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RESEARCH ARTICLE

Frequency, Clinical Profile, and Patterns of Coronary Artery Disease in Patients Undergoing Percutaneous Intervention at Tertiary Care Hospital in Somalia

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Abstract:

***Introduction*:** Coronary artery disease, the most common cause of death in the general population, is responsible for about one-third of all deaths in people over 35.

***Methods*:** This prospectively cross-sectional study was obtained from adult (≥30 years) patients those underwent angiography in Mogadishu Somali Türkiye Training and Research Hospital from June 2022 to December 2022. Individuals with significant coronary lesions angiography with angiography other than coronary, less than 70% lesion, refusal to consent, and those with missed data. data were analyzed using univariate descriptive statistics. The frequencies and percentages, Cas well as the mean ± (SD), were presented. Cross-tabulations were used to determine the association between the variables.

Result: From June to December 2022, 127 patients underwent angiography, and 102 of them met the inclusion criteria for significant coronary lesions. Among these patients, 35 (34.3%) presented with unstable angina, 34 (33.3%) with NSTEMI, 13 (12.7%) with stable angina, and 20 (19.6%) with other forms of NSTEMI. The mean age was 58.4 ± 12.8 years, with the highest prevalence in the 51-60 age group (41, 40.1%). There was a predominance of males (84.3%, n=86), of whom 35.3% (n=36) were smokers.

Regarding atherosclerotic cardiovascular disease (ASCVD) risk factors, hypertension was the most common (61.8%, n=63), followed by diabetes mellitus (53.9%, n=55), and dyslipidemia (50%, n=51). Typical chest pain was the most frequent initial symptom, occurring in 69.6% (n=71) of patients.

Angiographic findings revealed single vessel disease in 36.2% (n=37) of patients, double vessel disease in 32.4% (n=33), and triple vessel disease in 31.4% (n=32). The left anterior descending artery (LAD) was the most commonly affected artery. In terms of management, 78.4% (n=80) of patients were treated with percutaneous coronary intervention (PCI), while 21.6% (n=22) were recommended for coronary artery bypass grafting. Complications of PCI were rare, with hyperacute stent thrombosis and iatrogenic coronary artery dissection occurring in only 1.9% of cases.

***Conclusions*:** This study found a high prevalence of coronary artery disease (CAD) among middle-aged males with ASCVD risk factors at Mogadishu Somali Türkiye Training and Research Hospital. Unstable angina, NSTEMI, and LAD involvement were common, with most patients effectively managed through percutaneous coronary intervention and minimal complications.

Keywords: Percutaneous intervention, Angiogrpahy, Coronay artery disease, Risk factors.

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1. INTRODUCTION

Coronary heart disease is a major cardiovascular disease (CVD) and is the most common cause of death in the general population. It remains responsible for about one-third of all deaths in people over 35 [1]. 80% of deaths of CVD worldwide occur in low- and middle-income nations and affect men and women almost equally [2]. Despite the fact that mortality from acute MI has decreased by up to 50% from the 1990s to the 2000s, the incidence of coronary artery disease is expected to increase due to the increasing prevalence of obesity, diabetes, and metabolic syndrome, as well as global population aging [3,4]. According to reports, the prevalence of coronary artery disease (CAD) is rising in Sub-Saharan Africa, and the absolute number of cardiovascular deaths (CVD) has increased by more than 50% over the last three decades [5,6]. There were substantial differences in prevalence across sub-sahara countries, which reflect discrepancies in diagnostic criteria and methods available between SSA nations as well as the population's degree of understanding of the signs of coronary disease [7]. About 5.5% of all deaths from CVD happen in Sub-Saharan Africa (SSA), and that number is expected to double by 2030(8). Coronary artery disease (CAD) manifestations differ between the sexes; as a result, men are more likely than women of the same age to develop CAD [9]. Women are more likely than men to have an unrecognized myocardial infarction. Similarly, sudden death is more common in males than females [10]. Younger individuals and women are more likely to have MI with non-obstructive coronary arteries (MINOCA [50% stenosis]) [11]. Age, sex, ethnicity, and a family history of CAD are non-modifiable risk factors [12]. While High blood pressure, high blood cholesterol levels, diabetes, smoking, high alcohol consumption, obesity, lack of physical activity, an unhealthy diet, and stress are all modifiable factors [13]. The pattern of CAD is essential to understand because it affects the treatment options and disease outcomes. However, the impacts of such socio-demographic factors, clinical profile, prevalence of risk factors, and pattern distribution of CAD patients in Somalia remain unclear. Our study aimed to determine the clinical profile, prevalence of risk factors, and distribution of the Somali population's acute coronary syndrome (ACS) patients.

