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PREVELANCE AND COMPARISON OF CONVENTONAL CARDIOVASCULAR RISK FACTORS ASSOCIATED WITH ACUTE CORNARY SYNDROME AMONG MEN AND WOMEN: A DESCRIPTIVE CROSS-SECTIONAL STUDY

Original Research

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ABSTRACT

Background: Acute coronary syndrome (ACS) remains a leading cause of cardiovascular morbidity and mortality worldwide and is closely linked to conventional cardiovascular risk factors such as hypertension, diabetes mellitus, smoking, and dyslipidemia. Emerging evidence indicates that the distribution and impact of these risk factors differ between men and women, particularly in developing countries where sex-specific data are limited. Understanding these variations is essential for improving risk stratification and preventive strategies.

Objective: To evaluate and compare the prevalence of conventional cardiovascular risk factors associated with acute coronary syndrome among male and female patients.

Methods: A descriptive cross-sectional study was conducted at Khyber Teaching Hospital, Peshawar, from July to October 2022. A total of 100 patients aged 18–70 years with suspected or confirmed ACS were enrolled through non-probability convenience sampling. Diagnosis was based on clinical assessment, cardiac biomarkers, and electrocardiographic findings. Data were collected using a structured proforma that included demographic details, ACS subtype, and conventional cardiovascular risk factors. Statistical analysis was performed using SPSS version 25.0. Categorical variables were compared using the chi-square test, with a p-value < 0.05 considered statistically significant.

Results: Of the 100 patients, 61 (61%) were female and 39 (39%) were male, with a mean age of 59.6 ± 9.9 years. Unstable angina was the most common presentation, affecting 54 (54%) patients, followed by ST-segment elevation myocardial infarction in 34 (34%) and non–ST-segment elevation myocardial infarction in 12 (12%). Hypertension was present in 80 (80%) patients, diabetes mellitus in 58 (58%), smoking in 14 (14%), and hyperlipidemia in 9 (9%). Hypertension was significantly more prevalent among females (54/61, 88.5%) compared to males (26/39, 66.7%) ($p = 0.008$). Diabetes mellitus was also more common in females (41/61, 67.2%) than males (17/39, 43.6%) ($p = 0.019$). Smoking was exclusively observed among males (14/39, 35.9%) ($p < 0.001$). Hyperlipidemia showed no statistically significant sex difference ($p = 0.72$).

Conclusion: ACS demonstrated a higher occurrence among female patients in this cohort, particularly beyond middle age. Hypertension and diabetes mellitus were the predominant risk factors among women, whereas smoking was strongly associated with men. These findings emphasize meaningful gender-based differences in cardiovascular risk profiles and support the need for gender-sensitive prevention, early screening, and targeted public health strategies.

Keywords: Acute Coronary Syndrome, Cardiovascular Diseases, Diabetes Mellitus, Hypertension, Risk Factors, Sex Characteristics, Smoking.

