Review Article | **Cardiology**

Clinical Characteristics, Risk Factors and Angiographic Profile of Patients Undergoing Coronary Angiography-A Review Article

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Abstract

Coronary artery disease is one of the leading causes of mortality and morbidity in both developed and developing countries. Coronary artery disease (CAD) tends to present at a younger age and has more extensive angiographic involvement, resulting in genetic, conventional, metabolic and non-traditional risk factors. This systematic review provides a qualitative overview of the risk factors, angiographic features, treatments, and complications of Bangladeshi youth with coronary artery disease (CHD). Search PubMed, Embase, and Google Scholar for studies published between the year 2004 to 2022. Identified the paper. Studies conducted in Bangladesh and other countries in patients aged 25 to 65 years were published in English and included information on patients' clinical profiles and risk factors for early-onset CAD. Smoking, dyslipidemia, high BMI, high-sensitivity C-reactive protein, and hyperhomocysteinemia are frequently observed in young CAD patients. Among young patients with coronary artery disease, single-vessel disease was more common than multivessel disease. Complications of coronary artery disease, such as arrhythmias, cardiogenic shock, and heart failure, are also more common in young patients. Coronary angiography findings revealed that more than one-third of the patients had normal coronary arteries, but in the majority of patients they were found to have SVD, DVD, and TVD. In some cases, "TVD & LM" and mild CAD were also detected by her CAG.

Keywords: Coronary Artery Disease, Myocardial Infarction, Risk Factor.

INTRODUCTION

Coronary artery disease is one of the most common causes of mortality and morbidity in both developed and developing countries [1]. Coronary heart disease (CHD) tends to present at a younger age and has more extensive angiographic involvement resulting in genetic, conventional, metabolic and non-traditional risk factors [2]. The term "acute coronary syndrome" (ACS) refers to a group of clinical symptoms associated with new or worsening ischemic symptoms, ranging from unstable angina (UA) to non-ST-segment elevation myocardial infarction. (NSTEMI) encompasses a range of clinical symptoms. ST-segment elevation myocardial infarction (STEMI), Unstable angina and NSTEMI are closely related diseases, with similar pathophysiological origins and clinical manifestations, but differing in severity [3]. The proportion of ACS types varies between studies, with STEMI decreasing compared to his NSTEMI due to the development of more sensitive markers of myocardial injury [4]. It has also been found

that coronary heart disease mortality rates doubled between 1990 and 2020, with approximately 82% of the increase occurring in developing countries [1]. Socioeconomic changes associated with industrialization and urbanization are likely increasing the prevalence of major cardiovascular risk factors [5,6]. There are also some differences in risk factors such as hypertension, dyslipidemia, diabetes, smoking, and alcohol intake, especially considering the large variations in clinical symptoms between different age groups and between men and women [1]. In recent years, the frequency of coronary angiography (CAG) has increased significantly around the world. Coronary angiography is now part of routine testing and is considered the gold standard for the diagnosis of coronary artery disease [1]. Over the past 50 years, great advances have been defined and described in identifying the many factors associated with coronary heart disease, including lifestyle, biochemical, and genetic factors [7]. Furthermore, the increase and subsequent decline in the prevalence of coronary heart disease (CHD) in almost all developed countries in the

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second half of the 20th century is well documented [8]. Significant differences exist in the prevalence of coronary heart disease (CHD) related to age, gender, and ethnicity [1]. Meanwhile, cardiovascular diseases (CVD) are currently emerging as a major health burden in developing countries [9]. We hope that these research results will be useful for evaluating the current status and diagnostic results of coronary heart disease in Bangladesh.

Literature Search

This systematic review provides a qualitative overview of the risk factors, angiographic features, treatments, and complications of Bangladeshi youth with coronary artery disease (CHD). Search PubMed, Embase, and Google Scholar for studies published between the year 2004 to 2022 identified the paper.

Eligibility Criteria

All his 70 studies reviewed were included as research participants in this study. Studies conducted in Bangladesh and other countries in patients aged 25 to 65 years were published in English and included information on patients' clinical profiles and risk factors for early-onset CAD. Observational studies were included in the review, regardless of setting or sample size. Studies were excluded from the systematic review if they included any of the following: (1) Studies with insufficient or unclear information. (2) Case reports and series. (3) conference summaries, reviews, meta-analyses, editorials, and commentaries; (4) Studies that investigated a single risk factor. (5) Studies using only angiographic data. (6) Studies for which full text is not available. If two or more studies included the same patient group, the study with more patients was considered for review.

