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# GENDER DIFFERENCES IN RISK FACTOR PROFILE AND DISTRIBUTION OF CORONARY ARTERY DISEASE AMONG PATIENTS UNDERGOING CORONARY ANGIOGRAPHY

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All the authors contributed significantly to the research that resulted in the submitted manuscript.

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## ABSTRACT

**Objective:** To determine gender based differences in risk factors and distribution of coronary artery disease (CAD) in patients undergoing coronary angiography.

**Methodology:** This was cross sectional, observational study. We studied 851 patients who underwent coronary angiography at a tertiary care centre. Patients were interviewed regarding their basic demographics, cardiovascular risk factor profiles and disease status. CAD burden was quantified and compared across sex groups. Data underwent statistical analysis using SPSS V 19. Level of significance was 0.05.

**Results:** We included total 851 patients. 209 patients (117M, 32F) had STEMI, 310 (213M, 97F) had NSTEMI 286 (200M, 86F) had unstable angina, 54 (27M, 27F) had stable angina. Normal angiogram was reported in 24% of females whiles it was reported in 11.5% in males. Single vessel disease (SVD) was 17.9% and 16.5% in male and female respectively. Double vessel disease (DVD) was 27% and 22% in male and female respectively. Triple vessel disease (TVD) was reported in 43% and 38% in male and female respectively. Left main Stem (LMS) was reported normal in 86.4% in males and 84.5% in females. Ostial disease was found in 274 (44%) male and 72 (30%) females. Bifurcation disease was present in 105 (17%) males and 22 (0.9%) females. Calcification was present in 139 (22.75%) males and 49 (20%) females. LV dysfunction was present in 242 (39.5%) males and 66 (27.6%) females.

**Conclusion:** There are significant gender based differences in risk factor profile, presentation, number, distribution and complexity of coronary artery disease.

**Key Words:** Risk factors, Coronary artery disease, Angiography.

## INTRODUCTION

Coronary artery disease is (CAD) no longer confined by geographical area, age, sex, or socioeconomic boundaries. Heart disease has already reached epidemic proportions in poorer countries. Cardiovascular disease is posing a major public health hazard and clinical problem in South Asia (India, Pakistan, Bangladesh, and Nepal).

Since 1950, the incidence of coronary heart disease has risen among women while it has declined among men. The life time risk for developing CAD at the age of forty is two in three for men and one in three for women, and remains almost the same at the age of seventy, being one in three in men and one in four for women. Because of protective effect of estrogen and variable impact of other risk factors formation of CAD in females differ remarkably from men. These may be the possible basis that women are less likely than men to be referred for coronary angiography and subsequent revascularization.[1,2] However, it is now recognized that heart disease is the first killer of women, with an increase at middle age.[3] Following an acute event, women are reported to have worse outcomes,[4,5] with about two–thirds of women never fully recovering. They also face worse prognosis than men following surgical therapy for CAD.[6,7] Some studies show no substantial evidence for gender differences in severity of coronary artery disease[8,9] while others have found some significant differences.

Keeping these differences in mind we wanted to know gender based differences in distribution of coronary artery disease and risk factor profile in our population. So that a better identification, risk stratification and management plan can be made according to gender based difference.

## METHODOLOGY

The study group consist of unselected 851 consecutive patients who underwent coronary angiography in an academic tertiary care unit; National Institute of cardiovascular diseases (NICVD) Karachi from July 2010-Oct 2010. Exclusion criteria included patients with a history of coronary artery bypass graft Surgery. Informed consent was taken from all patients. Patients were asked about basic demographic data and reason of angiography.

Each angiogram was reviewed by two cardiologists. Significant lesion was defined as those with 70% diameter narrowing of coronary arteries and 50% for the left main coronary artery. Statistical analysis was carried out by using Fisher's exact test and chi-square. Level of significance was $< 0.05$. Data was analyzed using SPSS V-19.

## RESULTS

We included 851 patients; 612 (71.9%) males and 239 (28.1%) females. The male to female ratio is almost 3:1. The mean age of presentation was 52.49 years for males and 54.35 years for females. The femoral approach was site of vascular access in 683 (80.25%) patients; 496 (81%) males and in 187 (78%) in females while 169 (19.75%) patients had left heart catheterization (LHC) done via radial route. Type of presentation is mentioned in Table 1. Gender wise risk factor profile is mentioned in Table 2. Normal angiogram was reported in 24% of females whiles it was reported in 11.5% in males. Single vessel disease (SVD) was almost same 17.9% and 16.5% in male and female respectively. Double vessel disease (DVD) was 27% and 22% in male and female respectively. Triple vessel disease (TVD) was

**Table 1: Gender wise Presenting Conditions**

| Variables | Total | Male (n%) | Female n (%) | *p*-value |
|---|---|---|---|---|
| STEMI | 209 | 117 (19%) | 32 (13%) | 0.001 |
| NSTEMI | 310 | 213 (34.8%) | 97 (40.5%) | 0.132 |
| Unstable Angina | 286 | 200 (32.6%) | 86 (35.9%) | 0.375 |
| Stable Angina | 54 | 27 (0.4%) | 27 (11.2%) | 0.001 |

