

## FREQUENCY OF RISK FACTORS IN PATIENTS PRESENTING WITH ACUTE CORONARY SYNDROME BELOW 40 YEARS OF AGE

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### Contribution

NMAS conceived the idea and designed the study. Data collection and analysis was done by KIB and MTF while NUK did the final review. All authors contributed equally to the submitted manuscript.

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### ABSTRACT

**Objective:** To determine the frequency of factors leading to acute coronary syndrome in patients below 40 years of age presenting to tertiary care center.

**Methodology:** This descriptive cross sectional study was conducted at National Institute of Cardiovascular Disease, Karachi from 20th August 2015 to 19 February, 2016 for six months. Individuals of both genders with age below 40 years presented with acute coronary syndrome for first time were included. Patients with valvular heart disease, congenital heart disease, Congestive cardiac failure, chronic renal and respiratory failure were excluded from the study.

**Results:** Total of 86 patients were included. The average age of the patients was  $35.80 \pm 4.21$  years (95%CI: 34.89 to 36.71). Out of 85 patients, 72 (85%) were males and 13 (15%) were females with 5.54:1 male to female. ratio. ST-segment elevation myocardial infarction (STEMI) was observed in 38 (44.7%) cases, non-ST-segment elevation myocardial infarction (NSTEMI) was seen in 20 (23.5%) cases and unstable angina (UA) was observed in 27 (31.8%) patients. Family history was the commonest factor leading to acute coronary syndrome observed in 45 (52.9%) cases followed by smoking [31 (36.5%)], Obesity [14 (16.5%)], dyslipidemia [13 (15.3%)], diabetes mellitus [10 (11.8%)] and hypertension observed in [5 (5.9%)] cases. Smoking was commoner in higher age groups ( $p=0.013$ ). Comparison of factors of acute coronary syndrome between male and female revealed that smoking, family history, diabetes mellitus, hypertension were significantly higher in male patients than female.

**Conclusion:** Family history emerged as a most common risk factor associated with acute coronary syndrome in young individuals.

**Key Words:** Acute Coronary Syndrome, Risk Factors, Family History.

## INTRODUCTION

Coronary artery disease (CAD) is a devastating disease precisely because an otherwise healthy person in the prime of life may die or become disabled without warning when the afflicted individual is under the age of 40, the tragic consequences for family friends and occupation are particularly catastrophic and un-expected.<sup>1</sup>

Prevalence of conventional risk factors like diabetes, hypertension, smoking, dyslipidemia and obesity accounts for about 85% to 90% of premature CAD patients.<sup>2</sup> Often young CAD patients have multiple coexisting risk factors contributing to the disease.<sup>3</sup>

Pakistani people belong to the South Asian population which has the highest known rate of coronary artery disease (CAD)<sup>4</sup> According to the careful estimates based on scientific studies nearly 100,000 individuals suffered from acute myocardial infarction (AMI) in calendar year 2002.<sup>5</sup> The relative risk of developing CAD in Pakistani men is highest in early ages.<sup>6</sup>

In a recently published study, 16% of acute myocardial infarction patients at the Aga Khan University Hospital (AKUH) between 2000 - 2002 were found to be younger than 45 years of age and 93% of them were men.<sup>7</sup> In a relatively larger study, the incidence of AMI was found to be 192.8/100,000 males during 1994.<sup>8</sup> This figure places Pakistan at par with those countries which have the highest known rates of CAD

The study will help to prevent and to educate the young population below 40 years for acute coronary syndrome. The benefit is for both patients and physician to manage acute coronary syndrome in young patients. The purpose of this study was to determine the burden of factors leading to acute coronary syndrome in our young population.

## METHODOLOGY

This descriptive cross sectional study was conducted at National Institute of Cardiovascular Diseases Karachi from 20th August 2015 to 19th February 2016. Non probability purposive sampling technique was used. All individuals of both genders with age below 40 years presented with acute coronary syndrome for first time were included. Patients with valvular heart disease, congenital heart disease, Congestive cardiac failure, chronic renal and respiratory failure were excluded from the study.

The patients of age below 40 years and presenting with the diagnosis of acute coronary syndrome at NICVD Karachi, fulfilling the inclusion and exclusion criteria were enrolled for the study after taking informed consent. After given identification to patients, the demographic data such as age, gender, height and weight were recorded. The factors included in the proforma were investigated and recorded for each patients. The smoking > 11 pack per year was labeled as smoking habit present. Family history of angina, myocardial infarction, sudden cardiac death at age less than 55 in male and less than 65 was taken as positive. FBS values > 126mg/dl at the time of admission was labeled as diabetes mellitus positive, systolic BP and diastolic BP cut off points according to operational definition were used to screen hypertensive patients. Fasting lipid profile was used to determine the dyslipidemic patients on the basis of total cholesterol, HDL and LDL, according to criteria mentioned in the operational

definition. All these were noted in proforma by principal investigator.

