ORIGINAL ARTICLE

Pattern of Coronary Artery Diseases in Patients Having Age Less Than 40 Years with Acute Coronary Syndrome

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ABSTRACT

Aim: To assess the pattern of coronary artery diseases in patients older than 40 years with acute coronary syndrome.
Material and methods: This cross-sectional study was conducted at the cardiology department of ABC hospital. A total of 130 patients presenting with the acute coronary syndrome were enrolled. The pattern of coronary artery diseases was assessed. Categorical variables were presented as frequencies and percentages, while numerical variables were presented as mean and SD.
Results: The mean age of the patients in our study was 27.96±5.48 years. Most of the patients were male, accounting for 106 (81.5%). The most common factor was smoking 55.4% followed by hypertension 51.5%. Single vessel disease was a typical pattern presented in patients 37.7%. Three vessels disease was the second typical pattern observed in 22.3%.
Conclusion: Smoking and hypertension are the leading causes of coronary artery diseases. Single vessel disease is the most common pattern in coronary artery disease patients younger than 40 years.
Keywords: Acute coronary syndrome, Coronary artery disease, Pattern, Risk factors

INTRODUCTION

Most cardiovascular events involve coronary artery disease (CAD) caused by plaque buildup in the arteries carrying blood to the heart. From asymptomatic atherosclerosis and stable angina to acute coronary syndrome, all of these conditions are combined under the umbrella term "coronary artery disease". Indeed, it still ranks among the top killers in the United States. The first step in preventing coronary artery disorders is assessing potential risk factors [1, 2].

Coronary artery disease is a pivotal contributor to mortality rates everywhere. Roughly nine million fatalities worldwide in 2016 were attributed to ischemic heart disease, according to the World Health Organization [3]. Mortality rates from CAD are rising in industrialized economies but falling in emerging countries. Ischemia-related deaths are dropping in the United States and the United Kingdom. However, AHA data shows that in 2018, nearly 55% of the 16.5 million Americans aged 20 and up who had coronary artery disease were men. In developing countries, the prevalence of CAD is higher, and mortality rates are rising, as seen [4, 3]. The drop in mortality in advanced countries can be attributed to the increased use of secondary and primary cardiovascular preventive strategies [5, 6]. Primary prevention strategies aim to prevent cardiovascular complications with serious risks but no prior history. Those with a background in CAD can benefit from secondary prevention strategies, which are treatments to prevent further heart disease [7].

It has been claimed that genetics play a more significant role in developing IHD in younger patients [8]. Men experienced higher rates of affliction at earlier ages than women, and the vast majority of the afflicted belonged to the lower middle class [9]. Myocardial infarction in younger patients may not follow the same etiology as in older patients [10]. Congenital coronary anomalies, coronary spasms, early atherosclerosis, and drug-induced causes account for most myocardial infarction cases [11]. Some studies have linked long-term drug addiction to an increased risk of myocardial infarction and atherogenic outcomes in young adults [12].

In Pakistan, there is a dearth of information on the prevalence of risk factors and coronary angiographic observations in young individuals suffering from acute coronary syndrome (ACS). Variability in outcomes is expected in our population due to the socioeconomic and cultural variety, even if few studies have been conducted in the subcontinent. Therefore, this study aimed to determine the prevalence and distribution of CAD in ACS patients younger than 40 years. The current study aspires to do more than just add to the body of scientific knowledge on the subject; it also hopes to aid in the creation of proper ways of evaluating such patients at an appropriate age in order to minimize IHD among the young population.

MATERIAL AND METHODS

This cross-sectional study was conducted at the cardiology department of ABC hospital after approval from the ethical board of the hospital between January 2022 and July 2022. A total of 130 patients with acute coronary syndrome aged between 20 to 38 years were included in the study. Patients aged less than 20 years and more than 38 years and those who could not have coronary angiography were excluded. All the patients were subjected to clinical examination and history taking. Risk factors such as diabetes, hypertension, smoking and obesity, along with the pattern of coronary artery disease, were recorded on a predesigned proforma.

All the data were analyzed using IBM SPSS 20. For categorical variables, frequencies and percentages were calculated, while for numerical variables, the mean and standard deviation was used. All the data was presented in the form of tables.

RESULTS

This study was conducted on 130 patients presenting with ACS. The mean age of the patients in our study was 27.96±5.48 years. According to the gender distribution, we found that most of the patients were male, accounting for 106 (81.5%), compared to female patients. Our study's most common type of ACS was STEMI 94 (72.3%). Unstable angina was observed in 9 (6.9%) patients and NSTEMI was observed in 27 (20.8%) patients (Table 1). Regarding the risk factors of coronary artery diseases, we observed that the most common factor was smoking, which had a prevalence of 55.4%, followed by hypertension, which was 51.5%. Obesity had a prevalence of 14.6%, while diabetes was the least observed factor having a prevalence of 7.7% (Table 2). Our study observed that single vessel disease was a familiar pattern presented in patients, accounting for 37.7%. Three vessels disease was the second typical pattern observed which was present in 22.3% of patients (Table 3)
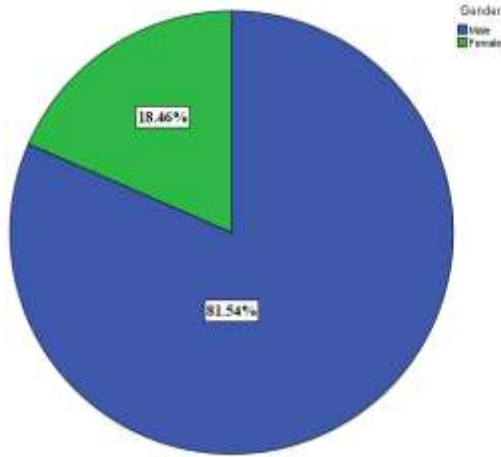
Graph 1: Gender distribution

