

# OBSTRUCTIVE CORONARY ARTERY DISEASE IN YOUNG FEMALES

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## ABSTRACT

**BACKGROUND:** To define myocardial infarction in “young”, many studies taken < 40 to 45 yrs. of age as cut off point. We have data in young males with obstructive coronary artery disease, but limited data in young females.

**OBJECTIVES:** To see the disease pattern, risk factors, presentation, ventricular function and PCI efficiency of young females in comparison with young males with obstructive coronary artery disease who require PCI.

**MATERIAL AND METHODS** We retrospectively analyzed the data of young patients (< 45 yrs. of age) who undergone PCI over past two years. We noted the clinical, investigative and treatment modalities of these patients.

**RESULTS:** 200 young patients had undergone PCI for obstructive CAD with 42 females over two year period. Females had more frequently hypertension (69.1% vs. 43.7%) and Type 2 Diabetes (33.3% vs 22.8%) which are statistically significant. Smoking was frequent in young males than young females. Males were presented as acute MI, whereas females with rest chest pain. Multi-vessel involvements, LV dysfunction, success of PCI and complication rates were similar in both groups. Females are more anemic (< 11 g/dl in females and < 13g/dl in males). Complexity of lesion (B2 or C type of lesions) is more in females which is statistically significant.

**CONCLUSION:** Young females had more frequently hypertension, Diabetes, acute coronary syndrome without MI, mild anemia, complex lesions than young males, but with same success and complication rate of PCI.

**KEYWORDS** Young females, Coronary artery disease, Percutaneous coronary intervention.

## INTRODUCTION

Many early studies on CAD in young patients labeled them as having “premature” CAD, but it is now better understood as a rapidly progressive form of the disease.

According to previous literature, these patients are mainly male and have several coronary risk factors, but with changing scenario of CAD in females this is a statement requires validation [1]. Even though CAD in young females started publications in early 1960s, limited publications on differences of disease profile in young men and women [2].

## MATERIALS AND METHODS:

We retrospectively analyzed the data of young patients (< 45 yrs. of age) who undergone PCI in our institute over past two years. We noted the details of coronary risk factors, type of CAD presentation, Coronary angiogram (CAG) and Coronary intervention (PCI) & it's out come in hospital were noted. Lab investigations included complete blood picture, renal parameters, cardiac enzymes and lipid profile. Anemia is defined as < 11gm/dl in females and < 13 gm. /dl in males. ECGs and 2D echo findings were noted. LV dysfunction is defined when LV EF was < 50% (both by Simpson's and volume estimation). In CAG culprit vessel, no of vessel involvement, lesional characters (like calcium, Complexity of lesion etc.,) and tortuosity of vessels were noted. Acute results of PCI like success, complications (including the puncture site complications) were noted.

## STATISTICAL ANALYSIS:

Univariate analysis of categorical variables was performed with the chi-square test and continuous variables were analyzed by Student's t-test. Correlations among parameters were evaluated by linear regression analysis. Differences were considered significant at P<0.05. Statistical analysis was performed using Minitab (16th version).

## RESULTS

Out of 200 cases of “young” PCI patients females were 42 (M: F: 3.76:1). Hypertension was present in 29(69.1%)

females vs. 69(43.7%) males, DM in 14(33.3%) females vs. 36(22.8%) males and smoking 02(4.8%) females vs. 75(47.5%) males. Five patients had early menopause, rest of females were in premenopausal stage. Hypertension, diabetes and anemia is more prevalent in young females than young male CAD patients (Table 1, 2, Fig 1).

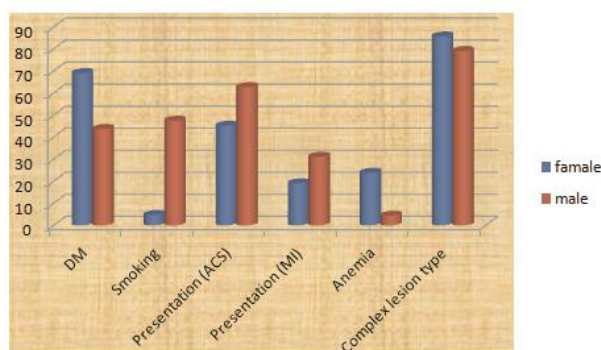
Table 1: Demographic features of young males and females with CAD

Parameters	Females	Males	“p” value
Number	42	158	-
Age (yrs.)	37.9±7.3	40.5±4.3	ns
Hypertension	29(69.1%)	69(43.7%)	0.008
Diabetes	14(33.3%)	36(22.8%)	0.07
Smoking	02(4.8%)	75(47.5%)	0.00

Table 2: Details of clinical and lab features of young males and females with CAD

Parameters	Females	Males	“p” value
Presentation(ACS)	19(45.2%)	99(62.7%)	0.03
Presentation(MI)	8(19.1%)	49(31.1%)	0.03
LV dysfunction	10(23.8%)	41(25.9%)	0.3
Multi vessel	08(19.1%)	35(22.2%)	Ns

Fig 1: Risk factor profile in study population



45.2% of young females presented as acute coronary syndrome (ACS) vs. 62.7% of males. Presentation as MI is more prevalent in males (31.1% vs. 19.1%). There was no difference in occurrence of LV dysfunction and no of vessels involvement in between young males and females. (Table 2).

In 42 female patients 53 lesions were treated and in 158 male patient 198 lesions were treated. Complexity of lesion (either B2 or C) is more in females which is statistically significant (p=0.02). (Table 3 & Fig 1). In Table 4 lesion location details were given.