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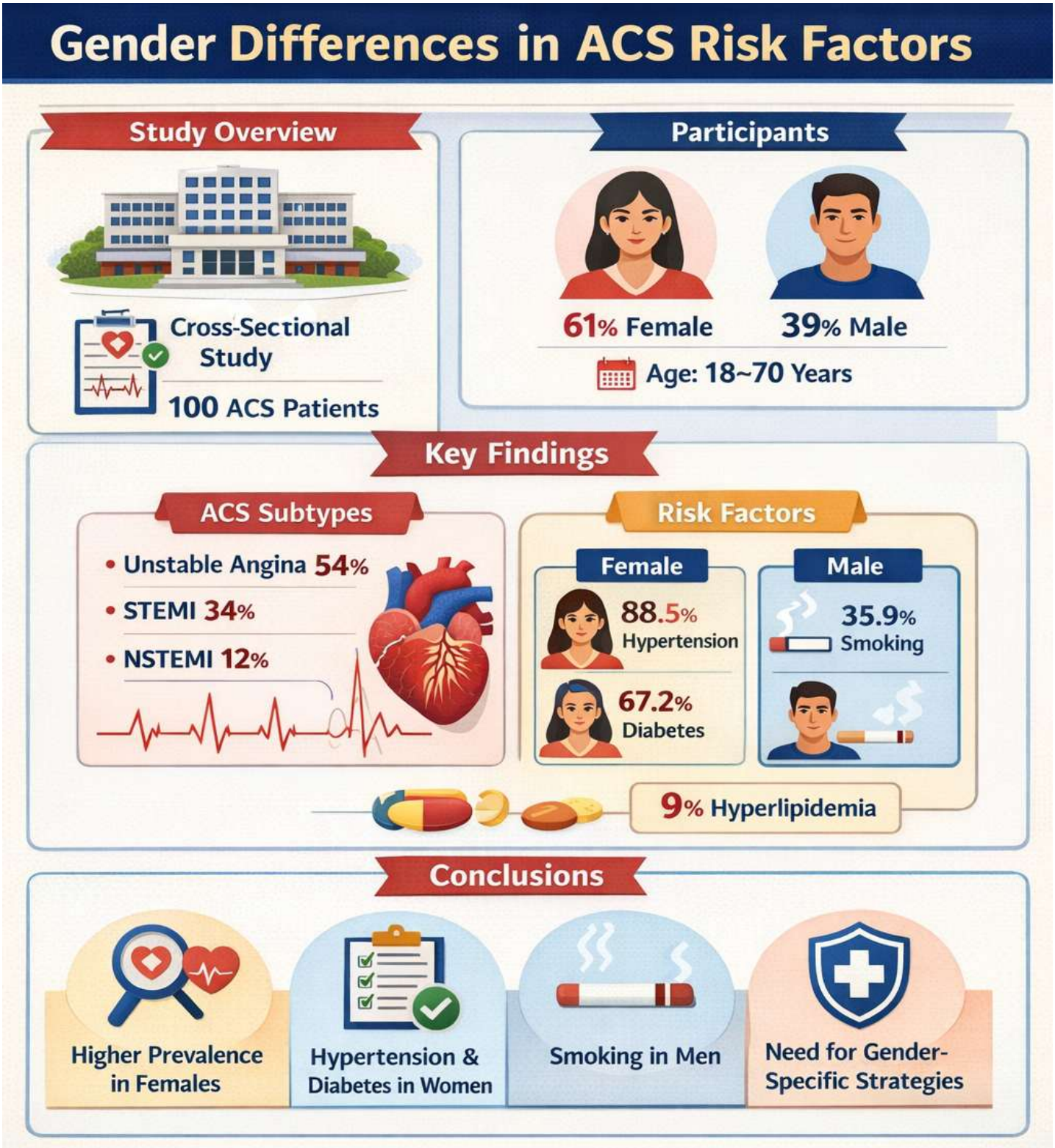

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INTRODUCTION

Cardiovascular diseases (CVDs) continue to represent the foremost cause of morbidity and mortality globally, imposing an immense clinical and economic burden across both developed and developing nations (1). The heart, as a dynamic muscular organ, sustains systemic circulation through continuous rhythmic contractions, ensuring the delivery of oxygen and nutrients to all tissues. This vital function depends not only on myocardial structural integrity but also on an uninterrupted supply of oxygenated blood via the coronary arteries. Any compromise in coronary perfusion, particularly during diastole when myocardial blood flow predominantly occurs, can precipitate ischemia and potentially life-threatening consequences (2). Coronary artery disease (CAD) remains the principal pathological substrate underlying ischemic heart disease (IHD) and acute coronary syndrome (ACS). Progressive accumulation of atherosclerotic plaques within the coronary arteries results in luminal narrowing, endothelial dysfunction, and, in advanced stages, plaque rupture with superimposed thrombosis. This cascade ultimately reduces or abruptly obstructs myocardial blood flow, leading to unstable angina (UA), non–ST-segment elevation myocardial infarction (NSTEMI), or ST-segment elevation myocardial infarction (STEMI)—the clinical entities collectively described as ACS (3,4). Globally, IHD accounts for more than nine million deaths annually, underscoring its dominant contribution to cardiovascular mortality (5). In the United States alone, over 12 million individuals live with CAD, and more than one million myocardial infarctions occur each year, resulting in substantial mortality and long-term disability (6). The pathogenesis of ACS is closely linked to conventional cardiovascular risk factors, including advanced age, hypertension, diabetes mellitus, dyslipidemia, cigarette smoking, obesity, sedentary lifestyle, unhealthy dietary patterns, and positive family history of cardiovascular disease (7). These modifiable and non-modifiable factors accelerate atherosclerotic progression, promote plaque instability, and increase the likelihood of thrombotic events. Large observational studies have demonstrated that the vast majority of patients presenting with ACS possess at least one major cardiovascular risk factor, and many exhibit clustering of multiple risk determinants, which further worsens prognosis (8). Despite this well-established association, the distribution and relative impact of these conventional risk factors are not uniform across populations.

