

## RISK FACTOR ASSESSMENT IN PATIENTS UNDERGOING CORONARY ANGIOGRAPHY AT ARMY CARDIAC CENTRE LAHORE

Aneela Afreen, Muhammad Nadir Khan, Muhammad Babar Khan\*, Ayaz Ahmad, Muhammad Shoaib Akbar, Shoaib Muhammad Danyal

Army Cardiac Centre Lahore Pakistan, \*Combined Military Hospital/National University of Medical Sciences (NUMS) Rawalpindi Pakistan

### ABSTRACT

**Objective:** To assess the frequency of risk factors in patients undergoing coronary angiography at Army Cardiac Centre Lahore.

**Study Design:** Descriptive cross sectional study.

**Place and Duration of Study:** Army Cardiac Centre Lahore, from May 2018 to Jul 2018.

**Material and Methods:** One hundred and ninety six patients were enrolled in the study through purposive convenience sampling. All the patients undergoing coronary angiography were included in the study after informed consent and the data was collected using a structured questionnaire regarding risk profile.

**Results:** Out of 196 patients enrolled, frequencies of male and female genders were 150 (76.53%) and 46 (23.46%) respectively. The age varied from 24 years to 90 years with a mean age of  $57.14 \pm 10.6$ . Maximum number of patients i.e. 67 (34.18%) were within 60-70 years. Increased BMI (overweight) was the most common risk factor with 105 (53.57%) patients having BMI between  $\geq 25$  and  $<30\text{kg/m}^2$ . Hypertension was the second most common risk factor with frequency 74 (37.75%) and Diabetes Mellitus was the third in line having 70 (35.71%) patients. Frequencies of other risk factors were Dyslipidemia 36 (18.36%), Smokers 34 (17.34%) and Family History 1 (0.51%).

**Conclusion:** Our findings highlighted the major contribution of modifiable risk factors in prevalence of Ischemic Heart Disease which can be controlled by adopting healthy lifestyle behaviors.

**Keywords:** Coronary Artery Disease, Coronary Angiography, Risk Factors.

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### INTRODUCTION

Cardiovascular disease has become one of the leading causes of death worldwide. In 2013, 17.3 million deaths and 330 million disability adjusted life years (DALYs) loss has said to be attributed by cardiovascular disease which make around 32% of all deaths & 13% of all DALYs lost in 2013<sup>1</sup>. This shows an absolute increase in both the number and the percentage of deaths and DALYs loss in 2013 as compared to the estimates done in 2010. According to World Health Organization (WHO) data, out of 17.7 million Cardiovascular deaths in 2015, 7.4 million were due to Coronary Artery Disease and due to increasing number of patients productivity loss in America due to cardiovascular disease is estimated to reach 276 billion dollars in 2030<sup>2</sup>. In 2015, 16.8 million Americans were found to be

suffering from coronary artery disease and this number is expected to be increased by 7.2 million by 2035<sup>3</sup>. According to a report published in 2017, cost of cardiovascular disease in America will exceed 1 trillion dollar by 2035<sup>4</sup>. The prevalence of coronary artery disease is increasing as a result of global transition from communicable to non-communicable diseases. According to a survey done by World Health Organization (WHO), 70% of the total disease burden in 2015 was attributable to non-communicable diseases<sup>2</sup> while in Pakistan 59% of the total disease burden is due to non-communicable diseases. In Pakistan more than 30% of population aged 45 years or older is having Coronary Artery Disease<sup>5</sup>. According to a survey done in 2011, 200,000 deaths per year have said to be caused by coronary artery disease which constitute about 410/100,000 of the population<sup>6</sup>. Due to increasing prevalence of coronary artery disease, number of patients presenting for coronary angiography are

**Correspondence:** Dr Muhammad Nadir Khan, Department of Cardiology, Army Cardiac Centre Lahore Pakistan  
Email: [yesnadirkhan@gmail.com](mailto:yesnadirkhan@gmail.com)

increasing day by day. Despite of its rapidly increasing prevalence, knowledge regarding risk factors of coronary artery disease is very low in our population<sup>7</sup>.

