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SYMPTOMS OF ACUTE CORONARY SYNDROMES: ARE THERE GENDER DIFFERENCES?

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Abstract

Objective: *To compare breathlessness and other presenting symptoms, including the absence of chest pain, in women and men with acute coronary syndrome (ACS).*

Study Design: *Prospective analytical cross-sectional study (design per approved protocol; verification of conduct pending).*

Settings: *Accident and Emergency Department, Jinnah Postgraduate Medical Centre, Karachi, Pakistan.*

Period: *From Dec 2024 to April 2025.*

Material & Methods: *The supplied dataset contained 120 records, with 60 female and 60 male ACS entries. Symptoms and risk factors were compared using chi-square/Fisher exact tests; age by t-test; and symptom-to-arrival time by Mann–Whitney U test. Logistic regression evaluated breathlessness by sex, adjusting for age, diabetes and ACS subtype. Estimates are provisional until the underlying records are authenticated.*

Results: *Breathlessness occurred in 27/60 women (45.0%) and 21/60 men (35.0%; OR 1.52, 95% CI 0.73–3.17; p=0.264). Chest discomfort was recorded in 75.0% and 80.0%, respectively (p=0.512). Median symptom-to-arrival time was 4.04 hours (IQR 2.41–6.95) in women versus 2.95 hours (IQR 1.71–5.22) in men (p=0.032). The adjusted odds ratio for breathlessness in women was 1.53 (95% CI 0.73–3.22; p=0.262).*

Conclusion: *In the supplied records, breathlessness and chest-pain absence did not differ significantly by sex, while women had a longer recorded symptom-to-arrival interval. Clinical interpretation requires validation of the underlying records.*

INTRODUCTION

Cardiovascular disease remains the leading cause of death worldwide: an estimated 19.8 million deaths occurred in 2022, representing nearly 32% of global mortality. Acute coronary syndrome (ACS), comprising ST-elevation myocardial infarction (STEMI), non-ST-elevation myocardial infarction (NSTEMI) and unstable angina, demands rapid recognition and evidence-based evaluation. Contemporary European and American guidance emphasises immediate electrocardiographic assessment, serial cardiac troponins and timely clinical risk stratification rather than reliance on a single symptom. Chest discomfort is frequent, but its absence does not safely exclude an acute coronary event.[1,2,3,4]

The assumption that men and women experience entirely different ACS symptoms is not supported by contemporary evidence. A

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2022 meta-analysis of 15 prospective studies including 10,730 individuals found higher rates of dyspnoea, nausea/vomiting, arm pain and palpitations among women with suspected ACS, while also showing substantial symptom overlap. Recent reviews have reinforced the importance of considering the full symptom constellation, associated comorbidities and the possibility of non-chest presentations. Evidence from Pakistan remains clinically relevant: a 2026 study from Faisalabad identified differences in ACS subtype distributions, while a Karachi emergency department study drew attention to dyspnoea in patients presenting with non-classical symptoms. These findings argue against describing women's symptoms as inherently "atypical".[5,6,7,8,9,10]

Despite expanding international evidence, standardised comparisons of symptoms at presentation among women and men with confirmed ACS in the Jinnah Postgraduate Medical Centre emergency department remain limited. The primary objective of the present study was to compare the frequency of breathlessness between female and male ACS patients. Secondary objectives were to compare other index symptoms, presentation without chest pain and symptom-to-arrival time, with exploratory adjustment for age, diabetes and ACS subtype. Findings may inform local history-taking and equitable triage practice, subject to confirmation of the dataset's provenance.

MATERIAL & METHODS

Study design and setting: The protocol specifies a prospective analytical cross-sectional study in the Accident and Emergency Department, Jinnah Postgraduate Medical Centre (JPMC), Karachi.

Study period: The protocol specifies four months from Dec 2024 to April 2025 following after approval from the institutional ethical review committee of JPMC.

Sample size and sampling: A two-independent-proportions calculation in the approved synopsis yielded 54 participants per group and, after 10% allowance, a target of 60 women and 60 men (total n=120). Non-probability purposive sampling with equal sex quotas was planned. The supplied dataset has 60 records per group.

Inclusion criteria: Adults aged 18 years or older with suspected ACS at presentation and a final consultant diagnosis of STEMI, NSTEMI or unstable angina, clinically stable for interview within 24 hours and providing written consent.

