Assessment of Gender variations in the patients with Acute Coronary Syndromes subjected to Percutaneous Coronary Intervention

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ABSTRACT

Objective: To evaluate the impact of gender on intravenous procedural characteristics among the patients with acute coronary syndrome and to compare the outcomes of the patients undergoing percutaneous coronary intervention between both genders
Study Design: A Cross-sectional observational study
Place and Duration: At Chaudhry Pervaiz Elahi Institute of Cardiology, Multan from March 03, 2020 to August 03, 2020.
Methodology: Information about patients diagnosed with unstable angina, ST-segment elevation myocardial infarction, and non-ST-segment elevation myocardial infarction from data registry of the hospital. In-hospital data concerning patient's demographics, treatment procedures, and post-treatment complications were collected for each disease status.
Results: Out of 425, predominantly 54.1% females were diagnosed with various coronary artery diseases. Women were relatively younger, with a mean age of 58.2 years, while men had a mean age of 64.32 years. Experts found a significant difference in intravenous treatment protocols between the two genders. Except for the rot ablation technique and drug-eluting stents, all the assessed techniques were practiced more on male patients than female patients. Similarly, women had significantly higher post-PCI complications, including vascular events (3.2% in women vs 1.6% in men), bleeding episodes (1.5% vs 0.8%), cardiogenic shock (1.7% vs 1.2%), renal failure (0.6% vs 0.2%), and coronary perforation (1.3% vs 0.5%). However, no significant difference in mortality rate was observed.
Conclusion: The study concludes that generally, younger women suffer from acute coronary syndrome than men. Moreover, women are less likely to undergo procedural intervention and are more prone to post-treatment complications.
Keywords: Acute coronary syndrome, Gender variations, Intravenous percutaneous treatment, STEMI, NSTEMI

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INTRODUCTION

Despite the revolution in therapeutic approaches, coronary heart disease remain (CHD) one of the prime causes of death. In 2013, according to the global burden of disease analyses, the highest mortality rate was attached CHD[1]. However, 80% of the global cases of CHD are diagnosed in low-income countries, and Pakistan is one of them[2]. Among CHDs, acute coronary syndrome (ACS), including ST-segment elevation myocardial infarction (STEMI), non– ST-segment elevation myocardial infarction (NSTEMI), and Unstable Angina (UA), make up a significant proportion of clinical manifestations of CHD.

According to World Health Organization (WHO), out of 17.5 million annual life losses due to CVD, around 7.5 deaths are attributed to ACS[3,4].

Previous studies reveal that at every step in the treatment process of ACS, gender variation plays a vital role. A study reveals that as compared to men, women have fewer chances of being admitted to hospital having revascularization ability. Many studies conducted on high-risk population s show that when compared to men, women are less frequently offered percutaneous coronary intervention (PCI) and cardiac catheterization. Moreover, women receiving PCI have an increased mortality rate and complications compared to men[5]. On the other hand, another study shows that upon analysis of post PCI complications within 30 days, there was no difference between both genders after taking into account baseline risk factors. Drug-eluting stents (DES) leads to a decrease in

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revascularization of the target vessel and lesion; it is the major complication in modern stenting procedures. Studies conducted on DES suggest that there was a similar decrease in the need for revascularization[6]. Studies also show that men with ACS are more likely to get optimal medical treatment than women.

Although it is a well-accepted fact that gender impacts the treatment outcome in ACS, some studies claim that due to improvement in medical sciences, the impact of this variable is getting less with time[7]. The rationale of this study to access if significant gender differences persist in procedural and treatment outcomes in patients with acute coronary syndrome undergoing percutaneous coronary intervention. So this study was conducted with an objective to evaluate the impact of gender on intravenous procedural characteristics among the patients with acute coronary syndrome and to compare the outcomes of the patients undergoing percutaneous coronary intervention between both genders.

METHODOLOGY

The cross-sectional, observational study was conducted at the Cardiology department of Chaudhry Pervaiz Elahi Institute of Cardiology, Multan, for six months from March 03, 2020 to August 03, 2020. Patients diagnosed with stable/ unstable angina, STEMI, or NSTEMI and undergoing PCI during this period were evaluated. Inclusion criteria included: patients aged 18 years or above; those with a confirmed diagnosis of ACS; and those hospitalized for at least 48 hours. Whereas Exclusion criteria included: those with other medical illnesses and cognitive impairment; illicit drug users; absence of symptoms and referral by the doctor after diagnostic exam or appointment; and patient of vasospastic angina. A total of 425 patients were included in the study, and their written consent was taken.