There are many risk factors for coronary artery disease which are classified into non modifiable and modifiable risk factor however world wide it is mainly driven by modifiable risk factors<sup>8</sup>. Non modifiable risk factors include age, gender and family history while modifiable risk factors include Hypertension, Diabetes Mellitus, Dyslipidemia, smoking, overweight and obesity. Conventional risk factors involved in development and progression of coronary artery disease include smoking, hypertension, diabetes, obesity, dyslipidemia and sedentary or unhealthy life style behavior. These risk factors play an important role not only in pathogenesis of disease but also have adverse effect on prognosis of coronary artery disease as they play an important role in progression of atherosclerotic disease process which is considered as main culprit in pathogenesis of coronary artery disease. Prevalence of these risk factors differ according to region, ethnicity and socioeconomic status in different parts of the world. Numerous studies have been conducted to identify the risk factors contributing to increasing prevalence of coronary artery disease but that data is not sufficient to identify the factors causing increase in disease burden in our local population. Therefore our data will help in identifying strength of these risk factors and in making policies for primary prevention to effectively control this increasing prevalence of coronary artery disease in our local population.

## MATERIAL AND METHODS

A descriptive cross sectional study was conducted at Army Cardiac Centre Lahore from May 2018 to Jul 2018 after approval from institutional ethical committee. One hundred ninty six patients were enrolled in study through purposive convenience sampling after getting informed consent. All males and females patients presenting for coronary angiography were included in the study. Patients presenting in emergency for

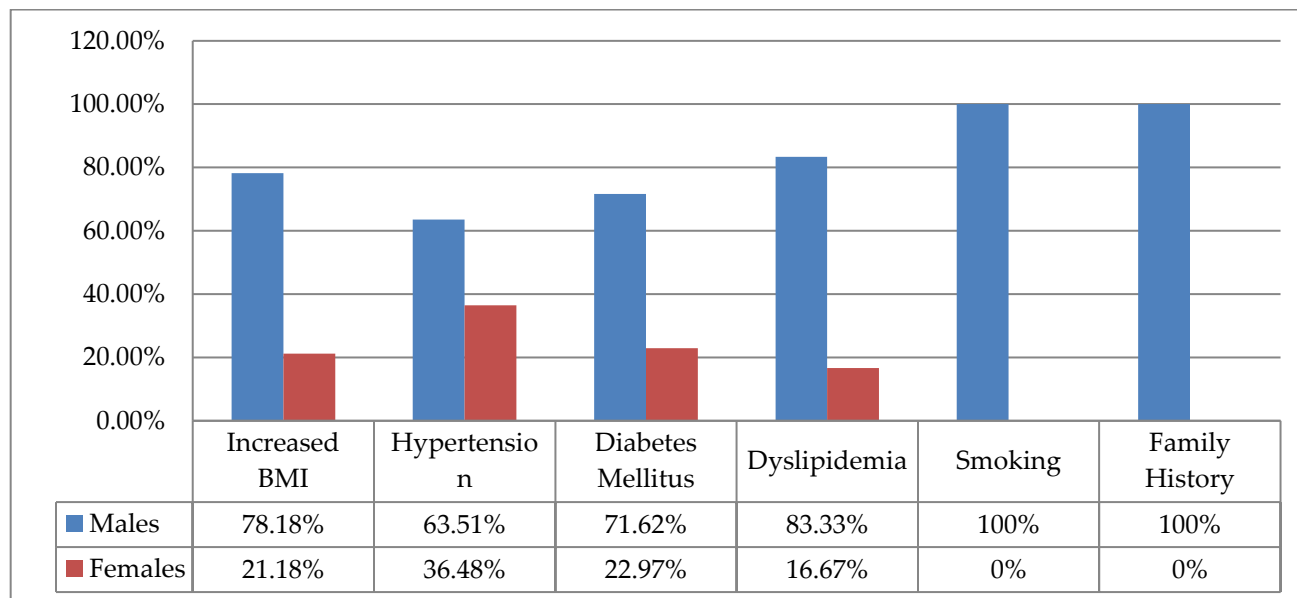
Primary Percutaneous Coronary Intervention (PCI) were excluded. Data was collected using a structured questionnaire based on history given by the patients.  $\geq 60$  years of age was considered as advanced age as per AHA description for the first cutoff limit of coronary artery disease. Family history was defined as first degree relative male  $< 55$  years of age and female  $< 65$  years of age affected by coronary artery disease as the advanced age itself is considered as an independent risk factor for development of coronary artery disease<sup>9</sup>. Patients giving family history of coronary artery disease beyond this age cut off limit were not considered as having positive family history of coronary artery disease. Hypertension was defined as systolic blood pressure of  $\geq 140$  mmHg and diastolic blood pressure  $\geq 90$  mmHg. Patients having blood pressure  $\leq 140/90$  mmHg but on regular anti hypertensive medications were also included. Diabetes was defined according to American Diabetes Association diagnostic criteria as fasting blood glucose level of  $\geq 126$  mg/dl or HbA1c  $\geq 6.5\%$  10 or on oral antidiabetic medications or on insulin therapy whereas fasting was defined as no caloric intake for at least 8 hours. Dyslipidemia was defined as fasting cholesterol  $\geq 200$ mg/dl or triglycerides  $\geq 150$ mg/dl or LDL cholesterol  $\geq 100$  mg/dl or HDL cholesterol  $< 35$ mg/dl. Those who were taking lipid lowering therapy as a part of primary prevention strategy and were having normal fasting lipid profile at present were not considered as having dyslipidemia. All those who were currently smoking anything including cigarette, huqqa or sheesha or have quit smoking less than a year ago were considered as smokers. Overweight or obesity was defined according to Body Mass Index (BMI) and were classified as  $\leq 18.5$  kg/m<sup>2</sup> below normal,  $\geq 18.5$  and  $< 25$  kg/m<sup>2</sup> normal,  $\geq 25$  and  $< 30$  kg/m<sup>2</sup> overweight,  $\geq 30$  and  $< 35$  kg/m<sup>2</sup> class I obesity,  $\geq 35$  and  $< 40$  kg/m<sup>2</sup> class II obesity and  $\geq 40$  kg/m<sup>2</sup> class III obesity<sup>11</sup>. Height was measured by using measuring tape and weight by using weighing machine. Frequency of different risk factors were calculated in terms of percentage

