DOI: https://doi.org/10.53350/pjmhs221651048

ORIGINAL ARTICLE

Gender Differences in Percutaneous Coronary Intervention Insights from the Coronary Angiography

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ABSTRACT

Background: The data from the prior studies have reported inconsistencies in the comorbidity burden, and baseline risk profile.
Objective: The data provide insights into the sex difference in percutaneous coronary interventions.
Study design: It is a retrospective study with statistical approach, conducted in the Department of Cardiology, Rehman Medical Institute Peshawar.
Material and Methods: The study was conducted from December 2021 to May 2022. The 400 patients visited the cardiology department of the hospital were included in the study. The selected patients were enrolled in the coronary angiography. The data was collected from cardiology department of two hospitals and analyzed. The ethical and review committee of the hospital approved the study. The informed consent was taken from the selected patients. The data contains demographic features, baselines characteristics, hospital complications and PCI course. The patients having residual stenosis of less than 50% after balloon angioplasty were included in the groups rated as successful PCI groups.
Results: Out of 400 patients taken from two hospitals there were 50% female. The women included in the study were 5 years older than the male patients. Women were on average 67 years old and men were 72 years old. Women in general had more cases of coronary angiography, also women were reported with cases like diabetes mellitus, and some of the cases reported congestive heart failure. The success of the procedure was more successful in case of women with 95% of female patients receiving successful procedure.
Conclusions: The overview of sex linked variations in PCI was observed in this study. The hospital mortality was found to be high in case of women, there was also not significant differences found between hospital mortalities for NSTE-2CS in case of cardiogenic problems
Keywords: Percutaneous coronary interventions (PCI), coronary angiography, cardiogenic shock, Non-ST elevation acute coronary syndrome (NSTE-ACS) and myocardial infraction.

INTRODUCTION

The controversial and limited knowledge about the sex differences patterns of percutaneous coronary interventions (PCI) is present. The mortality rates are observed to be higher in the recent years in the Pakistan. These rates are much higher in the developing countries as compared to the developed countries[1-2].

The most preferable method for the revascularization in the patients with the acute ST elevation myocardial infraction (STEMI). The better outcomes are associated with the primary PCI. PCI is an effective procedure for treatment of the coronary artery diseases (CAD) the The pharmacological interventions outcomes are observed to be less effective. The strokes[3-4], reinfection and mortality rated are observed to be reduced by the primary PCI. Though the less acceptance rates lies in the fact that this treatment is very expensive as compared to the others. It has increased the burden of the medics. The 47% of the patients received thrombolytic therapies. The first line of treatment for the STEMI patients in Pakistan is fibrinolysis[5-6]. The one of the leading cause of the mortality ACS has observed to be have higher incidence in the women as compared to the man. The changes in the percutaneous coronary intervention mainly effects sex-related differences with the passage of the time. The age, angiographic characteristics and coronary risk factors are the predisposing factors that differ in women and men diagnosed with CAD. The women diagnosed with CAD are normally older, with lower body mass index and higher prevalence of coronary risks factors comparing to the men[7-8].

The early mortality is associated with the women undergoing PCI. The different studies have reported that the mortality rates will increase to be 23.3 million by 2030. Coronary artery diseases are prevailing rapidly and affecting the people over the globe. The some researchers have reported the prognostic differences in different gender. The different studies showed different association of the sex-related outcomes with CAD. Few studies have reported the positive and direct association of female with the coronary angiography undergoing PCI[9], while other have reported both are independent factors. The higher risks of post procedural complications associated with the PCI are observed in the women as compared to the man.

The objective of this meta-analysis was to determine the sex-differences in patients with coronary angiography undergoing PCI[10].

MATERIAL AND METHODS

The study was conducted from December 2021 to May 2022. The 400 patients who visited the cardiology department of our institute teaching hospital were included in the study. The selected patients were those who were enrolled in the coronary angiography. The data was collected from cardiology department of two hospitals and analyzed. The ethical and review committee of the hospital approved the study. The informed consent was taken from the selected patients. The data contains demographic features, baselines characteristics, hospital complications and PCI course. The patients having residual stenosis of less than 50% after balloon angioplasty were included in the groups rated as successful PCI groups. According to the eligibility criteria all the patients treated with PCI for;

- non-ST elevation acute coronary syndrome (NSTE-ACS)
- ST elevation myocardial infraction (STEMI)
- coronary artery disease

Were included in the study. The analysis was performed by using statistical approaches. The data about the age, sex, prior PCI and myocardial infraction, cardiovascular risk factor, concomitant disease and stroke was collected. The cardiovascular outcomes, in-hospital complications, lesions characteristics were recorded. The pearson test performed for statistical analysis and the odds ratio were 95% were calculated by the logistics regressions. The significant p value was less than 0.05. The SAS software was used for the analysis.

RESULTS

The data from two hospitals was taken where the patients were registered. Sex differences were also described, during the therapeutic treatment after the patients were asked to carry out coronary angiography. Out of 400 patients taken from two

hospitals there were 50% female. The women included in the study were 5 years older than the male patients. Women were on average 67 years old and men were 72 years old. Women in general had more cases of coronary angiography, also women were reported with cases like diabetes mellitus, and some of the cases reported congestive heart failure. The success of the procedure was more successful in case of women with 95% of female patients receiving successful procedure.