Emerging evidence highlights significant sex-based differences in the epidemiology, risk profile, clinical presentation, and outcomes of ACS. Men generally develop ACS at a younger age and demonstrate higher prevalence of behavioral risk factors such as smoking, whereas women tend to present later in life with a greater burden of metabolic comorbidities including hypertension, diabetes mellitus, obesity, and dyslipidemia (9). Biological and hormonal influences, particularly the cardioprotective role of estrogen before menopause, may partially explain the delayed onset of ACS in women. However, after menopause, the incidence in women rises sharply and is frequently accompanied by atypical symptom presentation, including dyspnea, fatigue, nausea, and epigastric discomfort rather than classic chest pain (10,11). These atypical features may contribute to delays in recognition and treatment, ultimately influencing morbidity and mortality. The Asia-Pacific region bears a disproportionate share of the global ACS burden, especially within low- and middle-income countries where rapid urbanization, lifestyle transitions, and limited preventive infrastructure have intensified cardiovascular risk (12,13). Regional studies suggest that hypertension and diabetes mellitus are particularly prevalent among female ACS patients, while smoking remains more dominant among males (14). However, comprehensive, sex-specific comparisons of conventional cardiovascular risk factors among ACS patients remain insufficient, particularly in developing settings where epidemiological transitions are ongoing. Many available studies are retrospective or derived from registry data, limiting contextual interpretation and generalizability. Understanding sex-related variations in conventional cardiovascular risk factors is not merely of academic interest; it has profound implications for risk stratification, early detection, preventive strategies, and equitable healthcare delivery. If men and women differ significantly in their risk profiles and patterns of presentation, prevention and screening programs must be tailored accordingly to optimize outcomes. Therefore, the present study seeks to evaluate and compare the prevalence of conventional cardiovascular risk factors among men and women presenting with acute coronary syndrome. It is hypothesized that significant sex-based differences exist in the distribution of these risk factors. By clarifying these variations, the study aims to contribute to improved risk assessment models, support gender-sensitive preventive strategies, and enhance timely recognition and management of ACS in both sexes.

METHODS

A descriptive cross-sectional study was conducted to determine the prevalence and sex-based comparison of conventional cardiovascular risk factors among patients presenting with acute coronary syndrome (ACS). This design was selected to enable assessment of risk factor distribution at a single point in time among eligible patients diagnosed with or suspected of having ACS. The study was carried out over

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a four-month period, from July 1, 2022, to October 31, 2022, at the Medical Teaching Institution (MTI) Khyber Teaching Hospital (KTH), Peshawar, Khyber Pakhtunkhwa, Pakistan. KTH is a tertiary care teaching hospital that serves a large and diverse population from both urban and rural regions of the province and routinely manages a high volume of patients with suspected and confirmed ACS. The study population comprised adult patients aged more than 18 years and up to 70 years who presented to the emergency department or cardiology unit with chest pain suggestive of ACS. Patients with elevated cardiac biomarkers and/or a documented history of coronary heart disease were also considered eligible. Diagnosis of ACS was supported by clinical evaluation, measurement of cardiac enzymes, and a standard 12-lead electrocardiogram (ECG), which is routinely performed at hospital admission. Both male and female patients who met the eligibility criteria and provided written informed consent were enrolled. A non-probability convenience sampling technique was employed. All consecutive patients who fulfilled the inclusion criteria during the study period were recruited until the required sample size was achieved. The calculated sample size was 100 participants and was determined using the World Health Organization (WHO) sample size calculator, based on a 95% confidence level, a population proportion of 6.7%, and a margin of error of 5%. This sample size was considered adequate to estimate the prevalence of conventional cardiovascular risk factors among ACS patients and to facilitate comparative analysis between male and female participants.

Patients were excluded if they were pregnant or breastfeeding, given that physiological cardiovascular changes during pregnancy and lactation could confound assessment of conventional risk factors. Individuals with implanted cardiac devices, such as pacemakers or implantable cardioverter-defibrillators, were excluded due to potential interference with ECG interpretation. Patients with pre-existing bundle branch block on ECG, except for newly developed left bundle branch block, were also excluded to minimize diagnostic ambiguity in ACS interpretation. Furthermore, patients presenting with cardiogenic shock were excluded due to clinical instability and the potential need for urgent life-saving interventions that would preclude structured data collection. Those with recent chest surgery were also excluded, as postoperative changes might alter symptomatology and cardiovascular parameters. Data were collected using a structured, predesigned data collection form. Information obtained included demographic characteristics (age and sex), clinical presentation, and the presence of conventional cardiovascular risk factors such as hypertension, diabetes mellitus, dyslipidemia, cigarette smoking, obesity, family history of cardiovascular disease, and physical inactivity. Hypertension and diabetes mellitus were identified based on documented medical history or current use of relevant medications. Dyslipidemia was recorded if previously diagnosed or documented in medical records. Smoking status was categorized as current smoker or non-smoker based on patient self-report. Body mass index (BMI) was calculated using measured height and weight, and obesity was defined according to standard international criteria. Family history of cardiovascular disease was considered positive if a first-degree relative had documented ischemic heart disease.