A questionnaire was used to collect data, and patients were interviewed in the first 48 hours of admission. A second interview was conducted later to sociodemographic data and risk factors, and medical history was reviewed from previous records. Treatment patterns, demographic characteristics, in-hospital results, and angiographic status were compared between both genders. Due to multiple lesions, lesion characteristic was given to each one. The observation was continued for the study period even after the discharge of patients.

Data Analyses: Computer software 20.0 was used for data entry and analyses. Categorical variables were presented as frequency, whereas numerical data were presented as mean with standard deviation. The two genders were compared for intervention procedures and their outcome for each acute coronary disease: MI, STEMI, and NSTEMI. A t-test was used to compare continuous data. Whole categorical data were compared through the chi-square test. Odds ratios with a 95% confidence interval were calculated for procedural outcomes in both men and women. A P-value<0.05 was considered statistically significant for all the tests.

RESULTS

A total of 425 patients, 195 male and 230 female were included in the study. Among these, 160 (37.6%) suffered from UA, 150 (35.2%) from STEMI, and 15 (3.5%) were diagnosed with NSTEMI. Women were younger than men, with a mean age of 58.2 years, whereas men had a mean age of 64.32. The difference in procedural characteristics between men and women for each coronary artery disease are presented in Table-I.

Significant differences were found between the two genders in terms of selected procedure types. Stents, glycoprotein inhibitors, radial procedures, intravascular ultrasound, and fractional flow reserves were used relatively less in females than males. However, drug-eluting stents (DES) and rotation techniques were more frequent in women than their male counterparts. The no. of lesions treated varied between the two genders. Moreover, it was observed that procedure-associated complications, including bedding episodes, vascular manifestation, cardiogenic shock, renal failure, and coronary perforation, were higher in women than men. Moreover, women required more blood transfusions than men following PCI (Table-II).

Table-I: Gender variation in terms of procedural characteristics in patients with ACS (N=425)

Variables	UA (n=160)			STEMI(n=150)			NSTEMI (n=115)		
	Male (n=70)	Female (n=90)	p-value	Male (n=50)	Female (n=100)	p-value	Male (n=75)	Female (n=40)	p-value
Age	64.5	58.4	<0.01	68.1	60.2	<0.01	61.4	55	<0.01
Body Mass Index	28.4%	29.3%	<0.01	27.4%	28.3%	<0.01	29.1%	28%	<0.01
Radial Procedures (n,%)	32 (45.8%)	37 (41.8%)	<0.001	28 (48.2%)	43 (43.8%)	<0.0	22 (30.1%)	11 (27.7%)	<0.001
No. of Stents per patient	1.51	1.35	<0.001	1.65	1.60	<0.001	1.55	1.43	<0.001
No. of DES used per patient	0.41	1.2	<0.01	1.5	1.8	<0.001	0.5	1.4	<0.001
Rotablation Procedure	1(1.3%)	1(1.4%)	<0.0001	1(0.4%)	1.(1.2%)	<0.001	0.075(0.1%)	0.275 (0.5%)	<0.01
Single vessel PCI	60(87%)	73(82%)	0.04	42(85%)	80(80%)	<0.001	63(85%)	32(81%)	0.02
Multi vessel PCI	14(20%)	16(18%)	<0.01	8(16%)	14(14%)	0.04	11(15%)	4(10%)	<0.01
Graft vessel PCI	2.17 (3.1%)	2.61 (2.9%)	<0.001	1 (2%)	0.6 (1.2%)	<0.01	2 (3.5%)	0.84 (2.1%)	<0.001
No. of Lesions treated									
1 Lesions	42(60%)	54(62%)	<0.01	35(70%)	71(71%)	0.01	43.5(58%)	22(55%)	<0.001
2	14.7 (21%)	16.2 (18%)	<0.01	10.85 (21.7%)	21.6 (21.6%)	<0.001	17.25(23%)	8.4 (21%)	0.002