The incidence of complications that appeared because of procedure was also slightly more in female than in male. As far as elective PCI is concerned the success rate in primary stage was higher in case of women. It was found that the incidence of PCI in case of single vessel was found in case of men more than female, therefore they underwent whole vessel occlusion especially in case of bypass grafts. There were major differences found of mortality rate between men and women due to catheterization carried out in the laboratory. There was a clear comparison found between NSTEC-ACS and PCI patients. The success of stent rate was more in case of women. The sex differences found in the procedural features of STEMI were less significant. In case of cardiogenic shock, the incidence rate was not dependent on sex differences.

Table 1: Outcomes in the hospital

	Female	Male	Odds Ratio (age adjusted)
PCI in cardiogenic shock			
	n=100	n=100	
Death in hospital	(46%)	(43%)	1.06 (0.7-1.2)
Major adverse cardiac event	(26%)	(29%)	1.05(0.9-1.5)
Major lethal cardiac or cerebrovascular event	(24%)	(23%)	1.03(0.7-1.4)
Non-lethal recovery	(3%)	(2%)	0.93(0.91-1.2)
Other complication	1.1%	(2%)	2.3(0.5-2.4)
PCI in STEMI-ACS without cardiac problem			
	n=100	n=100	
Death in hospital	6%	4%	1.2(0.8-1.15)
Major adverse cardiac event	7%	4%	1.17(0.7-1.2)
Major lethal cardiac or cerebrovascular event	6.9%	3.9%	1.21(1.1-1.25)
Non-lethal recovery	1%	0.5%	1.17(1.09-1.23)
Other complication	2.3%	1%	2.4(2-2.5)
PCI in NSTE-ACS individual without cardiogenic problems			
	n=100	n=100	
Death in hospital	3%	1.9%	1.1(1.0-1.9)
Major adverse cardiac event	2.7%	2%	1.0(1.0-1.9)
Major lethal cardiac or cerebrovascular event	3%	2.1%	1.8(0.9-1.9)
Non-lethal recovery	2%	1%	1.62(0.8-1.78)
Other complication	5%	2.4%	1.97(1.87-2.1)
PCI in elective patients			
	n=100	n=100	
Death in hospital	0.6%	0.2%	1.09 (0.9-2.1)
Major adverse cardiac event	0.8%	0.5%	1.39(0.8-1.39)
Major lethal cardiac or cerebrovascular event	0.3%	0.2%	1.45(0.7-1.46)
Non-lethal recovery	1.9%	1%	1.33(0.66-1.34)
Other complication	3%	2.0%	2.0 (0.99-2.1)

DISCUSSION

This study was carried out to find sex differences in the percutaneous coronary intervention, an insight that was needed from coronary angiography and PCI registry. Data was taken from two hospitals. It was found that there were more angiography cases carried out on women as compared to men still the mortality rate was high in women. The diseases like diabetes mellitus were seen more predominately in case of women as compared to men. Similar results were found after a study carried out in America[11-12]. It was not clear until now that why there was a clear cut difference between usage of invasive procedures related to coronary diseases in men and women in spite of the fact that there are many reported advantages of PCI in lowering the complications of ischemia.

The women were found to be older as compared to men. In case of STEMI patients there was age difference of 10 years found between men and women, with women being older than men. It was not found through analysis that there was any more PCI primary success rate in men as compared to women. In case of PCI and NSTE-ACS[13-14], the rate was quite high in case of women. These findings are consistent with the previous reports where similar success ratio was found between men and women[15].

It was found after analysis that the complications that arise during procedures and after the intervention were more prominently found in women as compared to men. Similar studies have been described before as well, but the main reasons to find this here were problems like higher comorbidity, differences in correct dosage[16-17], variations in endothelial functions. It was stated by previous analysis that the use of primary PCI over fibrinolytic therapy is much more advantageous in case of acute myocardial infarction, in some cases the future risk for any myocardial event was not reduced by any of these therapies[18-19]. As per previous studies there was much lower chance of long term mortality in women as compared to men. Even after adjusting the age of the patients the hospital mortality was higher for PCI and STEMI in case of our analysis. However, it has prominently decreased over the passage of time.

As per previous studies in our studies it was also found that there were more cases of young female death as compared to men in case of STEMI. However, as per studies carried out in 1999 it was found that the mortality cases used to be high as compared to current pace in case of both sexes. Especially in case of STEMI the hospital death cases have decreased prominently. Another study has shown that there are 20% more cases of hospital mortality in case of women[20-21]. Another important finding revealed that the sex differences that are observed in case of vascular complications after the PCI are quite similar to after lone coronary angiography. All these points reflect why there was less use of severe anticoagulant and the use of smaller sized sheath.

There were no such results found where any sex differences appeared in specific risk groups. It was found that there were some cases where PCI was found in more than one coronary vessel in case of STEMI, and it was the case that was associated with high mortality in men as compared to women[22]. However, in case of patients that were not suffering from acute coronary syndrome the PCI in more than one vessel, like PCI in CABG, was linked with high mortality rate in case of women. The reasons why these differences appeared needed to be further addressed. However, this study also had some limitations as this data was only taken from two hospitals, if more hospitals were added in the study, the analysis could be more precise. Also the minor variations that appear in the results were may be due to population based effect. According to the reports, the data about the invasive coronary angioplasty was not followed up that either the patients had non-invasive treatment[23]. There was also no data regarding the vascular access, but as per studies the radial access was reduced by 10% from 2007. Therefore, in this study the completeness of revascularization was not described in case of both sexes[24].

CONCLUSION

In this study the overview of sex linked variations in case of PCI were observed. The hospital mortality was found to be high in case of women, there was also not significant differences found between hospital mortalities for NSTE-2CS in case of cardiogenic problems. Other sort of complications was also found to be much elevated in women than men. There is need for further studies to find out about the reasons of these differences.

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