Demographic variables like age, height and weight calculated body mass index, hypertension, diabetes mellitus, smoking, dyslipidemia, ischemic heart disease and family history of CAD were recorded.

Data was entered and analyzed in statistical. Software (SPSS-10). Frequency and percentage were computed for categorical variables like age groups. Gender, acute coronary syndrome. Factors leading to acute coronary syndrome (smoking, family history of CAD, dyslipidemia, hypertension, diabetes and obesity). Mean and standard deviation, 95% confidence interval were computed for quantitative observation like age, weight, height, BMI, duration of hypertension and diabetes. Chi-square test was applied to compare proportion difference between age groups, gender for factors leading to acute coronary syndrome.  $P < 0.05$  was considered level of significant. Effect of age and gender were control by stratification.

## RESULTS

A total of 85 patients with the diagnosis of acute coronary syndrome were included in this study. Most of the patients were between 36 to 39 years of age that is 62.4 percent as shown in figure 1. The average age of the patients was  $35.80 \pm 4.21$  years (95%CI: 34.89 to 36.71). The average and 95% confidence interval of the body mass index was  $27.13 \pm 7.5\text{kg/m}^2$  (95%CI. 25.5 to 28.75) similarly the average. weight and height are presented in table-1. Out of 85 patients, 72 (85%) were male and 13 (15%) were female with 5.54:1 male to female ratio.

ST-segment elevation myocardial infarction (STEMI) was observed in 38 (44.7%) cases, non- ST- segment elevation myocardial infarction (NSTEMI) was seen in 20 (23.5%) cases and unstable angina (UA) was observed in 27 (31.8%).

Frequency of factors leading to acute coronary syndrome in patients is presented in table-2. Family history was the commonest factors leading to acute coronary syndrome that was observed in [45 (52.9%)] cases followed by smoking [31 (36.5%)], Obesity [14 (16.5%)], dyslipidemia [13 (15.3%)], diabetes mellitus [10 (11.8%)] and hypertension was observed in [5 (5.9%)] cases. Patients who are smokers, the average number of packet per year  $12.13 \pm 5.98$  packet

Comparisons of factors leading to acute coronary syndrome among age groups are presented in table 3. Smoking was significant higher in elderly groups ( $p=0.013$ ). Other factors were not significant among age groups. Like comparison of factors of acute coronary syndrome between male and female are showing smoking, family history, diabetes mellitus, hypertension were significantly higher in male patients than female as shown in table-4.

Figure 1: Age Distribution of the Patients (n=85)

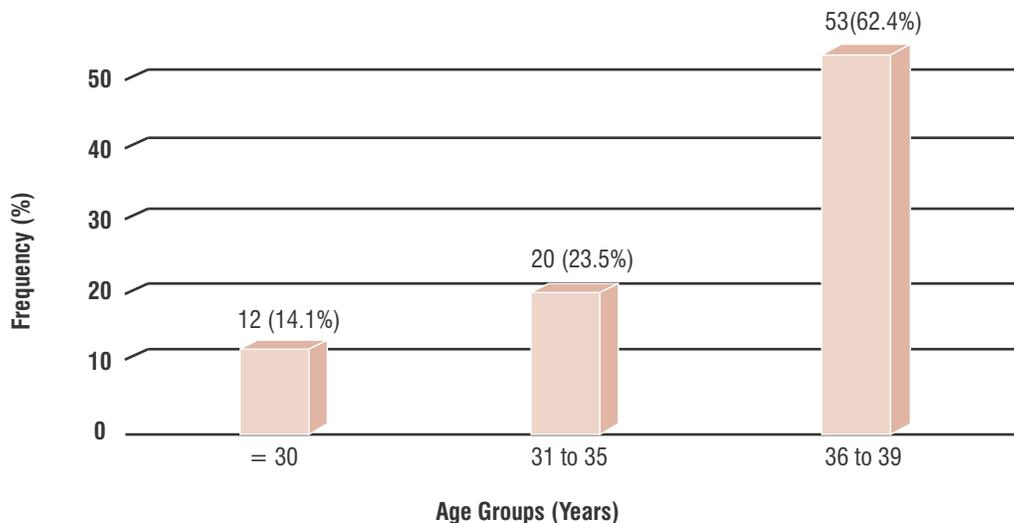


Table 1: Baseline Demographic & Clinical Characteristics of Patients (n=85)

Variables	Mean ± SD	95%CI	Median (IQR)	Max-Min
Age (Year)	35.80 ± 4.21	34.89 to 36.71	38(4)	39-22
Height(m)	1.635 ± 0.11	1.61 to 1.66	1.64 (0.07)	1.86-1
Weight (kg)	71.86 ± 14.92	68.64 to 75.08	71(18)	132-45
BMI (kg/m <sup>2</sup> )	27.13 ± 7.5	25.5 to 28.75	26.07 (5.06)	82-17.69

Table 2: Frequency of Factors Leading to Acute Coronary Syndrome (n=85)