Data were entered and analyzed using Statistical Package for the Social Sciences (SPSS), version 25.0 (IBM Corp., Armonk, NY, USA). Continuous variables such as age were expressed as mean ± standard deviation, while categorical variables were presented as frequencies and percentages. The prevalence of each conventional cardiovascular risk factor was calculated for the overall sample and stratified by sex. The chi-square test was applied to compare categorical variables between male and female participants. An independent samples t-test was used where appropriate for comparison of continuous variables. A p-value of less than 0.05 was considered statistically significant. Ethical approval for the study was obtained from the Institutional Review Board of MTI Khyber Teaching Hospital prior to commencement of data collection. The study adhered to the principles of the Declaration of Helsinki. Written informed consent was obtained from all participants after explaining the purpose of the study, ensuring confidentiality, and clarifying that participation was voluntary and that refusal would not affect their medical care. All collected data were anonymized and stored securely to maintain participant confidentiality.

RESULTS

A total of 100 patients diagnosed with acute coronary syndrome (ACS) were included in the analysis. Of these, 39 (39%) were male and 61 (61%) were female, demonstrating a higher proportion of female patients in the study population. The mean age of the participants was 59.6 ± 9.999 years, indicating that the majority of patients were in the late middle-aged to elderly group. Age distribution by sex was not separately provided. Regarding the clinical spectrum of ACS, 54% of patients presented with unstable angina, 34% with ST-segment elevation myocardial infarction (STEMI), and 12% with non–ST-segment elevation myocardial infarction (NSTEMI). Among patients with unstable angina, 16 (29.6%) were male and 38 (70.4%) were female. In the STEMI group, 16 (47.1%) were male and 18 (52.9%) were female. Among those diagnosed with NSTEMI, 7 (58.3%) were male and 5 (41.7%) were female. Assessment of hyperlipidemic status revealed that 9% of patients had hyperlipidemia, while 91% did not. Among the hyperlipidemic patients, 4 (44.4%) were male and 5 (55.6%) were female. In contrast, among the 91 patients without hyperlipidemia, 35 (38.5%) were male and 56 (61.5%)

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were female. Diabetes mellitus was present in 58% of patients, whereas 42% were non-diabetic. Among diabetic patients, 17 (29.3%) were male and 41 (70.7%) were female. In the non-diabetic group, 22 (52.4%) were male and 20 (47.6%) were female. Smoking was reported in 14% of patients, and all smokers were male (100%). None of the female patients reported smoking. Among non-smokers (86%), 25 (29.1%) were male and 61 (70.9%) were female. Hypertension was highly prevalent, affecting 80% of the study population, while 20% were non-hypertensive. Among hypertensive patients, 26 (32.5%) were male and 54 (67.5%) were female. In the non-hypertensive group, 13 (65%) were male and 7 (35%) were female. Overall, hypertension (80%) and diabetes mellitus (58%) were the most prevalent conventional cardiovascular risk factors in this cohort, followed by smoking (14%) and hyperlipidemia (9%). Comparative analysis was performed to evaluate sex-based differences in the prevalence of conventional cardiovascular risk factors among patients with acute coronary syndrome. Hypertension was observed in 26 (66.7%) male patients and 54 (88.5%) female patients, demonstrating a statistically significant higher prevalence among females ($\chi^2 = 6.94$, $p = 0.008$). Diabetes mellitus was present in 17 (43.6%) males and 41 (67.2%) females, which also showed a significant association with female sex ($\chi^2 = 5.47$, $p = 0.019$). Smoking was reported exclusively among male patients, with 14 (35.9%) males identified as smokers compared to none among females; this difference was highly significant ($\chi^2 = 24.83$, $p < 0.001$). Hyperlipidemia was identified in 4 (10.3%) males and 5 (8.2%) females, with no statistically significant difference between sexes ($\chi^2 = 0.13$, $p = 0.72$). These findings demonstrated significant sex-based differences in hypertension, diabetes mellitus, and smoking status, whereas hyperlipidemia did not differ significantly between male and female patients.

