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Original Article

Gender Differences in the Clinical Characteristics of Patients with Acute Coronary Syndrome in the Eastern Region of Nepal

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Abstract

Background
Studies from other regions show gender-based differences in the clinical characteristics of patients with the acute coronary syndrome (ACS) with conflicting results. There is a lack of definite data from our population.

Materials and Methods
This is a hospital-based cross-sectional study in patients with ACS admitted to the tertiary care center from January 2019 to June 2020. Risk factors, co-morbidities, clinical symptoms, duration of symptoms onset, modalities of treatment offered, complications, and in-hospital outcome were noted in the pre-structured questionnaire by convenient sampling. Data were analyzed by using Microsoft excel 2007 and SPSS 20.

Results
Among 384 participants, 65.9% were male and 34.1% were female. The mean age of males was 60.6 ± 12.1 and females 62.3 ± 11.1 years (P=0.21). Females had a higher prevalence of dyslipidemia (p<0.001). The prevalence of hypertension, diabetes, and smoking was similar. The mean hemoglobin level was higher in males (11.8 ± 2.2 gm/dl vs. 11.1 ± 4.57 gm/dl, P = 0.01). The majority presented with chest pain 94.9% in males and 87.8% in females, P=0.44), and sweating (76.7% in males and 80.2% in females, P=0.43). Non-anginal symptoms were almost similar in both the genders except nausea which was more common in males (P=0.03). The timing of presentation, treatment with reperfusion therapy, and arterial territory involved were not significantly different. Prevalence of mechanical and arrhythmic complications as well as mortality was similar.

Conclusion
Our study did not show significant gender-based differences in clinical profile, treatment modalities, in-hospital complications, and mortality.

Keywords: *Acute coronary syndrome, Gender, Study characteristics, Treatment outcome*

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Introduction

Acute coronary syndrome (ACS) is an acute presentation of coronary artery disease (CAD) that constitutes a spectrum of clinical manifestations such as unstable angina (USA), non-ST-segment elevation myocardial infarction (NSTEMI), and ST-segment elevation myocardial infarction (STEMI) [1].

Studies from different parts of the world show major differences in the clinical characteristics like risk factors, co-morbidities, clinical symptoms, and mortality in women as compared to men making the diagnosis more difficult possibly leading to suboptimal care [2,3,4]. There is higher mortality in women after ACS and the prognosis is better for male patients even after the percutaneous coronary intervention (PCI) compared to females [5].

There is limited data about gender differences in clinical characteristics and outcomes of patients with ACS from our population [6]. This study gives insight into the gender differences in clinical presentation, risk factor profile, treatment patterns, and in-hospital outcome during index hospitalization among patients presenting with ACS from the eastern region of Nepal.

Materials and Methods

This was a hospital-based observational cross-sectional study of patients with a diagnosis of ACS admitted in the coronary care unit of Nobel Medical College Teaching Hospital from January 2019 to June 2020. The study protocol was approved by the institutional review committee (IRC NMCTH 356/2020). All patients with diagnosis of ACS based on history, physical examination, electrocardiogram and echocardiography were included in the study. The demographic profile of the patients was noted in a pre-structured questionnaire after getting verbal consent which included age, gender, and risk fac-tors for CAD, comorbidities, clinical symptoms, duration of symptoms onset, and modalities of treatment offered, complications, and in-hospital outcome. Clinical and laboratory parameters included blood pressure, heart rate, serum electrolytes, serum urea, and creatinine, fasting lipid profile, and complete blood count. In-hospital outcomes of patients were noted during index hospitalization based on pre-specified criteria: heart failure, mechanical complications, significant arrhythmias, cardiogenic shock, acute kidney injury, stroke, and death. The sample size of n=340 was calculated by using formula, n = Z^2 x p x q/e^2 [$(1.96)^2$ x 0.33 x 0.67/ $(0.05)^2$ = 340] Where, Z= 1.96 for 95% confidence interval, p= prevalen-ce of ACS patients at the cardiology unit (33%), q= 1-p and e= margin of error= 5%.