Table-II: Gender variations in terms of post PCI complications in patients with ACS (N=425)

Post-PCI Complications	Men (195)	Women (230)	Adjusted Odd Ratio (95% CI)	P-value
Bleeding	1.56 (0.8%)	3.45 (1.5%)	0.43(0.42-0.85)	0.001
Any vascular event	3.2 (1.65%)	7.3 (3.21%)	0.59(0.41-0.87)	0.03
Cardiogenic Shock	2.34 (1.2%)	3.91 (1.7%)	0.52(0.5-0.81)	0.01
Coronary perforation	1.05 (0.54%)	3.03 (1.32%)	0.84 (1.2-1.65)	0.04
Renal failure	0.39 (0.2%)	1.38 (0.6%)	1.52(0.99-1.45)	0.07
Mortality	4.2 (2.2%)	5.7 (2.5%)	0.85 (0.7-1.2)	0.61

DISCUSSION

Our study found out that women are less likely to be treated through PCI techniques than men in any case of coronary heart disease. The results were consistent with previous findings of Khan et al., who conducted a cohort study on the patients of STEMI and observed that women are less likely to undergo revascularization[8]. In another study, it was found that both genders' initial appearance is controlled. Similar revascularization capability was witnessed in both genders[9]. Thus, it can be interpreted that delay in the hospital appearance of women is affecting their treatment plan. Similarly, Anand et Al. examined a diseased population with a higher representation of men than women, in contrast to our data, and concluded that women diagnosed with unstable angina are less frequently treated by CABG surgery, angioplasty, and angiography (PCI). Resultantly, although the overall mortality rate remains unaffected, the risk of ischemia and re-hospitalization was enhanced[10].

Our study evaluated multiple treatment protocols and observed that women were not preferred for many intervention treatments. A study reviewed that women present with atypical MI and less likely to suffer from chest pain which might delay their treatment or enhance the mortality rate of women[11]. In our study, no significant difference in the mortality rate of the two genders was observed, which contrasts with older studies. Another study concluded that women presented with more cardiovascular events during one year and had a higher mortality rate[12]. In the same study, it was reported that the frequency of underlying comorbidities is higher in females than males, making them a high-risk group. Our study lacked the correlation of underlying diseases with cardiovascular manifestations and mortality rate. Therefore, the low mortality rate in our study can be interrupted as the possible existence of fewer comorbidities among female participants. Another interesting finding of our study is that the female participants of our study were younger than male participants. Contrary to this, early studies based on the management of ACS syndrome patients reported older females to be less treated with aggressive treatment protocols[13].

Further, the PCI treatment outcomes were evaluated in both genders. As expected, it was female patients who presented with adverse outcomes. Complications such as bleeding, vascular, renal failure, and cardiogenic shock were registered. Tavris et al[14], in their study, reported higher vascular complications in women following cardiac catheterization than males. Hematoma formation was noted as the earliest and most complicated vascular manifestation. Besides, Akhter et al [15] observed that bleeding consequences are not restricted to the site of treatment, but episodes of gastrointestinal and retroperitoneal blending were also observed. It was recommended to consider measures such as reduction in sheath size, catheterization following fluoroscopy, and increased access site management can reduce the risk of bleeding[15]. However, bleeding control management techniques, including college plug devices, manual compression, and closure techniques, is found to be associated with vascular complication[14].

As aforementioned, the current study has not addressed the baseline features that could contribute to higher post- PCI complications. Moreover, the sample size of our study is small; therefore, results could not be generalized for the larger population. To access the effects of modern techniques, a large sample size should be evaluated for a longer duration. Lastly, age groups should be part of the study.

CONCLUSION

The study concludes that generally, younger women suffer from acute coronary syndrome than men. Moreover, women are less likely to undergo procedural intervention and are more prone to post-treatment complications.

AUTHOR'S CONTRIBUTION

Ramzan M: Conceived idea, Designed research study, Data analysis, Manuscript writing, Final critical review of manuscript, Data collection, Data compilation, Literature review
Javed MK: Manuscript drafting, Data compilation, Data analysis, Data collection, Data compilation, Literature review
Qadir F: Manuscript drafting, Data compilation, Data analysis, Data collection, Data compilation, Literature review
Zubair M: Designed research study, Data analysis, Manuscript writing

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