2. METHOD

This study is a prospective cross-sectional study of patients those underwent angiography in Mogadishu Somali Türkiye Training and Research Hospital. The data was collected through a structured questionnaire containing close-ended questions. One of our authors completed the survey to increase the accuracy of the data. Individuals with significant coronary lesions angiography with angiography other than coronary, less than 70% lesion, refusal to consent, and those with missed data.

The addressed characteristics included age, Gender, history of smoking, history of chronic disease such as; diabetic Milletus, hypertension, cholesterol, complaint of the first presentation, and angiographic findings.

Ischemic heart disease can be classified into acute coronary syndrome (unstable, Non-ST, and ST-Elevation myocardial infarction) and stable coronary artery disease (chronic coronary syndrome).

STEMI was considered myocardial ischemia associated with persistent ST-segment elevation or new left bundle-branch block on an electrocardiogram. Diagnostic ST-segment elevation was defined as new ST-segment elevation at the J point in at least two contiguous leads in the absence of left ventricular hypertrophy as follows: leads V2 and V3 and/or other contiguous chest leads or limb leads, with new ST-segment elevation of 2 mm (0.2 mV) for men or 1.5 mm (0.15 mV) for women, and/or 1 mm (0.1 mV) in other contiguous chest leads or limb leads. Whether cardiac biomarkers were increased or not in the absence of ST-segment elevation indicated NSTE-ACS, including NSTEMI and UA.

Unstable patients were recommended directly for angiography, while those with stable coronary artery disease were recommended for angiography after positive non-invasive stress test testing.

Hyperlipidemia was a history of dyslipidemia that had been medically diagnosed and/or treated, total cholesterol above 200 mg/dl, low-density lipoprotein above or equal to 130 mg/dl, or high-density lipoprotein below 40 mg/dl. The hypertension criteria were those with a history of previous hypertension, treated with lifestyle changes, and those with a blood pressure greater than 140 mmHg systolic or 90

mmHg diastolic on at least two occasions. Diabetes was defined as a fasting blood sugar level of 126 mg/dl or higher or a history of diabetes diagnosed and/or treated with medication and/or lifestyle change. In our study, smokers were defined as current smokers or those who had recently quit smoking.

Coronary angiography involves imaging the coronary anatomy under fluoroscopy, which is made possible by the direct injection of contrast material into the pericardial coronary arteries through a catheter advanced from a peripheral artery to the aortic root and into the coronary Ostia.

Visual or quantitative coronary angiography was used as it is a simple, easy, and quick way to measure how bad a lesion is. We didn't use other methods to measure the lesion, like anatomical by using intravascular ultrasound and physiological by using coronary flow reserve or fractional flow reserve, because they weren't available in our hospital.

Coronary stenosis was classified as mild if the visible narrowing was less than 50%, moderate between 50% and 70%, and severe with a diameter loss of 70% or greater. A 70% or more stenosis in the pericardial coronary artery or 50% in the left main coronary artery was seen as anatomically significant lesions [14,15]. Only those with a lesion of more than 70 were included in our study.

Patients were classified as having a single-vessel disease (SVD), double-vessel disease (DVD), or triple-vessel disease (TVD) accordingly.

Patients provided informed consent, and this study did not disclose personal information. The analysis was performed in line with the principles of the Helsinki Declaration contents. The research ethics board committee of Mogadishu Somalia Turkiye Recep Tayyip Erdoğan Training and Research Hospital approved the study (Ref: MSTH/10580).