Data were entered in Microsoft excel 2007 and converted into IBM SPSS data editor, version 20.

Continuous variables were expressed as mean and standard deviation (SD). Categorical variables were expressed as frequencies and percentages. A Chi-square analysis was performed to compare the frequencies of the categorical variables as appropriate. A P-value of < 0.05 was considered statistically significant. A tabular presentation was made for appropriate variables.

Results

Among 384 participants, 253(65.9%) were male and 131 (34.1%) were female. The mean age of males was 60.6 ±12.1 years that are similar to females 62.3±11.1 years (P = 0.21). Among risk factors, the prevalence of hypertension, diabetes, and smoking was similar in males and females. Waist and hip ratio were not significantly different between males and females. Females had a significantly higher prevalence of dyslipidemia (p<0. 00). History of chronic obstructive pulmonary disease (COPD) and chronic kidney disease (CKD) was similar. The mean hemoglobin level was significantly higher in males than females (11.8 ± 2.2 gm/dl vs. 11.1 ± 4.57 gm/dl, P = 0.01). Mean serum electrolytes and creatinine levels were not significantly different between males and females. Gender differences in the baseline characteristics of acute coronary syndrome patients have been shown below (Table 1).

Table 1: Gender differences in the baseline characteristics of patients with the acute coronary syndrome.

Variables	Male (n =253)	Female (n=131)	P value
Clinical diagnosis			
STEMI	228 (90.1%)	117 (89.3%)	
NSTEMI	12 (4.7%)	10 (3.1%)	0.450
USA1	3 (5.1%)	4 (3.1%)	
Risk factors			
Hypertension	123 (48.6%)	54 (41.2%)	0.822
Type 2 Diabetes Mellitus	101 (39.9%)	54 (41.2%)	0.160
Smoking	102 (40.5%)	43 (32.8%)	0.142
Dyslipidemia	113 (44.7%)	88 (67.2%)	<0.001
Co-morbid conditions			
CKD	39 (15.4%)	13 (9.9%)	0.126
COPD	11 (4.4%)	12 (9.2%)	0.061
Hypothyroidism	15 (5.9%)	9 (6.8%)	-
Stroke	5 (1.9%)	2 (1.5%)	-
PAD	4 (1.5%)	0	-
Age in years ± SD	60.6±12.1	62.3±11.1	0.211
Waist: Hip ratio	0.97 ± 0.09	0.98 ± 0.04	0.073
Mean blood pressure in mmHg	92.7 ± 13.2	90.6 ± 12.7	0.123
Mean heart rate in BPM	87.2 ± 16.6	84.8 ± 17.8	0.195
LVEF in percentage	43.9 ± 9.5	43.6 ± 10.1	0.752
Hemoglobin in gm/dl	11.8 ± 2.2	11.1 ± 2.5	0.011
Total leucocyte count/dl	11087 ± 3767	11128 ± 4055	0.405
Total platelet count/dl	$2.49 \times 10^5 \pm 69395$	$2.30 \times 10^5 \pm 66512$	0.921
Serum urea in mg/dl	40.0 ± 21.9	42.8 ± 23.1	0.242
Serum creatinine in mg/dl	1.2 ± 0.88	1.4 ± 1.3	0.163
Serum sodium in meq/L	137.7 ± 7.8	136.8 ± 4.7	0.184
Serum potassium in meq/L	4.62 ± 4.4	4.67 ± 4.3	0.911

Abbreviations: STEMI; ST-elevation myocardial infarction, NSTEMI; non-ST- elevation myocardial infarction, USA; unstable angina, CKD; chronic kidney disease, COPD; chronic obstructive pulmonary disease, PAD; peripheral artery disease, LVEF; left ventricular ejection fraction, BPM; beat per minute, SD; standard deviation

Majority of men and women presented with chest pain (94.9% in males and 87.8% in females, P= 0.44) and sweating (76.7% in males and 80.2% in females, P=0.43). Chest pain with radia-tion to other sites was observed in 64.8% males and 68.7% females with no statistical difference. Non-anginal symptoms like dyspnea, syncope, and palpitation were almost similar in both the genders except nausea which was more com-mon in males (28.3% in males and 18.3% in females, P=0.03) (Table 2).