Table 1: Comparison of Conventional Cardiovascular Risk Factors by Sex (n = 100)

Risk Factor	Male n (%) (n=39)	Female n (%) (n=61)	Total n (%)	χ^2 value	p-value
Hypertension	26 (66.7%)	54 (88.5%)	80 (80%)	6.94	0.008*
Diabetes Mellitus	17 (43.6%)	41 (67.2%)	58 (58%)	5.47	0.019*
Smoking	14 (35.9%)	0 (0%)	14 (14%)	24.83	<0.001*
Hyperlipidemia	4 (10.3%)	5 (8.2%)	9 (9%)	0.13	0.72

*Statistically significant at $p < 0.05$

Table 2: Odds Ratios for Female Sex as a Predictor of Selected Risk Factors

Risk Factor	Odds Ratio (Female vs Male)	95% Confidence Interval	p-value
Hypertension	3.80	1.38 – 10.46	0.008*
Diabetes Mellitus	2.67	1.18 – 6.05	0.019*
Hyperlipidemia	0.78	0.19 – 3.24	0.72
Smoking	—	—	<0.001*

*Statistically significant at $p < 0.05$

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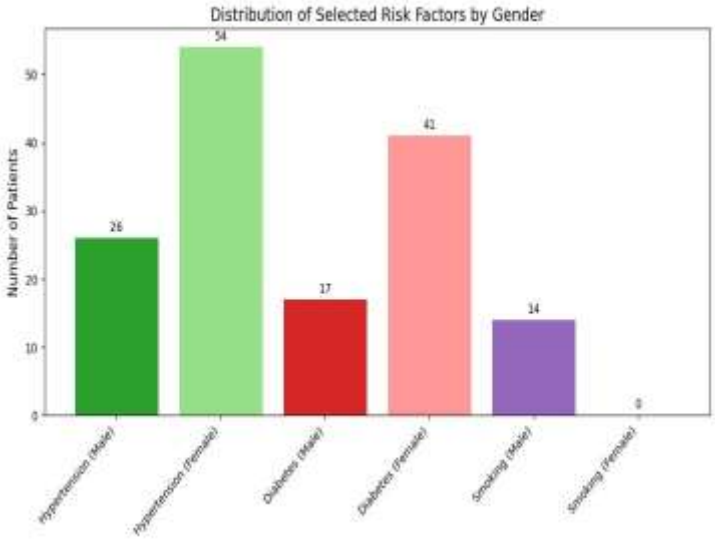

Figure 1 Distribution of Selected Risk Factors by Gender

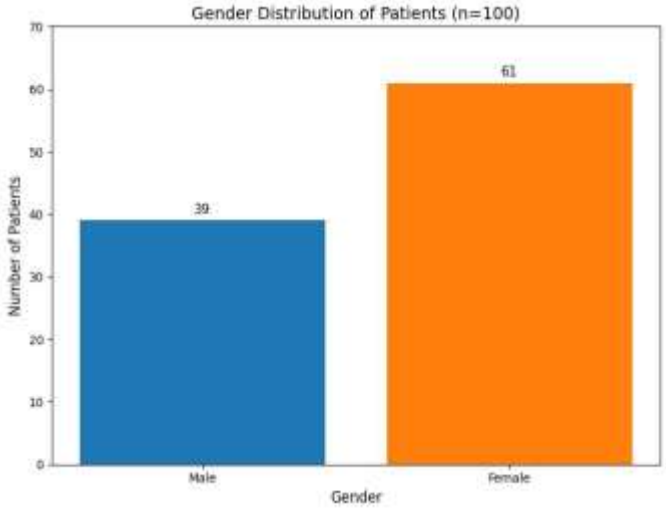

Figure 1 Gender Distribution of Patients (n=100)