The data were analyzed using univariate descriptive statistics. The frequencies and percentages, as well as the mean ± (SD), were presented. Cross-tabulations were used to determine the association between the variables.

3. RESULTS

The angiographic findings of 127 coronary artery disease patients with angiography were analyzed. The prevalence of coronary artery disease was 80.3% (102/127) among patients underwent percutaneous coronary intervention. Their mean age was 58.4±12.8 years.Regarding the age distribution of the cases, the most predominant age group was 51-60 years (40.2%), followed by 61-70 years (21.6%), 41–50 years (17.5%), 71 years and above (16.7), and the least predominant age group was under 30-20 years (6.9%)**.** On Gender distribution, a high predominance of males was found and constituted 84.3% (n=86) of the total patients, while 15.7% of the participants were female. In terms of co-morbidities, hypertension was the most common co-morbidity of the study participants (61.8%, n=63), followed by diabetic Miletus (53.9%, n=55), and hyperlipidemia (50%, n=51**).** Smokers were present in 35.3% (n=36) with no female smokers (Table **1**).

In our study, majority of the patients (69.6%, n = 71) had chest pain, 21 patients (20.5%) had dyspnea, and 10 (9.8%) non specific features.

Based on the clinical presentations, electrocardiogram, and cardiac enzymes, patients were categorized into four groups; most of the patients had unstable angina (n=35, 34.3%), flowed by those with NSTEMI (n=13, 12.7%), those with STEMI (n=34, 33.3%), and others (n=20, 19.6%) (Figure **1**).

The patients those underwent percutaneous coronary intervention their angiographic findings were categorized into three groups: single vessel disease (about 36.2%, n=37), double vessel disease (about 32.4 %, n=33), and triple vessel disease (about 31.4 %, n=32). LAD was the most overall involved artery, followed by circumflex artery, right coronary artery, and left main vessel disease, 82.4 %, 55.8 %, 54.9 %, and 12.7%, respectively (Table **2**).

Regarding to the lesion involved site of each artery, the most commonly involved site of LAD was found to be the proximal LAD (53.7%, n = 44), followed by the mid-LAD (40.2%, n = 33), and more than two site lesions (6.1%, n = 5). In CX, the proximal and distal lesions were almost equal: 50.9% (n = 29)

Table 1. Socio-demographic characteristics and clinical presentations among patients underwent coronary artery intervention

Parameters		Frequency (%)
Gender	Male	86 (84.3%)
	Male	16 (15.7%)
Age group	30-40	7 (6.9%)
	41-50	15 (14.7%)
	51-60	41 (40.1 %)
	61-70	22 (21.6%)
	>70	17 (16.7%)
Smoking	Yes	36 (35.3%)
	No	64 (62.7%)
Physical inactivity	Yes	68 (66.7%)
	No	34 (33.3%)
Comorbidities	HTN	63 (61.8%)
	DM	55 (53.9%)
	Hyperlipidemia	51 (50%)
-	Obesity	2 (1.9%)
Clinical presentations	Chest pain	71 (69.6%)
	Shortness of breath	54 (42.9%)
	Non specific features	30 (29.4%)

Abbreviations: HTN: Hypertension, DM: Diabetic Milletus, CAD: Coronary Artery Disease, ACS: Acute Coronary Syndrome, STEMI: -ST Elevation Myocardial Infarction, NSTEMI: -Non-ST Elevation Myocardial infraction.