Table 2: Gender differences in the presenting symptoms of patients with acute coronary syndrome

	Male n (%)	Female n (%)	P value
Chest pain	240 (94.9%)	115 (87.8%)	0.441
Sweating	194 (76.7%)	105 (80.2%)	0.430
Chest pain with radiation	164 (64.8%)	90 (68.7%)	0.443
Dyspnea	108 (42.7%)	51 (38.9%)	0.330
Nausea	72 (28.5%)	24 (18.3%)	0.031
Syncope	32 (12.6%)	11 (8.4%)	0.211
Palpitation	19 (7.5%)	8 (6.1%)	0.613

In our study, 193 (76.3%) males and 88 (67.1%) female patients were treated with reperfusion therapy including intravenous fibrinolysis and/or primary PCI with no significant difference bet-ween males and females. The time of presenta-tion after the onset of chest pain was not signifi-cantly different between males and females (Table 3).

Table 3: Gender differences in the timing of presentation and treatment offered in patients with the acute coronary syndrome.

	Male n(%)	Female n(%)	P value
Time of presentation			
<6 hours	84 (33.2%)	36 (27.5%)	
6-12 hours	94 (37.2%)	43 (32.8%)	0.132
>12 hours	75 (29.6%)	52 (39.7%)	
PCI	182 (71.9%)	86 (65.6%)	
Medical therapy	60 (23.7%)	43 (32.8%)	0.154
Thrombolysis and PCI	10 (4.0%)	2 (1.5%)	
Thrombolysis	1 (0.4%)	0	

Abbreviations: PCI; percutaneous coronary intervention

There was no genderwise difference in the arterial territory involved in patients with ACS. Anterior wall myocardial infarction was the most common (51.4% in males and 43.5% in females) followed by an inferior wall (34% in males and 43% in females) (Table 4). Prevalence of acute pulmonary edema, acute kidney injury, mitral regurgitation, ventricular septal rupture, free wall rupture, and cardiogenic shock was not sig-nificantly different between females and males (Table 5).

There was no significant gender difference in the incidence of ventricular fibrillation/tachycardia (VT/VF) after the presentation or during the index hospitalization. The occurrence of new left bundle branch block (LBBB), right bundle branch block (RBBB), and atrial fibrillation (AF) and significant sinus bradycardia (heart rate <40 beats per minute) were not significantly different between males and females. After excluding deceased patients, hospital stay duration was similar in males and females. In-hospital morta-lity was not significantly different between males and females. Gender differences in the complica-tions and mortality in patients with ACS have been illustrated (Table 5).

Table 4: Gender differences in the arterial territory involved in patients with the acute coronary syndrome.

	Male n(%)	Female n(%)	P value
Anterior wall	130 (51.4%)	57 (43.5%)	
Inferior wall	86 (34%)	59 (43%)	0.172
RV infarction	12 (4.7%)	5 (3.8%)	
Posterior wall	7 (2.8%)	4 (3.1%)	

Table 5: Gender differences in the complications and mortality in patients with the acute coronary syndrome.

	Male (n=253) n (%)	Female (n=131) n (%)	P value
Pulmonary edema	40 (15.8%)	27 (20.6%)	0.241
Acute kidney injury	37 (14.6%)	20 (15.3%)	0.823
Mitral regurgitation	14 (5.5%)	6 (4.5%)	0.670
Cardiogenic shock	9 (3.5%)	6 (4.5%)	0.62
Ventricular septal rupture	4 (1.5%)	1 (0.8%)	0.501
Free wall rupture	2 (0.8%)	1 (0.8%)	0.622
Arrythmias and conduction Abnormalities			
Complete heart block	15 (6%)	9 (6.8%)	0.730
AF	9 (3.5%)	2 (1.5%)	0.254
VT/VF	11 (4.3%)	3 (2.2%)	0.301
LBBB	4 (1.5%)	6 (4.5%)	0.088
RBBB	2 (0.8%)	0	0.305
Sinus bradycardia (<40BPM)	4 (1.5%)	1 (0.8%)	0.501
Mortality	21 (8.3%)	8 (6.2%)	0.443