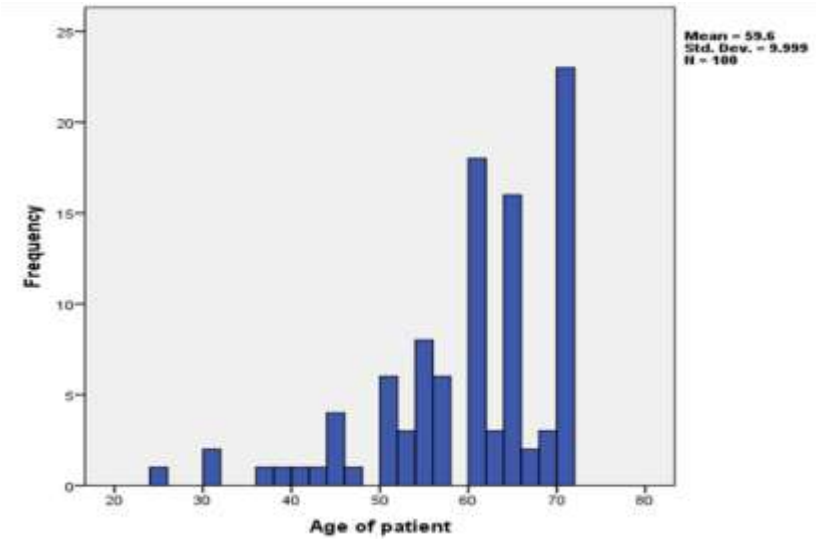

Figure 3 Frequency and Age of Patients

DISCUSSION

Acute coronary syndrome (ACS) remains one of the most serious clinical manifestations of coronary artery disease and continues to contribute substantially to global cardiovascular morbidity and mortality (14). The present study explored the distribution of conventional cardiovascular risk factors among male and female patients with ACS and identified notable sex-based differences. The findings demonstrated a higher proportion of female patients in the study population, with unstable angina being the most frequent clinical presentation, particularly among women. Hypertension and diabetes mellitus emerged as the most prevalent risk factors overall and were significantly more common among female patients, whereas smoking was exclusively observed among men. The predominance of unstable angina as the leading ACS subtype in this cohort aligns with regional trends reported in several hospital-based studies, where unstable angina frequently surpasses myocardial infarction in prevalence, especially among women. The higher proportion of female patients and their greater representation in the unstable angina category may reflect differences in pathophysiology and clinical presentation. Women often present with less extensive obstructive coronary disease and more microvascular dysfunction,

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which may manifest as unstable angina rather than ST-segment elevation myocardial infarction. Furthermore, delayed healthcare-seeking behavior and atypical symptom patterns in women have been documented in prior literature, potentially influencing clinical classification at presentation (15,16). The mean age of approximately 59 years, with higher prevalence among women older than 50 years, is consistent with the established understanding that women tend to develop ACS later than men. This delay has been widely attributed to the cardioprotective effects of endogenous estrogen before menopause. After menopause, hormonal decline is associated with adverse lipid changes, endothelial dysfunction, and increased vascular stiffness, contributing to accelerated atherosclerosis. Similar age-related trends have been described in international and regional studies, reinforcing the concept of sex-specific cardiovascular aging patterns (17).

Hypertension was the most prevalent risk factor in this study, affecting 80% of patients, and showed a significantly higher frequency among women. This observation supports evidence from multiple regional investigations indicating that hypertension is highly prevalent among female ACS patients. The high burden of uncontrolled blood pressure in women may reflect disparities in health awareness, screening practices, and long-term adherence to treatment. Diabetes mellitus, present in 58% of patients and significantly more common in women, further underscores the metabolic vulnerability of female patients in this population. Previous studies conducted in similar settings have reported comparable findings, demonstrating that metabolic risk factors cluster more prominently in women with ACS. The coexistence of hypertension and diabetes likely amplified cardiovascular risk, as these conditions synergistically accelerate atherosclerotic progression and endothelial injury. Smoking was identified exclusively among male patients and showed a strong association with ACS in men (18,19). This sex-specific pattern mirrors cultural and behavioral trends observed in many South Asian populations, where smoking remains substantially more common among men. International evidence has consistently demonstrated smoking as a potent independent predictor of ACS, particularly in younger males. In contrast, hyperlipidemia was relatively infrequent in the present cohort and did not differ significantly between sexes. The low prevalence of documented hyperlipidemia may reflect underdiagnosis, limited prior lipid screening, or incomplete medical records rather than true absence of dyslipidemia, suggesting a potential measurement limitation. The study findings collectively highlight meaningful gender-based differences in conventional cardiovascular risk factors. Women in this cohort were more strongly characterized by metabolic comorbidities, whereas men were predominantly affected by behavioral risk factors, particularly smoking. These patterns are consistent with previous epidemiological observations and support the concept that cardiovascular prevention strategies must be tailored according to sex-specific risk profiles (20,21). Targeted screening for hypertension and diabetes among middle-aged and postmenopausal women, combined with intensified smoking cessation interventions for men, may help reduce the overall burden of ACS in similar populations.