Definition

Currently, CAD accounts for the largest number of deaths in the world [10,11]. Low- and middle-income countries account for more than 80% of the global burden of cardiovascular disease [12]. The South Asian region includes eight low- and middle-income countries: Nepal, India, Afghanistan, Pakistan, Bhutan, Sri Lanka, Maldives, and Bangladesh. South Asian ethnicity has been identified as a risk factor for various noncommunicable diseases, including CAD [13]. Although CAD is commonly observed in adults aged 60 years or older, South Asians have a younger age at first myocardial infarction compared to people from other regions [14]. The age at onset of coronary heart disease in younger people has been defined in different ways and ranges from <60 years to <30 years. There is no commonly accepted age limit that defines a "young" patient, but an age limit of 45 years has been used in some studies to define a "young" patient for CAD [15-18]. Commonly identified risk factors for coronary heart disease in young people include smoking, hypertension, diabetes, dyslipidemia, obesity, and family history [19-22]. However, other less common risk factors, such as vasculitis, substance abuse, and coagulation disorders, have also been associated with coronary heart disease in young people [20].

Hypertension

Seventy studies showed that the prevalence of hypertension in patients ranged from 8.8% [23] to 80.0% [24]. Seven studies have reported that 27.8% [25] to 57.5% [20] of Bangladeshi patients suffer from hypertension. Similarly, the prevalence of hypertension in Pakistani patients ranged from 10.2% [26] to 75.0% [27]. Sixteen studies from Bangladesh also reported a range of hypertension prevalence from 14.0% [28] to 80.0%, [24] and an Indian study reported a range of hypertension prevalence from 8.8% [23] to 8.8% [23] among young CAD patients. It has been shown that 44.7% [29] suffer from hypertension.

Diabetes mellitus

Seventy studies from South Asia described diabetes as a risk factor for early-onset coronary heart disease, with frequencies ranging from 2.4% [30] to 80.6% [31]. It has been reported. Eight studies conducted in Bangladesh found that 14% [32] to 47.4% [33] of patients had diabetes. Studies in Pakistan and Bangladesh reported the highest prevalence of diabetes, well over 50% of patients [24,27]. Similarly, 34 studies from India investigated the prevalence of diabetes in young-onset CAD patients. Bhardwaj *et al.,* reported that up to 80.6% of young CAD patients in India had diabetes [31].

High body mass index

According to 43 studies, high BMI (≥23 kg/m2) was observed in 1.7% [34] to 97.1% [35] of young South Asian patients with CAD. According to two studies, approximately 13.3% [36] and 25.0% [20] of Bangladeshi patients had a high BMI, respectively. Pakistani patients were reported to have high BMI that ranged from 15.6% [37] to 97.1%, [35] and up to 60.7% [18] of Bangladeshi patients had a high BMI. Similarly, the proportion of patients with high BMI ranged from as low as 1.7% [34] to as high as 69.0% [38] in India, according to 24 studies.

Dyslipidemia

According to 55 studies, dyslipidemia was present in 2.5% [22] to 97.3% [39] of young patients with CAD. The prevalence of dyslipidemia in Bangladeshi patients was in the range of 9.6% [25] to 46.8% [32]. According to Adam *et al.,* up to 84.3% of Pakistani patients had dyslipidemia [40]. According to 15 studies, 11.9% [41] to 97.3% [39] of patients in Bangladesh had dyslipidemia. Similarly, dyslipidemia was found in 88.3% of Indian patients [23].

Angiography findings

Fifty-nine studies described angiographic findings in the patients. The findings are described based on the number and type of vessels involved.

Number of vessels involved

Single-vessel disease (SVD) has been reported in 16.7% to 88.3% [22] of study populations [24]. Except for the findings of Pramanik *et al.,* [24] the prevalence of SVD was higher than that of double-vessel disease (DVD) and triple-vessel disease (TVD) in all of the studies. Alexander *et al.,* in South India reported the highest prevalence of SVD (88.3%) [22]. Other studies in the Indian population have also reported a high percentage of patients with SVD among their study cohorts. Kalimuddin *et al.,* [42] reported a 68.3% rate of SVD in their patients, the highest reported rate in Bangladeshi patients. The highest prevalences of SVD in Bangladeshi and Pakistani patients were 65.0% [36] and 63.4%, [43] respectively. The percentage of patients with DVD was between 4.9% [44] and 36.9% [25] in South Asia in 45 studies. The highest prevalences of DVD were reported in Nepal (36.9%) [25] and India (36.4%) [45]. The highest reported rates of DVD in Bangladesh and Pakistan were 31.1% [18] and 27.5% [40] of patients, respectively.

Outcomes and complications of CAD

Thirty studies reported the in-hospital complications and outcomes of patients treated for young CAD. Complications and outcomes included cardiogenic shock, heart failure, arrhythmias, in-hospital mortality, mechanical complications, acute pericarditis, and stent thrombosis.