Table 3: Lesional characters in young males and females with CAD

Parameters	Females	Males	“p” value
No of lesions per pt	1.3	1.3	ns
No of lesions	53	198	
Complexity of lesion (b2 or c)	36(85.7%)	125(79.1%)	0.02
Calcium at lesion	0	2(1.3%)	ns
Tortuosity of vessel	1(2.4%)	5(3.2%)	ns

Table 4: Site of lesion in young males and females with CAD

Site of lesion	No of female cases	No of male cases
LAD and/or D1	32 (60.4%)	100 (50.5%)
LCX and/or OM	5 (9.4%)	35 (17.7%)
RCA and/or PDA,PLV	14 (26.4%)	61 (30.8%)
LMCA	1 (1.9%)	0
SVG	1 (1.9%)	2 (1.01%)

As there is significant improvement in technology of PCI, even though lesional complexity is more in female patients there is no difference in success or complication rates between two groups. (Table 5). As majority of PCI were done Trans radially in both groups there was no difference in occurrence of local site hematomas.

Table 5: Acute Results of coronary angioplasty in young males and females with CAD.

Angioplasty details	Females (%)	Males (%)	“p” value
Success of PCI	100%	98.42%	ns
Complications of PCI			
No reflow	0	1(0.63%)	ns
AST or SAST	1(2.3%)	2(1.3%)	ns
Hematoma at puncture site	1(2.3%)	3(1.9%)	ns

## DISCUSSION

CAD in young adults were given importance since longtime [3]. Fortunately, the incidence of myocardial infarction (MI) and symptomatic CAD in young adults is low; most of old studies show that only about 3% of all CAD cases occur in this age range [4]. According to NOEMAN A et al, CAD in young female: males were 1:4.53 [5]. Arzamendi D et al in their autopsy series observed that among young individuals who died of CAD, 3-vessel disease was observed in 39.7% of cases. Moreover, among the whole population <40 years old, at least one significant coronary lesion was observed in 39.5% of cases, irrespective to the cause of death [6]. Indeed, when a rigorous intravascular ultrasound-based investigation was undertaken in a cohort of recently transplanted hearts (mean donor age  $33.4 \pm 13.2$  years) by Tuzcu et al. [7], the prevalence of disease was >50%, with one in six teenagers manifesting coronary lesions.

Diabetes and hyperlipidemia are also frequently present in young CAD patients [8, 9]. Young women with CAD comprise an especially interesting group given the protective effect of estrogen, but which factors are predictive in this distinctly unusual cohort is poorly understood [4]. Anecdotal cases suggest that diabetes in women may have a more powerful role than in men. In present study, DM was more prevalent than in young men but that is not statistically significant.

According to previous studies, Hypertension and lack of exercise are both firmly established risk factors for CAD in general, but they appear to contribute only marginally in this population. Undoubtedly, accounting for the surprising absence of a powerful influence of these factors in this population is important in fully comprehending the pathogenesis of CAD in young adults. On contrary, in our study, hypertension was more prevalent in young females (69.1%) than young males, which is statistically significant.

In young males the smoking is considered as a strong risk factor for CAD. According to the Framingham study repeated exposure to cigarettes and the resulting frequent catecholamine surges damage endothelial cells, leading to dysfunction and injury of the vascular intima [10]. In our series smoking is very less in females, so other mechanisms play important role in female CAD. Women who smoke have a quantitatively similar risk as men [11], but more than five times the risk of

nonsmoking women [12]. Smoking in combination with oral contraceptives poses a 13-fold increase in CAD mortality [13]. Truncal obesity and increased body mass index (BMI) have recently been proposed as potential independent risk factors, particularly in young women with CAD.

Presence of calcium at lesion site and tortuous vessels are features of elderly. But in a subgroup analysis of the Coronary Artery Risk Development in Young Adults (CARDIA) study, high objective hostility scores were associated with the presence of coronary artery calcification. The interaction between a genetic propensity to form vulnerable plaque combined with acute stress and/or an active infectious/inflammatory process needs further study [14]. In present study we are not taken emotional history separately, but found that presence of coronary calcium was rare.

Huang JH, et al in their study showed Left main, left anterior descending and bifurcation lesions were more common while type C lesion and right coronary lesion were less common in young female CAD group compared to young male CAD group ( $P < 0.01-0.05$ ). The average lesion length in female patients was significantly longer than that in male patients [ $(20.36 \pm 13.37)$  mm vs.  $(23.04 \pm 13.86)$  mm,  $P < 0.05$ ] [15]. In this study also complexity of lesion was more in young females CAD patients, but not in any particular coronary territory.

In young patients with a single culprit lesion, and among most women (especially those with dissection or coronary spasm), a plaque rupture on a previously non-significant vulnerable plaque is usually the mechanism of acute presentation [3]. But we have not seen any coronary dissections in our young females presented with MI.

Limitations of the study: Major limitation is we analyzed the young patients who were for PCI; means already significant coronary obstructive lesions were present, which in real world may not represent to compare CAD young male and female population. All these patients belong to single ethnic Asian population. We have noted the conventional risk factors only but not the other risk factors specific for females as suggested by Jairath N like depression and thyroid function [16]. If we can better identify and characterize the mechanism of disease in this population, our understanding of CAD in more typical cases will be vastly improved.

In conclusion, Young PCI requiring CAD females had more frequently hypertension and diabetes than young PCI requiring male CAD patients. More so these young females present with acute coronary syndrome without MI with mild anemia. They have more complex coronary lesions than young males, but with same success and complication rate of PCI.

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