Prioritize smoking cessation initiatives targeting men.

3. Screen high-risk T2DM patients for silent ischemia.

4. Conduct multicenter studies with angiographic correlation.

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