Exclusion criteria: Type 2 myocardial infarction, non-coronary myocardial injury, an alternative final diagnosis, cardiac arrest, ventilation, altered consciousness or impaired recall, late transfer, repeat enrolment or refusal/withdrawal of consent, as specified in the protocol.

Data collection: The approved questionnaire captures study identification, age, gender category, hypertension, diabetes, dyslipidaemia, smoking and prior ischaemic heart disease; first and predominant symptoms; 14 index-episode symptom indicators; chest-pain features; symptom onset and emergency-registration timestamps; initial electrocardiographic findings; serial high-sensitivity troponin classification; and final consultant ACS subtype. The uploaded records were used as received; no clinical variables were imputed or modified. The instrument defines breathlessness as patient-reported shortness of breath during the index episode and chest-pain absence as no chest discomfort from onset to arrival.

Statistical analysis: The supplied data were independently analysed using Python statistical routines in accordance with the pre-specified SPSS version 26 plan. Continuous variables are presented as mean ± standard deviation or median (interquartile range), and categorical variables as frequency (percentage). Pearson chi-square tests were used for categorical comparisons, with Fisher exact testing where small expected counts made it preferable. An independent-samples t-test compared age and Mann–Whitney U test compared skewed symptom-to-arrival time. Unadjusted odds ratios (ORs) with 95% confidence intervals were calculated for binary comparisons. Binary logistic regression modelled breathlessness (yes=1) as a function of female versus male

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group, age in years, diabetes and ACS subtype (STEMI reference). Stratified analyses by age (<60/≥60 years), diabetes and ACS subtype were exploratory. Tests were two-sided and p≤0.05 was nominally significant; exploratory p-values were not adjusted for multiple comparisons.

RESULTS

The dataset comprised 120 ACS entries, equally divided into 60 women and 60 men. Mean age was 59.93 ± 10.49 and 58.42 ± 10.88 years, respectively (p=0.438). Fifty-one (42.5%) entries were classified as STEMI, 53 (44.2%) as NSTEMI and 16 (13.3%) as unstable angina; the distributions did not differ significantly between groups (p=0.638). Hypertension affected 65.0% of women and 60.0% of men. Current smoking was more frequently recorded in men, 40.0% versus 6.7% (p<0.001) (Table-I).

Table-I: Baseline characteristics by gender category (n=120)

Characteristic	Female (n=60)	Male (n=60)	p-value
Age, mean ± SD (years)	59.93 ± 10.49	58.42 ± 10.88	0.438
Hypertension, n (%)	39 (65.0)	36 (60.0)	0.572
Diabetes, n (%)	21 (35.0)	19 (31.7)	0.699
Dyslipidaemia, n (%)	21 (35.0)	18 (30.0)	0.559
Current smoking, n (%)	4 (6.7)	24 (40.0)	<0.001
Previous IHD, n (%)	16 (26.7)	21 (35.0)	0.323
ACS subtype: STEMI	27 (45.0)	24 (40.0)	0.638†
ACS subtype: NSTEMI	24 (40.0)	29 (48.3)	—
ACS subtype: unstable angina	9 (15.0)	7 (11.7)	—

Values are n (%) unless stated otherwise; percentages use gender-group denominators of 60. †Overall 2×3 chi-square comparison for ACS subtype. IHD=ischaemic heart disease; SD=standard deviation.

Breathlessness, the primary symptom of interest, was recorded in 27 women (45.0%) versus 21 men (35.0%). This difference was not statistically significant (unadjusted OR 1.52, 95% CI 0.73–3.17; p=0.264). Chest pain/discomfort was recorded in 45 women (75.0%) and 48 men (80.0%; p=0.512), meaning 15 women and 12 men had presentations without chest pain. Nausea/vomiting and palpitations were numerically more common in women, whereas diaphoresis was more frequent in men. The nominal p-value for palpitations was 0.040; this exploratory association should not be treated as definitive after multiple symptom comparisons (Table-II).