Table 1: Type of ACS

Type of ACS	Frequency	Percent
STEMI	94	72.3
Unstable Angina	9	6.9
NSTEMI	27	20.8
Total	130	100.0

Table 2: Risk factors of coronary artery diseases

Risk factors	Frequency	Percentage
Diabetes	10	7.7
Obesity	19	14.6
Hypertension	67	51.5
Smoking	72	55.4

Table 3: The pattern of coronary artery diseases

Pattern of coronary artery diseases	Frequency	Percent
Three vessels disease	29	22.3
Branched vessel disease	26	20.0
Single vessel disease	49	37.7
Two vessels disease	26	20.0
Total	130	100.0

DISCUSSION

Ischemic heart disease (IHD) in young populations, also known as premature coronary artery disease (CAD), continues to be a growing public health concern in our culture[13]. In the past, this condition was thought to be a sickness that only affected older people[14]. The incidence of idiopathic hypertension in the population of South Asia is significantly higher than that of the population in the western world. Studies, including necropsy, have shown that atherosclerotic alterations began to occur in the blood arteries in early childhood, but symptoms of these changes did not appear until after age 40. It is pretty concerning that cardiovascular problems are becoming more common in younger generations[15]. This is a public health issue. There has been some discussion about the possibility of a larger involvement of the hereditary component in younger IHD patients. Compared to women, the prevalence of younger age groups was much more significant in men, and the bulk of those who suffered belonged to the country's lower middle-class socioeconomic structure. There is insufficient evidence to conclude that the pathogenesis of myocardial infarction in younger people is the same as that observed in patients of an older age.[16]

Our study, which used data from the general population, allows us to estimate how serious the risk factors are in these patients and how much they influence the likelihood that they will develop coronary artery disease in the future. We discovered all of the patients who presented with ACS during our investigation were under the age of 40. Pakistan does not have any national statistics on younger patients diagnosed with ACS; however, international studies routinely report cases of younger people in their early 30s and late 20s. This is a worrying condition that needs to be correctly identified in order to decrease the burden of diagnosing young people with this illness.[17, 18]

Smoking (55.4% of participants), hypertension (51.5%), obesity (14.6%), and diabetes (7.7%) were accounted for among young patients with an age of fewer than 40 years who were diagnosed with coronary artery disease (CAD). Smoking was the most common risk factor implicated in our study. According to the findings of another study[13] carried out in Pakistan, smoking was the primary cause of coronary artery disease (CAD), while hypertension was the second most prevalent risk factor associated with developing CAD. These findings are comparable to our study. When we compared our data with the findings of other international studies that had been published, we discovered that hyperlipidemia was the most prevalent risk factor among those countries' populations (8.8%)[19, 20]. The risk factors between developed countries and developing countries like Pakistan differ significantly. However, smoking is a risk factor that can be modified, and this change can potentially lessen the burden of coronary artery disease in young Pakistani males.

We found that the presence of single vessel CAD was the most common pattern of CAD that we saw in our study (37.7%), followed by three vessels disease (22.3%), while branched vessel disease and two vessels disease both had the same prevalence (20%). The data available to reflect the pattern of coronary artery disease in young adults are limited everywhere in the world. This may be due to underlying risk factors, which may play a significant role in the development of coronary artery disease. For example, in our study, the most common risk factor we found was cigarette smoking, and the most common CAD pattern was three vessel coronary artery disease. Both of these were found to be the most common patterns of coronary artery disease.

On the other hand, a study[21] conducted in India that was almost conducted on the same social and cultural class found that dyslipidemia and a family history of coronary artery disease were more prevalent, and the underlying pattern of coronary artery disease was single vessel CAD. When looking at international data, the same findings were observed[22]. The discrepancy between our findings and those of other studies may result from the presence of an underlying prevalent risk factor. For example, people who smoke cigarettes have a greater risk of developing three vessels of coronary artery disease (CAD), whereas people who have hyperlipidemia are more likely to have coronary artery disease in only one vessel.

CONCLUSION

From our study, we conclude that the most common pattern of coronary artery diseases in patients under 40 years presenting with ACD was single vessel coronary artery disease, found in 37.7% of patients, followed by three vessel diseases, which was 22.3%. It was found that the most prevalent risk factor was smoking, followed by hypertension.