Cardiogenic shock

Twenty-seven studies reported cardiogenic shock, with frequencies ranging from 0.2% [46] to 36.9% [47]. The highest and lowest frequencies among the South Asian population were reported in India. Among these, five studies in Nepal reported cardiogenic shock in 4.5% [43] to 12.5% [20] of the patients. A single study in Pakistan reported cardiogenic shock in 0.4% of patients [37]. Seven studies in Bangladesh provided a cardiogenic shock prevalence range of 0.8% [41] to 6.0% [44] among young patients with CAD.

Arrhythmia

Twenty-two studies reported arrhythmia (tachycardia or bradycardia) as a complication in young patients with CAD. In these studies, arrhythmias were recorded in 1.7% [36] to 64.3% [47] of the patients. The frequency of arrhythmias in young patients with CAD ranged from 1.7% [36] to 12.5% [20] in four studies in Nepal. Batra *et al.,* in Pakistan reported that 8.0% of patients developed arrhythmia as a complication of CAD [48]. Similarly, seven studies in Bangladesh reported arrhythmia in patients in the range of 3.3% [41] to 10.0% [28]. Ten studies in India reported arrhythmia in patients with frequencies ranging from 3.0% [45] to 64.3% [47].

Treatment of CAD

Multiple treatment modalities, such as thrombolysis, PCIs, medical treatment, and coronary artery bypass graft (CABG) surgery, were selected in the studies in this review.

Thrombolysis

Twenty studies reported thrombolysis as a treatment for patients with AMI. The rate of thrombolysis differed across the studies. Thrombolysis was performed in 0.4% [49] to 100.0% [50] of the patients, according to the studies. Khan *et al.,* [50] in Pakistan reported 100% use of thrombolytic agents in patients who were diagnosed with AMI. The second-highest thrombolysis rate (78.7%) was reported by Vaidya *et al.,* in India [51]. Only a handful of studies mentioned the type of thrombolytic agent used. Streptokinase was the most reported thrombolytic agent used in South Asia. The studies reported the use of streptokinase in 15% [20] to 100% [50] of the study patients with AMI. Other less commonly used agents for thrombolysis were tenecteplase and reteplase.

Optimal medical treatment only

Fifteen studies described medical management as a treatment option in young patients with CAD. Up to 65.9% of the patients were managed with only optimal medical treatment, as reported by Patil *et al.,* [44].

Percutaneous coronary intervention

PCI was a commonly employed treatment option in patients, as reported in 20 studies. Primary PCI was provided to 0.8% to 81.0% of all the patients who presented to institutions within the window period. Additionally, routine, and elective PCI was offered to many patients, according to the studies. In five studies, more than two-thirds of young patients with CAD received primary, rescue, or routine PCI.

CABG surgery

One study found that the prevalence of depressive disorders among South Asians ranged from 0.5% to 97.0% of the population [52]. Similarly, anxiety disorders have been reported in up to 66% of South Asians [52]. According to Ren *et al.,* [53] these psychiatric disorders occur more frequently in CAD patients than in the general population. Chronic burden on the cardiovascular system due to autonomic and endocrine dysregulation may explain the apparent association between depressive disorders and CAD. Patients with coronary artery disease who have high depression and anxiety scores on psychological symptom scales may see improvement after treatment for their coronary artery disease. Furthermore, psychiatric treatment of these patients may improve the overall prognosis of CAD [54]. Regarding angiographic features, in a young South Asian CAD patient, the probability of SVD was higher than that of her DVD or TVD. A similar distribution of angiographic features has been reported in young Caucasian patients [55]. However, multivessel disease occurs more frequently in older CAD patients [56,57]. Atherosclerotic lesions in young patients are located within and proximally within

the LAD and have been identified as an important determinant of reduced left ventricular ejection fraction. This represents increased mortality in STEMI [58]. According to our review, the most common complications in young CAD patients were heart failure, cardiogenic shock, arrhythmia, and mechanical complications [22,40,59]. Young people with CAD have significantly lower rates of complications such as cardiogenic shock, heart failure, and arrhythmia than older people [22,40,59]. However, some studies found no statistically significant differences in these complications [15,22]. Our study showed that the mortality rate of young-onset CAD patients in the South Asian region ranged from 0.2% to 12.0%. Studies have reported that South Asian patients younger than 45 years have a significantly lower mortality rate than patients older than 45 years [15,22,41]. However, differences in complications after acute coronary syndrome, including death, were not statistically apparent. In other studies, it is significant between younger and older patients [15,59].

CONCLUSION

A high proportion of patients with coronary artery disease have smoking and smokeless tobacco use, diabetes, hypertension, family history of coronary artery disease or recent coronary artery disease, dyslipidemia, high BMI, elevated hs-CRP, and hyperhomocysteinemia. being observed. SVD was more common than multivessel disease in patients with coronary artery disease in Bangladesh and other South Asian countries. Complications such as arrhythmia, cardiogenic shock, and heart failure were commonly observed in study patients. Additionally, strategies should be implemented to reduce the prevalence of modifiable risk factors that are common in youth with CAD.

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