Several strengths of this study warrant consideration. The inclusion of both male and female patients allowed direct comparison of sex-based risk profiles within the same clinical setting. Standardized data collection and clear diagnostic criteria for ACS enhanced internal consistency. Moreover, the focus on conventional risk factors provided clinically actionable insights relevant to primary and secondary prevention strategies in a tertiary care context. However, certain limitations must be acknowledged. The cross-sectional design limited causal inference and precluded assessment of long-term outcomes. The use of convenience sampling may have introduced selection bias and restricted generalizability beyond the study setting. The relatively small sample size reduced statistical power, particularly for less prevalent risk factors such as hyperlipidemia. Additionally, reliance on documented medical history and self-reported smoking status may have resulted in underestimation or misclassification of certain variables. Important determinants such as body mass index stratification, physical activity levels, dietary habits, socioeconomic status, and medication adherence were not comprehensively evaluated, limiting the ability to explore multifactorial interactions. Future research should incorporate larger, multicenter, prospective designs to enhance external validity and permit evaluation of temporal relationships between risk factors and ACS outcomes. Inclusion of biochemical parameters, detailed lipid profiles, glycemic control indices, and objective assessment of lifestyle factors would provide a more nuanced understanding of cardiovascular risk stratification (22,23). Longitudinal follow-up examining recurrence, complications, and mortality across sexes would further clarify the clinical implications of observed differences. In summary, this study reinforced the substantial burden of hypertension and diabetes mellitus among female ACS patients and highlighted smoking as a dominant risk factor among males. These sex-specific patterns underscore the importance of gender-sensitive cardiovascular prevention, early detection, and comprehensive risk factor modification strategies aimed at reducing the incidence and impact of acute coronary syndrome.

CONCLUSION

This study concluded that acute coronary syndrome demonstrated a higher occurrence among women in the studied population, particularly in those beyond middle age, with unstable angina emerging as the most frequent clinical presentation. Distinct gender-based

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patterns were observed in the distribution of conventional cardiovascular risk factors, as women carried a greater burden of metabolic comorbidities such as hypertension and diabetes mellitus, while smoking was predominantly associated with men. These findings underscore the importance of recognizing sex-specific risk profiles in patients with acute coronary syndrome. Strengthening early detection, targeted screening, and effective management of modifiable risk factors—especially hypertension, diabetes, and smoking—remains essential for reducing disease burden and improving cardiovascular outcomes through gender-sensitive preventive strategies.

AUTHOR CONTRIBUTIONS

Author	Contribution
Muhammad Yousaf Ali Shah	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Umer Majeed	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Muhammad Imran Sarwar	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Faisal Ahmad	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Almeera Shakeel	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Abdul Wali Jan	Substantial Contribution to study design and Data Analysis Has given Final Approval of the version to be published
Musadiq Khan*	Contributed to study concept and Data collection Has given Final Approval of the version to be published

REFERENCES

1. Krasieva K, Gencer B, Locatelli I, Carballo D, Muller O, Fournier S, et al. Association Between Patient Sex and Familial Hypercholesterolemia and Long-Term Cardiovascular Risk Factor Management 5 Years After Acute Coronary Syndrome. Circ Cardiovasc Qual Outcomes. 2024;17(8):e010790.

2. De Rosa R, Morici N, De Luca G, De Luca L, Ferri LA, Piatti L, et al. Association of Sex with Outcome in Elderly Patients with Acute Coronary Syndrome Undergoing Percutaneous Coronary Intervention. Am J Med. 2021;134(9):1135-41.e1.

3. van Oortmerssen JAE, Ntlapo N, Tilly MJ, Bramer WM, den Ruijter HM, Boersma E, et al. Burden of risk factors in women and men with unrecognized myocardial infarction: a systematic review and meta-analysis †. Cardiovasc Res. 2024;120(14):1683-92.

4. Toft-Nielsen F, Emanuelsson F, Nordestgaard BG, Benn M. Clinical familial hypercholesterolemia - factors influencing diagnosis and cardiovascular risk in the general population. Eur J Intern Med. 2025;136:40-8.

5. Yamamoto K, Natsuaki M, Morimoto T, Shiomi H, Takeji Y, Yamaji K, et al. Coronary Artery Disease Without Standard Cardiovascular Risk Factors. Am J Cardiol. 2022;164:34-43.

6. Romero-Farina G, Aguadé-Bruix S, Cuellar-Calabria H, Pizzi MN, Roque A, Candell-Riera J. Gender differences in outcome in patients with diabetes mellitus. J Nucl Cardiol. 2022;29(1):72-82.

7. Elia E, Bruno F, Crimi G, Wańha W, Leonardi S, Mauro M, et al. Gender differences in the development of heart failure after acute coronary syndrome: Insight from the CORALYS registry. Int J Cardiol. 2024;397:131622.