REFERENCES

1. Aragam KG, Dobbyn A, Judy R, Chaffin M, Chaudhary K, Hindy G, et al. Limitations of contemporary guidelines for managing patients at high genetic risk of coronary artery disease. J Am Coll Cardiol. 2020;75(22):2769-80.
2. Cagle SD, Cooperstein N. Coronary artery disease: diagnosis and management. Primary Care: Clin Off Pract. 2018;45(1):45-61.
3. Nowbar AN, Gitto M, Howard JP, Francis DP, Al-Lamee R. Mortality From Ischemic Heart Disease. Circ Cardiovasc Qual Outcomes. 2019;12(6):e005375.
4. Benjamin EJ, Virani SS, Callaway CW, Chamberlain AM, Chang AR, Cheng S, et al., American Heart Association Council on Epidemiology and Prevention Statistics Committee and Stroke Statistics Subcommittee. Heart Disease and Stroke Statistics-2018 Update: A Report From the American Heart Association. Circulation. 2018;137(12):67-492.

5. Diener HC, Hankey GJ. Primary and secondary prevention of ischemic stroke and cerebral hemorrhage: JACC focus seminar. J Am Coll Cardiol. 2020;75(15):1804-18.

6. Malakar AK, Choudhury D, Halder B, Paul P, Uddin A, Chakraborty S. A review on coronary artery disease, its risk factors, and therapeutics. J Cell Physiol. 2019;234(10):16812-23.

7. Mensah GA, Roth GA, Fuster V. The global burden of cardiovascular diseases and risk factors: 2020 and beyond. J Am Coll Cardiol. 2019;74(20):2529-32.

8. Mansur AdP, Mattar AP, Rolim AL, Yoshi FR, Marin JF, César LAM, et al. Distribution of risk factors in parents and siblings of patients with early coronary artery disease. Arq Bras Cardiol.2003;80(6):582-84.

9. Cheng C-I, Yeh K-H, Chang H-W, Yu T-H, Chen Y-H, Chai H-T, et al. Comparison of baseline characteristics, clinical features, angiographic results, and early outcomes in men vs women with acute myocardial infarction undergoing primary coronary intervention. Chest. 2004;126(1):47-53.

10. Singh A, Gupta A, DeFilippis EM, Qamar A, Biery DW, Almarzooq Z, et al. Cardiovascular mortality after type 1 and type 2 myocardial infarction in young adults. J Am Coll Cardiol. 2020;75(9):1003-13.

11. Duymun S, Misodi E. Myocardial bridging: a case presentation of atypical chest pain syndrome in a Young Woman. Am J Case Rep. 2020;21:e923075-1.

12. Zimmerman F, Cameron A, Fisher L, Ng G. Myocardial infarction in young adults: angiographic characterization, risk factors and prognosis. J Am Coll Cardiol. 1995;26(3):654.

13. Balouch IJ, Ahmed I, Farooq F, Raza SA, Soomro NA, Khan MN, Sial JA, Karim M. Pattern of Coronary Artery Diseases in Patients Under 40 Years of Age with Acute Coronary Syndrome . Pak Heart J. 2021;54(02):144- 147.

14. Batra MK, Rizvi NH, Sial JA, Saghir T, Karim M. Angiographic characteristics and in hospital outcome of young patients, age up to 40 versus more than 40 years undergoing primary percutaneous coronary intervention. J Pak Med Assoc. 2019;69(9):1308-12.

15. Tuzcu EM, Kapadia SR, Tutar E, Ziada KM, Hobbs RE, McCarthy PM, et al. High prevalence of coronary atherosclerosis in asymptomatic teenagers and young adults: evidence from intravascular ultrasound. Circulation. 2001;103(22):2705-10

16. Mansur AdP, Mattar AP, Rolim AL, Yoshi FR, Marin JF, César LAM, et al. Distribution of risk factors in parents and siblings of patients with early coronary artery disease. Arq Bras Cardiol. 2003;80(6):582-4.

17. Aggarwal A, Srivastava S, Velmurugan M. Newer perspectives of coronary artery disease in young. World J Cardiol 2016; 8(12):728-34.

18. Aggarwal A, Aggarwal S, Sharma V. Cardiovascular risk factors in young patients of coronary artery disease: Differences over a decade. J Cardiovasc Thorac Res 2014; 6(3):169-73.

19. Berry JG, Gay JC, Joynt MK, Coleman EA, Bucholz EM, 'O'Neill MR, et al. Age trends in 30 day hospital readmissions: US national retrospective analysis. BMJ 2018; 360:k497.

20. Bucholz EM, Gooding HC, de Ferranti SD. Awareness of cardiovascular risk factors in U.S. Young adults aged 18-39 years. Am J Prev Med 2018; 54(4):e67-e77.

21. Prajapati J, Jain S, Virpariya K, Rawal J, Joshi H, Sharma K, et al. Novel atherosclerotic risk factors and angiographic profile of young Gujarati patients with acute coronary syndrome. J Assoc Physicians India 2014 Jul; 62(7):584-8.

22. Maroszynska-Dmoch EM, Wozakowska-Kaplon B. Clinical and angiographic characteristics of coronary artery disease in young adults: A single centre study. Kardiol Pol 2016; 74(4):314-21.