and distribution of risk factors with respect to gender was assessed.

## RESULTS

Out of 196 patients 150 (76.53%) were male and 46 (23.46%) were female which revealed a comparatively higher burden of cardiovascular disease in males as compared to females. Age varied from 24 to 90 years with a mean age 57.14

factor. Out of 196 patients enrolled 118 (60.20%) patients were having BMI greater than normal i.e.  $\geq 25 \text{ kg/m}^2$ . Among these 118 patients, a major percentage i.e. 105 (53.57%) was in range of overweight having BMI between  $\geq 25$  and  $< 30 \text{ kg/m}^2$  while among rest 11 (5.61%) were having class I obesity with BMI in range of  $\geq 30$  and  $< 35 \text{ kg/m}^2$ , 01 (0.51%) was having class II obesity with BMI between  $\geq 35$  and  $< 40 \text{ kg/m}^2$  and 01 (0.51%) was



**Figure: Gender wise distribution of risk factors.**

$\pm 10.61$ . Maximum number of patients i.e. 67 (34.18%) were within age bracket 60-70 years while a significant number of patients i.e. 58 (29.59%) were between 50-60 years. The frequency of patients between 70-80 years was 23 (11.73%) while 4 (2.04%) were between 80-90 years of age and there was only one patient (0.51%) above 90 years of age. Similarly in younger age group 31 (15.81%) of the patients were between 40-50 years of age while 05 (2.55%) were between 30-40 years of age and only 03 (1.53%) were between 20-30 years of age. Third non modifiable risk factor i.e. positive family history was found to be comparatively lower in our study population. There was only 1 (0.51%) patient having positive family history of coronary artery disease.

Among the modifiable risk factors, increased BMI i.e. overweight was the most frequent risk

in range of class III obesity having BMI  $\geq 40 \text{ kg/m}^2$ . Among rest of the 78 patients, 77 (39.28%) were having normal BMI i.e. between  $\geq 18.5 \text{ kg/m}^2$  and  $< 25 \text{ kg/m}^2$  while there was 01 (0.51%) who was underweight having BMI  $< 18.5 \text{ kg/m}^2$ . Among the modifiable risk factors, second most common risk factor was hypertension with a frequency of 74 (37.75%) while diabetes mellitus was third in line having frequency of 70 (35.71%). Among the other risk factors 34 (17.34%) were current smokers while the frequency of Dyslipidemia was 36 (18.36%). Following Figure shows gender wise distribution of risk factor.

## DISCUSSION

This study helped us to identify the prevalence of risk factors of coronary artery disease in our local population. Like many other countries Pakistan too is undergoing transition from communicable to non-communicable diseases

and coronary artery disease too is a non-communicable disease.

Among the non-modifiable risk factors, age was considered as most important as in our study mean age of presentation is  $57.14 \pm 10.61$  which is quite a younger age in comparison with a study done in Iraq where mean age of presentation of mature coronary artery disease was  $63.5 \pm 6.4$ <sup>12</sup>.