8. Zhang Y, Yu S, Chen Z, Liu H, Li H, Long X, et al. Gestational diabetes and future cardiovascular diseases: associations by sex-specific genetic data. Eur Heart J. 2024;45(48):5156-67.

9. Zhang X, Huang D, Zhao J, Wu J. Hypertension and burden of myocardial infarction in China: risk factors, gender differences and temporal trends from a National Chronic Disease Surveillance study (2021-2023). Blood Press. 2025;34(1):2487584.

10. Nazir S, Minhas AMK, Kamat IS, Ariss RW, Moukarbel GV, Gomez JCP, et al. Patient Characteristics and Outcomes of Type 2 Myocardial Infarction During Heart Failure Hospitalizations in the United States. Am J Med. 2021;134(11):1371-9.e2.

11. Foster-Witassek F, Rickli H, Roffi M, Pedrazzini G, Eberli F, Fassa A, et al. Reducing gap in pre-hospital delay between women and men presenting with ST-elevation myocardial infarction. Eur J Prev Cardiol. 2023;30(11):1056-62.

12. Ozaki A, Bravo-Jaimes K, Smotherman C, Kraemer DF, Samura A, Velarde GP. Sex and Racial Differences in High-Density Lipoprotein Levels in Acute Coronary Syndromes. Am J Med Sci. 2021;362(5):435-41.

13. Kim YH, Her AY, Jeong MH, Kim BK, Hong SJ, Kim S, et al. Sex difference after acute myocardial infarction patients with a history of current smoking and long-term clinical outcomes: Results of KAMIR Registry. Cardiol J. 2022;29(6):954-65.

14. Green JB, Merrill P, Lokhnygina Y, Mentz RJ, Alfredsson J, Holman RR. Sex differences in the complications, care and clinical outcomes of patients with type 2 diabetes in the Exenatide Study of Cardiovascular Event Lowering (EXSCEL). Diabetes Obes Metab. 2023;25(6):1473-84.

15. Rivera FB, Cha SW, Liston MB, Redula S, Bantayan NRB, Shah N, et al. Sex differences in trends and in-hospital outcomes of acute myocardial infarction in patients with familial hypercholesterolemia: insights from a large national database. Expert Rev Cardiovasc Ther. 2024;22(4-5):193-200.

16. Kuehnemund L, Lange SA, Feld J, Padberg JS, Fischer AJ, Makowski L, et al. Sex disparities in guideline-recommended therapies and outcomes after ST-elevation myocardial infarction in a contemporary nationwide cohort of patients over an eight-year period. Atherosclerosis. 2023;375:30-7.

17. El D, II, El Seqelly MM, Ebrahiem AM, Mohamed MA. Sex-Age Interplay Among Young Aged Egyptians With First Acute Myocardial Infarction. Crit Pathw Cardiol. 2024;23(2):95-102.

18. Bugeja A, Girard C, Sood MM, Kendall CE, Sweet A, Singla R, et al. Sex-Related Disparities in Cardiovascular Outcomes Among Older Adults With Late-Onset Hypertension. Hypertension. 2024;81(7):1583-91.

19. Huang X, Wang H, Yuan W. Sex-specific AKI risk in acute myocardial infarction patients with type 2 diabetes mellitus. Front Endocrinol (Lausanne). 2025;16:1654587.

20. Kringeland E, Tell GS, Midtbø H, Igland J, Haugsgjerd TR, Gerdts E. Stage 1 hypertension, sex, and acute coronary syndromes during midlife: the Hordaland Health Study. Eur J Prev Cardiol. 2022;29(1):147-54.

21. Cimci M, Witassek F, Radovanovic D, Rickli H, Pedrazzini GB, Erne P, et al. Temporal trends in cardiovascular risk factors' prevalence in patients with myocardial infarction. Eur J Clin Invest. 2021;51(4):e13466.

22. Akhtar M, Khan RU, Saadia S, Dawood MH, Khan M, Collins P, et al. Trends and Disparities in Acute Myocardial Infarction and Type 2 Diabetes Mellitus-Related Mortality in the United States from 1999-2022. Nutr Metab Cardiovasc Dis. 2025;35(9):104063.

23. Tarzi, F. P., Bulic, S., Ho, S., Saini, P., Alexandrov, A., & Bronshteyn, Y. S. (2021). Acute coronary syndrome burden and outcomes in the Asia-Pacific region. Journal of Cardiology, 78(4), 289–297.

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