Table-II: Index symptoms and gender comparisons (n=120)

Symptom	Female n (%)	Male n (%)	OR (95% CI)	p-value
Chest pain/discomfort	45 (75.0)	48 (80.0)	0.75 (0.32–1.77)	0.512
Breathlessness	27 (45.0)	21 (35.0)	1.52 (0.73–3.17)	0.264
Sweating/diaphoresis	27 (45.0)	36 (60.0)	0.55 (0.26–1.13)	0.100
Nausea/vomiting	28 (46.7)	19 (31.7)	1.89 (0.90–3.97)	0.092

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Symptom	Female n (%)	Male n (%)	OR (95% CI)	p-value
Palpitations	10 (16.7)	3 (5.0)	3.80 (0.99–14.58)	0.040
Dizziness/lightheadedness	14 (23.3)	9 (15.0)	1.72 (0.68–4.36)	0.246
Syncope/presyncope	4 (6.7)	2 (3.3)	2.07 (0.36–11.76)	0.679*
Fatigue/general weakness	21 (35.0)	23 (38.3)	0.87 (0.41–1.82)	0.705
Back/interscapular pain	11 (18.3)	8 (13.3)	1.46 (0.54–3.93)	0.453
Jaw/neck pain	9 (15.0)	8 (13.3)	1.15 (0.41–3.21)	0.793
Arm/shoulder pain	25 (41.7)	18 (30.0)	1.67 (0.78–3.54)	0.183
Epigastric discomfort	8 (13.3)	10 (16.7)	0.77 (0.28–2.11)	0.609
Ghabrahat/restlessness	38 (63.3)	31 (51.7)	1.62 (0.78–3.35)	0.196
Other symptoms	0 (0.0)	3 (5.0)	0.16 (0.01–3.23)	0.244*

OR is female compared with male. Pearson chi-square p-values unless marked * (Fisher exact). OR confidence intervals use the odds-ratio method; zero-cell estimates use a continuity correction. Symptoms were assessed independently and may co-occur.

Symptom-to-arrival times were right-skewed. Women had a median interval of 4.04 hours (IQR 2.41–6.95) compared with 2.95 hours (IQR 1.71–5.22) in men (Mann–Whitney U=2209; p=0.032). Arrival within two hours occurred in 18.3% of women and 35.0% of men; presentation after six hours occurred in 33.3% versus 20.0%. The overall three-level timing distribution did not meet the nominal significance threshold (p=0.074) (Table-III).

Table-III: Symptom-to-arrival time by gender category (n=120)

Measure	Female (n=60)	Male (n=60)	p-value
Median hours (IQR)	4.04 (2.41–6.95)	2.95 (1.71–5.22)	0.032*
<2 hours, n (%)	11 (18.3)	21 (35.0)	0.074†
2–6 hours, n (%)	29 (48.3)	27 (45.0)	—
>6 hours, n (%)	20 (33.3)	12 (20.0)	—

*Mann–Whitney U test; †overall 2×3 chi-square test. The two p-values address different hypotheses.

In the prespecified multivariable model, gender group was not significantly associated with breathlessness after controlling for age, diabetes and ACS subtype (female versus male adjusted OR 1.53, 95% CI 0.73–3.22; p=0.262). None of the other adjustment variables showed a significant association at the 0.05 threshold (Table-IV). Exploratory subgroup comparisons within age groups, diabetes status and ACS subtype similarly did not establish a consistent statistically significant between-gender difference in breathlessness; several subgroups were small.

Table-IV: Multivariable logistic regression for breathlessness (n=120)

Variable	Adjusted OR	95% CI	p-value
Female versus male	1.53	0.73–3.22	0.262
Age (per year)	1.01	0.97–1.05	0.606

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Variable	Adjusted OR	95% CI	p-value
Diabetes (yes versus no)	0.78	0.33–1.82	0.564
NSTEMI versus STEMI	1.29	0.58–2.90	0.533
Unstable angina versus STEMI	1.36	0.41–4.50	0.618

Outcome: breathlessness yes=1. Binary logistic regression with simultaneous adjustment for age, diabetes and ACS subtype; 120 complete records; Wald 95% confidence intervals. OR=odds ratio; CI=confidence interval.

DISCUSSION

The primary finding from the supplied dataset was that breathlessness was recorded in 45% of women and 35% of men with an ACS diagnosis, a difference that was neither statistically significant in unadjusted analysis nor after adjustment for age, diabetes and ACS subtype. Importantly, the adjusted confidence interval was wide and compatible with both a modest reduction and a substantial increase in the odds of breathlessness. This should not be interpreted as equivalence of symptoms between women and men. In a large systematic review, Cardeillac and colleagues reported a modest but consistent increase in dyspnoea among women with suspected ACS, whereas the smaller size and deliberately equal group allocation in the present dataset limit precision.[5,6]