Second non modifiable risk factor is gender. In our study, a major percentage of our study population i.e. 76.53% were male which implies male gender as a significant risk factor for coronary artery disease. This finding of gender distribution is in line with the published literature<sup>13</sup>. This gender distribution is also in line with the published data on prevalence of coronary artery disease by American Heart Association<sup>14</sup>. Family history is also an important non modifiable risk factor but in our study only a minor percentage i.e. 0.51% was having positive family history which can be attributed to the age cut off limit to be declared positive for family history. This was in contrast to a study conducted in 1998-99 where 38.19% of the patients were having positive family history<sup>15</sup>.

Among modifiable risk factors increased BMI i.e. overweight or obesity is the most common risk factor. In our study 53.57% were having BMI  $\geq 25\text{kg/m}^2$  and this finding is further validated by Hassan *et al*<sup>16</sup> and Alan *et al*<sup>17</sup> in two different studies depicting an increase likelihood of coronary artery disease in obese patients. Hypertension was the second most common risk factor encompassing frequency of 37.75%. This finding is in accordance with the joint statement of Austrian Society of Cardiology and Austrian Society of Hypertension stating lower the blood pressure, lower is the risk of development of coronary artery disease<sup>18</sup>. Third most common factor in line was diabetes mellitus which is also in line with the published literature stating coronary artery disease as the main cause of death in patients of both types of diabetes type 1 & type 2 and is causing 2-4% increase risk in

mortality<sup>19</sup> and according to the available data Pakistan is among those top 10 countries of the world which are having highest burden of diabetes<sup>20</sup>. This finding of ours was also in correspondence with a study done in UK stating 33% prevalence of diabetes in Pakistanis residing in United Kingdom and it was relatively higher than all other ethnic groups<sup>21</sup>. Another important modifiable risk factor was dyslipidemia having percentage of 18.36% which is also validated by a study done by Alamir *et al* which elucidates an association between dyslipidemia and multivessel coronary artery disease<sup>22</sup>. The comparatively lower percentage of dyslipidemia has also been already validated in published literature documenting development of coronary artery disease in Pakistani population at much lower level of cholesterol<sup>23</sup>. 17.34% were found to be active smokers in our study population and these all were males which is in line with a Pakistani study conducted by Abbas *et al* which concluded that in Pakistan there is higher prevalence of smoking in males as compared to females<sup>5</sup>. It is also validated in study done by Inouedo-documenting smoking as a major cause of cardiovascular morbidity and mortality<sup>24</sup>. Tolstrup *et al* has also found an association between smoking and coronary artery disease in all age groups<sup>25</sup>.

## CONCLUSION

Our findings highlight the relative prevalence of different risk factors of coronary artery disease in our local population. Apart from presence of non modifiable risk factors, we have a greater number of patients with modifiable risk factors like overweight, obesity, hypertension, diabetes and smoking. This shows that a greater number of our local population is becoming victim of cardiovascular diseases because of unhealthy lifestyle. Therefore there is need to conduct public awareness programs to make people aware of these modifiable risk factors. Community based measures for screening and primary prevention should be implemented with emphasis on life style modification and younger population in particular should be motivated to adopt healthy life style behavior to combat this



globally increasing burden of coronary artery disease as well as to limit the financial burden on country's economy due to increasing disease prevalence.

### CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

### REFERENCES

1. The Global Burden of Disease: 2013 update. 2016. <http://ghdx.healthdata.org/gdb-data-tool>.
2. World Health Organization Cardiovascular diseases. Available from: <http://apps.who.int/iris/bitstream/handle/10665/272980/9789241513777-eng.pdf?ua=1>
3. Cardiovascular disease: A costly burden for America – Projections through 2035. Available from: <https://healthmetrics.heart.org/wp-content/uploads/2017/10/Cardiovascular-Disease-A-Costly-Burden.pdf>
4. [http://www.heart.org/idc/groups/heart-public/@wcm/@adv/documents/downloadable/ucm\\_491543](http://www.heart.org/idc/groups/heart-public/@wcm/@adv/documents/downloadable/ucm_491543).
5. Chaudhry AI, Pervaiz F, Asghar I, Raza M, Zubair S, Abbas S. Frequency of risk factors in patients of coronary artery disease undergoing coronary artery bypass graft surgery at a tertiary care cardiac unit. *Pak Armed Forces Med J* 2017; 67(2): S168-73.
6. National Health Survey of Pakistan 2011.
7. Dodani S, Mistry R, Khwaja A, Farooqi M, Qureshi R, Kazmi K. Prevalence and awareness of risk factors and behaviors of coronary heart disease in an urban population of Karachi, the largest city of Pakistan: a community survey. *J Public Health (Oxf)* 2004; 26(3): 245-49.
8. Thomas A, Gaziano, Prabhakaran D, Gaziano MJ. Global burden of cardiovascular disease: Braunwald's Heart Disease 2018; 1-17.
9. Hajar R. Risk factors for coronary artery disease: Historical perspectives. *Heart Views* 2017; 18(3): 109-114
10. American Diabetes Association. Diabetes care: Diagnosis and classification of diabetes mellitus 2010; 33(1): S62-69
11. National Institutes of Health (NIH), National Heart, Lung and Blood Institute (NHLBI). The practical guide: Identification, evaluation and treatment of overweight and obesity in adults. Bethesda: National Institutes of Health 2000, NIH publication 00-4084.
12. Muhammad MA, Jehangeer IH, Shaikhow KS. Prevalence and risk factors of premature coronary artery disease in patients undergoing coronary angiography in Kurdistan, Iraq. *BMC Cardiovascular Disorders* 2015; 15: 155.
13. Chiha J, Mitchell P, Gopineth B, Plant HJA, Kovoop, Thiagalingam A. Gender differences in severity and extent of coronary artery disease. *IJC Heart and Vasculture* 2015; 8: 161-66.
14. Mozaffarian D, Benjamin EJ, Go AS, Arnett DK, Blaha MJ, Cushman M, et al. Heart disease and stroke statistics-2015 update: a report from the American Heart Association. *Circulation* 2015; 131(4): e29-e322.
15. Akram Z, Sarwar M, Shafi T, Kamal T, Aziz T, Sheikh AS. Risk factor analysis of Ischemic Heart Disease in patients presenting for coronary angiography at Punjab Institute of Cardiology, Lahore- initial results of ongoing perspective study. *Pak J Cardiol Dec* 1999; 10(4): 115-20.
16. Flint JA, Rexrode MK, Hu BF, Glynn JR, Caspard H, Manson E T et al. Body mass index, waist circumference and risk of coronary heart disease: A prospective study among men and women. *Obes Res Clin Pract* 2010; 4(3): e171-e181.
17. Alkhawam H, Nguyen J, Sayanlar J, Sogomonian R, Desai R, Jolly J et al. Coronary artery disease in patients with BMI > 30 kg/m<sup>2</sup>: A retrospective chart analysis. *J Community Hosp Intern Med Perspect* 2016; 6(3): 10
18. Weber T, Lang I, Zweiker R, Horn S, Wenzel RR, Watschinger B et al. Hypertension and coronary artery disease: epidemiology, physiology, effects of treatment and recommendations: A joint scientific statement from Austrian Society of Cardiology and Austrian Society of Hypertension. *Wein Klin Wochenschr* 2016; 128(13-14): 467-79.
19. Aronson D, Edelman RE. Coronary artery disease and diabetes mellitus. *Cardiol Clin* 2014; 32(3): 439-55.
20. Ghaffar A, Reddy KS, Singhi M. Burden of non communicable diseases in South Asia. *BMJ* 2004; 328(7443): 807-10.
21. Riste L, Khan F, Cruickshank K. High prevalence of type 2 diabetes in all ethnic groups, including Europeans, in a British inner city: Relative poverty, history, inactivity or 21st century Europe? *Diabetes Care* 2001; 24(8): 1377-88.
22. Alamir AM, Goyfman M, Chaus A, Dabbous F, Tamura L, Sandfort V. The Correlation of Dyslipidemia with the Extent of Coronary Artery Disease in the Multiethnic Study of Atherosclerosis. *J Lipids* 2018; 5607349: 1-9.
23. Nishtar S, Wierzbicki AS, Lumb PJ. Waist- hip ratio and low HDL predict the risk of coronary artery disease in Pakistanis. *Curr Med Res Opin* 2004; 20(1): 55-62.
24. Inoue T. Cigarette smoking as a risk factor of coronary artery disease and its effects on platelet function. *TobInduc Dis* 2001; 2(1): 2.
25. Tolstrup SJ, Hvidtfeldt AU, Flachs ME, Spiegelman D, Heitmann LB, Balter K et al. Smoking and risk of coronary heart disease in younger, middle-aged and older adults. *AM J Public Health* 2014; 104(1): 96-102.