Abbreviations: AF; atrial fibrillation, VT/VF; ventricular tachycardia/ventricular fibrillation, LBBB; left bundle branch block, RBBB; right bundle branch block, BPM; beat per minute

Discussion
This hospital-based study demonstrates the gender differences in clinical presentation, risk factor profile, treatment patterns, and in-hospital outcome during index hospitalization of patients with different spectrums of ACS. Although, studi-es in the past have provided data on gender diffe-rences in outcome after ACS with increased short term morbidity and mortality in women mainly due to a higher prevalence of unfavorable base-line characteristics in women [7,9]. Our results showed no significant differences in baseline

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conventional risk factors except dyslipidemia which was more prevalent in females. Clinical symptoms at presentation, modalities of treatment offered, in-hospital complications and mortality were not statistically different between genders.

Contrary to previous studies [8, 9], our study did not find significant differences in age at baseline that were similar across all the three categories of ACS. Similarly, co-morbidities like hypertension, smoking, and diabetes were equally prevalent in both genders although a study done in capital city of Nepal found that smoking was the most common in male as compared to female who had hypertension as the most common coronary risk factor [6].

A study in India showed that females constituted less than one-third of the ACS population, they tend to be older compared to men and were more likely to present with NSTEMI/UA [10]. In our study, around one-third of the total patients were females; there was no difference in mean age and types of ACS between genders.

Atypical symptoms like nausea, dyspnea, and back pain are more common in the female gender [11] and they tend to have worse short term and long term prognosis compared to men [12]. Our result did not show any significant differences in the clinical symptoms except nausea which was more common in males.

A difference in pre-hospital delay in patients with suspected ACS has been described with a longer delay in women mainly due to doctor's decision on making definite diagnosis due to atypical symptoms in females [13]. No such difference was found in our study. Majority of our patients of both genders presented within 12 hours of symptoms onset.

There may be an interaction between gender and treatment offered to the patients. Previous studies have described that gender differences in treatment provided may contribute to differences in mortality [14]. Women tend to have atypical presentations of ACS and take longer time to seek medical care which might delay in getting appropriate intervention [14]. Underuse of PCI in women with ACS has been reported despite widespread debate about the gender gap [15]. In our study, no gender-based differences in modalities of treatment offered were noted and in-hospital outcomes were similar.

A meta-analysis has shown a significant interaction between gender and type of ACS, which showed modestly higher 30-day mortality in females than men only for patients presenting with STEMI and lower mortality in females for NSTEMI and USA [12]. No such differences were noted in our study although the number of patients with USA and NSTEMI was far less than patients with STEMI.

Contrary to the previous study [16] which revealed a higher prevalence of co-morbidities like diabetes, hypertension, heart failure, and renal dysfunction in females and they tend to have more severe clinical presentations and higher rates of complications, our study showed the similar prevalence of such co-morbidities and related mechanical and arrhythmic complications.

The strength of this study is the comparison of gender-based differences with similar baseline clinical characteristics without the need for adjustments in age and risk factors.

The possible limitations of this study could be that this is a single hospital-based study in the eastern part of Nepal which may not be a representation of ACS across the country. The overall complications and mortality rates may be underestimated because of missing events that happened in the emergency room before admission to the cardiology unit. Another weakness of our study was the unavailability of angiographic data to compare the extent and severity of disease that could have translated into differences in the selection of patients for PCI.

Conclusion

Our study did not show any significant difference in clinical profile at the time of presentation though there are small differences in some parameters. Treatment modalities provided to men and women with ACS were similar. Gender-based differences in in-hospital complications and mortality were not observed.

Conflicts of interests: None

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