Leading Factors	Frequency (n)	Percentage (%)
Family History of CAD	45	52.9%
Smoking	31	36.5%
Dyslipidemia	13	15.3%
Obesity	14	16.5%
Diabetes	10	11.8%
Hypertension	5	5.9%

Table 3: Comparison of Factors to Acute Coronary Syndrome With Respect to Age Groups (n=85)

Variables	Age Groups (Years)			P-Values
	< 30	31 to 35	36 to 39	
Obesity	0	7	7	0.92
Smoking	8	3	20	0.013*
Family history of CAD	5	9	31	0.41
Dyslipidemia	1	6	6	0.11
Diabetes mellitus	0	2	8	0.32
Hypertension	0	0	5	0.20

Chi square test \* significant

**Tables 4: Comparison of Factors to Acute Coronary Syndrome with Respect to Gender**

Variables	Male (n=72)	Female (n=13)	P-Values
Obesity	11	3	0.42
Smoking	31	0	0.003*
Family history of CAD	39	6	0.045
Dyslipidemia	9	4	0.11
Diabetes mellitus	9	1	0.02
Hypertension	5	0	0.012

Chi square test \* significant

## DISCUSSION

Interesting trends emerged from this study. Male predominance in one aspect and has been reported elsewhere by researchers like Noeman A, Jaffery MH, Abbas S; and Ahmed I in their studies<sup>1,9,11</sup>. Male predominance seems to be related to more prevalence of coronary heart disease in young males as compared to premenopausal females as premenopausal period is a time when the risk of coronary events for women is low. The role of female sex hormones to protecting premenopausal women from overt atherosclerosis is widely accepted.<sup>12</sup>

ST-segment elevation myocardial infarction emerged out as the most common form of acute coronary syndrome in young individuals in this study as 44.7%. This finding is consistent with other studies from developing countries.<sup>10</sup> This finding may be due to more frequent hospitalization of young patients with ST-segment elevation myocardial infarction and offering them more reperfusion therapy (either pharmacological or catheter based) as compared to older individuals.

Family history emerged as a most common risk factor leading to acute coronary syndrome in young patients he. 52.9% which is not surprising as same along with smoking as a major risk factor previously reported in both local and international studies by Doughty M, Friedlander Y Hoffmann E, Ismail J, and many other researchers.<sup>13-16</sup> While comparing with other studies like Ahmed I reports 17%.; Noeman A 18.8%.<sup>9</sup> This percentage is quite high but still much less than was reported in a recent Canadian study where 67% of young women below 45 years reported positive family history.<sup>17</sup>

To know the exact reason behind this risk factor change in our young population needs further large scale studies and evaluation. This high percentage of family history showed the transmission of mutated genes for coronary heart disease in families and high lightened their role in the of young onset coronary artery disease in our local population. The scientists from Britain, India, Pakistan and the United States also showed that mutation affect about four percent of South Asians - or 60 million people - giving them a lifelong predisposition to heart disease. Now that the defect has been identified, there is a new glimmer of hope. It could be detected very early during pregnancy and carriers of the defect could be identified at a young age by genetic screening and advised to adopt a healthier lifestyle and eventually, new drugs could be developed to postpone the onset of symptoms.<sup>18</sup> Oxford Vascular study (OXVASC) is an ongoing

prospective population based study of CAD and stroke with very high level of clinical ascertainment which allows detailed study of Family History, such data may help formulate improved risk prediction tools and to inform future GWAS(Genome wide association studies).<sup>19</sup>

Smoking as a major risk factor for young coronary artery disease is also mentioned in other studies reported by Doughty M, Chaudhry L, Ismail J, and many other reporters.<sup>13,16,20</sup> Although the percentage of smokers mentioned in our study 36.5% which is lower than reported by other local studies as by Noeman A as (63.4%) and Ahmed as (79%). It still high-lightened the importance smoking play in pathogenesis of coronary artery disease at young age by promoting premature atherosclerosis.<sup>9,11</sup>

Hypertension as a risk factor is less common in young patients with acute coronary syndrome in our study (5.9%) than in older patients somewhat similar but little higher figures are given by Burazeri G in his study as 15%.<sup>21</sup> Prevalence of hypertension in another study population of young adult males was 1.6%.<sup>22</sup> While the prevalence of hypertension is relatively low in young adults. It nevertheless constitutes an important problem, as target organ damage is correlated with duration of disease, and early detection and management of hypertension may confer reduction in long-term risks of cardiovascular disease.

Diabetes mellitus was seen in 11.8% which is comparable to study by BurazeriG as 7-9%.<sup>21</sup> These figures showed that diabetes is more likely to be associated with acute coronary syndrome in older patients than in young patients.

## LIMITATIONS

This was a single centre, non randomized study with a small sample size. Hence the results may not be generalized. Recruitment of participants from other centres would have improved the generalization and external validity of the findings. Future non randomized studies with larger sample size are warranted.

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