**STEMI** = ST elevation myocardial infarction
**NSTEMI** = Non ST elevation myocardial infarction

**Table 2: Gender wise Risk factor Profile**

| Variables | Total | Male (n%) | Female n (%) | *p*-value |
|---|---|---|---|---|
| HTN | 577 | 393 (64.2%) | 184 (76.9%) | 0.001 |
| DM | 343 | 239 (39%) | 104 (43.5%) | 0.362 |
| Smoking | 323 | 308 (50%) | 15 (0.6%) | 0.001 |
| Hyperlipidemia | 196 | 135 (22%) | 61 (25%) | 0.279 |
| Family history | 179 | 138 (22.5%) | 41 (17.1%) | 0.092 |

**Table 3: Distribution of Disease**

| Variables | Total | Male (n%) | Female n (%) | *p*-value |
|---|---|---|---|---|
| Left Main Artery | 120 | 83 (13.5%) | 37 (15.4%) | 0.511 |
| Left Anterior Descending Artery | 649 | 485 (79%) | 164 (68.6%) | 0.002 |
| Left Circumflex Artery | 483 | 356 (58%) | 127 (53.1%) | 0.191 |
| Right Coronary Artery | 497 | 375 (61%) | 122 (51%) | 0.005 |
| Diagonal one | 222 | 176 (28.7%) | 46 (19.2%) | 0.026 |
| Diagonal two | 46 | 36 (0.5%) | 10 (0.4%) | 0.114 |
| Obtuse marginal one | 261 | 194 (31.6%) | 67 (28%) | 0.898 |
| Obtuse marginal two | 85 | 64 (1.0%) | 21 (0.87%) | 0.059 |

**Table 4: Characteristics of lesion**

| Variables | Total | Male (n%) | Female n (%) | *p*-value |
|---|---|---|---|---|
| Ostial disease | 346 | 274 (44.7%) | 72 (30%) | 0.000 |
| Bifurcation disease | 127 | 105 (17%) | 22 (0.9%) | 0.013 |
| Calcification | 188 | 139 (22.75) | 49 (20%) | 0.557 |
| LV Dysfunction | 308 | 242 (39.5%) | 66 (27.6%) | 0.001 |

reported in 43% and 38% in male and female respectively. Left main artery (LM) was reported normal in almost equal frequency 86.4% in males and 84.5% in females. Gender wise distribution of disease is mentioned in Table 3. High risk feature of coronary anatomy are mentioned in Table 4.

## DISCUSSION

Like other studies we have found that female undergoing angiography were on average older than male subjects.[10-12]

We also found that patients with STEMI were much more likely to be males while female had more prevalence of stable disease. Our study showed that females were more hypertensive than their male counterparts. Multiple studies have shown that women are more likely to have a history of traditional risk factors of coronary atherosclerosis such as hypertension, diabetes and hypercholesterolemia except cigarette smoking[13,14] our study confirmed these findings.

Available data suggest that, for the same degree of symptoms as men, women present with less obstructive coronary artery disease (CAD).[15,16] We too found higher prevalence of normal angiogram in females than males.

We report the incidence of single vessel disease (SVD) in 17.9% males and in 16.5% females. This is comparably equal in distribution in gender but lower in prevalence as compared to other published data. Younes et al[17] reported SVD in 21.8% in males and 23.6 % in Females. Other study done in Netherlands by Roeters et al[18] found equal but quite higher prevalence of SVD with 42% in males and 44.0% in females. In our study double vessel disease (DVD) was 27% in males and 22% in females, almost similar results were found in Roeters et al[18] ( 27% Vs 26.6%). While Younes et al[17] found DVD in 34% males and 31.8% females.

About 43% of males and 38% of females had TVD in our study. Younes et al[17] has found similar results as in our population (43.9% Vs 44.9%), while Roetrs et al found (25.5% Vs 24.2%).

One study by leaf et al[19] done on 112 women and 722 men with coronary artery disease from 1972 through 1981 in Los Angles, U.S.A, found no evidence for gender differences in terms of the extent of coronary artery lesions. We found that in males left anterior descending artery (LAD) was significantly involved, followed by right coronary artery (RCA) [statistically significant] and left circumflex artery (LCX) [statistically nonsignificant] as compared to females. We did not found less involvement of left main artery (LM) in females as compared to males as suggested by one study[20] Complex lesion such as Ostial, bifurcation and calcified were found more in males as compared to females.[21] Left ventricular dysfunction was also found more prevalent in males as compared to females. This finding was also reported by other studies.[17,22]

We have demonstrated several important gender differences

in risk factor profile, clinical presentation to angiographic characteristics. However, there may still be inherent biological differences between genders that have yet to be defined that may also explain these outcomes .[23]

## LIMITATIONS

Our study did not address clinical outcomes, including cardiovascular morbidity and mortality. Myocardial infarction frequently develops from angiographically nonobstructive lesions therefore angiographic findings of our study cannot be extrapolated to CAD associated mortality. Our conclusions does not apply to the general population, they are hypothesis- generating and deserve future exploration in a larger, multicenter study.

## CONCLUSION

There are significant gender based differences in risk factor profile, presentation, number, distribution and complexity of coronary artery disease.

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