Chest pain/discomfort remained the most frequently recorded symptom in both groups (75% of women, 80% of men). Approximately one in four women and one in five men had no recorded chest pain, yet this comparison did not differ significantly by sex. Chest-pain absence is therefore clinically important for patients of either sex and cannot be used as a surrogate for gender. This interpretation fits contemporary chest-pain and ACS guidance, as well as recent reviews emphasising symptom overlap and multimodal assessment. Contemporary reviews similarly emphasise that symptom distributions overlap substantially between women and men.[2,3,4,7,8]

Some associated symptoms displayed patterns consistent with parts of the international literature. Women more frequently recorded nausea/vomiting (46.7% versus 31.7%) and palpitations (16.7% versus 5.0%), while men more frequently reported diaphoresis (60.0% versus 45.0%). Only the palpitations comparison reached a nominal p-value below 0.05, with an imprecise effect estimate and multiple exploratory tests; this result may be due to chance. Earlier emergency-care research has documented systematic differences in the evaluation of women with suspected ACS, and a Chinese emergency department study identified sex-related variation in management patterns. Such work supports systematic symptom documentation rather than clinician reliance on a rigid "female symptom" checklist.[11,12]

The most clinically notable secondary observation was a longer recorded interval from symptom onset to ED registration among women (4.04 versus 2.95 hours). Similar signals have appeared in regional and international literature. Kodliwadmath and colleagues documented later presentation among postmenopausal women in an Indian ACS cohort. The FORCE-ACS registry has likewise described differences in the presentation and management of patients, although its population and setting differ. Systematic reviews by Lunova and colleagues and Hu and colleagues have associated female sex with greater delays in parts of the evidence base. A registry analysis from China reported persistent sex differences in prehospital delay despite improvements over time. However, the present comparison is unadjusted, is based on a single hospital and measures time to registration, not individual components of patient decision-making, transport or emergency-system response; causation should not be inferred.[13,14,15,16,17]

The relevance of delay to the local setting is substantial. A 2025 systematic review of South Asian myocardial-infarction studies reported important prehospital barriers, including access and symptom recognition, while a prospective

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Karachi cohort described associations between prehospital and hospital delays and myocardial-infarction complications. These studies support further local investigation of how symptoms are interpreted, who decides when to seek help and how patients reach care. The present dataset does not include enough detail on household decision-making, education, distance, transport or socioeconomic status to attribute the observed difference to any particular factor.[18,19]

Risk factor profiles also differed between the two groups, with current smoking far more common among men in the supplied records. Such imbalance illustrates why comparisons by sex must consider baseline characteristics and syndrome subtype. Nonetheless, adjustment for only age, diabetes and ACS type was prespecified and does not eliminate residual confounding. Recent evidence reviews have found sex differences in ambulance assessment and treatment, while large chest-pain triage studies have demonstrated heterogeneous presentations and care-process differences. Similarly, analyses of acute myocardial-infarction diagnosis and treatment continue to identify opportunities to improve equitable recognition and investigation. The practical implication is to standardise careful symptom enquiry alongside ECG and troponin assessment, not to derive separate clinical algorithms from these 120 entries alone.[20,21,22]

The study's nominally non-significant primary comparison should be read as inconclusive rather than disproving a sex-related difference. The selected sample of 60 women and 60 men was designed for an initial contrast, not for a robust prediction model or multiple subgroup tests; unstable-angina strata were particularly small. Contemporary overviews underline that sex-related differences in ACS are multifactorial and may depend on age, coronary mechanism, access to care and local practice. Replication in consecutive patients with verifiable source records, standardised ascertainment and broader site representation would strengthen generalisability and the reliability of adjusted estimates.[23]

Limitations are particularly important. This is a single-centre, purposive, quota-balanced dataset; patients unable to be interviewed within 24 hours were excluded by design, so severe presentations may be under-represented. Symptoms and onset times were self-reported and vulnerable to recall error. The number of events is modest for subgroup and adjusted comparisons, and secondary p-values were not corrected for multiple testing. These are fundamental provenance concerns rather than ordinary missing-data limitations. Until original clinical source documents and institutional permissions are authenticated, this manuscript must be treated as a statistical demonstration based on supplied records and must not be submitted as a report of genuine patient recruitment.

CONCLUSION

In the supplied ACS dataset, breathlessness and presentation without chest pain were not significantly different between women and men. Women had a longer recorded symptom-to-arrival interval. These provisional observations require source-data verification before clinical or publication-level conclusions are drawn.

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