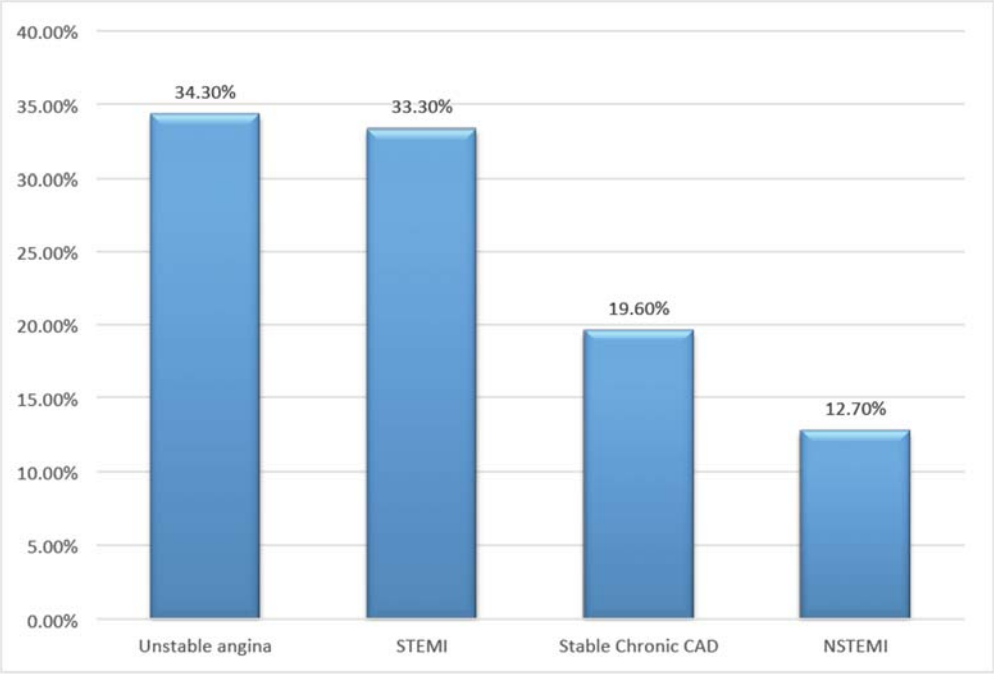

Figure 1. Clinical diagnosis among patients undergone coronary angiography.

and 49.1% (n = 28), respectively. In the RCA, the proximal lesion was 39.3% (n = 22), the mid-RCA was 35.7% (n = 20), the distal RCA was 17.9% (n = 10), and involvement at more than one site was 7.1% (n = 4). In terms of lesions of the artery due to different types of CAD, the LAD was the most common artery among these patients (Table **3**).

According to dominant systems, the RCA was the most dominant system with 81.4% (n = 83), followed by the circumflex artery was 14.7% (n = 15) and 4% (n = 3) as a co-dominant system (Figure **2**). In terms of management, 80 (78.4%) had a percutaneous intervention, while 22 (21.6%) of them had been recommended for coronary artery bypass grafting.

Hyper acute stent thrombosis 0.98 %(n=1) and iatrogenic coronary artery dissection 0.98%(n=1) were the only coronary complications among studied group. Doppler ultrasound at the puncture site was done before discharge. Local hematomas (8%, n = 8.2), pseudoaneurysms (2%, n = 2.04), and arteriovenous fistulas (0.8%, n = 0.816) were the most frequent puncture site complications (Table **4**)

Table 2. Extent of coronary artery involvement among patients underwent coronary angiography.

Parameters			Frequency (%)
No of vessel	Single vessel		37 (36.2 %)
	Double		33 (32.4 %)
	Triple		32 (31.4 %)
	LMCA		13 (12.7%)
Site of occlusion of Target vessel	LAD		82(80.4%)
		Proximal LAD	44(53.7%)
		Mid-LAD	33(40.2%)
		More than two site lesions	5 (6.1%,)
	CX		57(55.8%)
		Proximal CX	29 (50.9%)
		Distal	28 (49.1%)
	RCA		56(54.9%)
		Proximal RCA	22 (39.3%)
		Mid RCA	20 (35.7%)
		Distal RCA	10 (17.9%)
		Involvement more than one site	4 (7.1%)

Abbreviations: LAD; Left anterior descending artery, CX; Circumflex artery, RCA; Right Coronary Artery, LMCA; Left Main Coronary Artery,

Table 3. Characteristics of angiography findings in terms of different types of CAD.

Angiography findings	Unstable	NSTEMI	STEMI	STABLE CAD	Total
LAD	29(35.4%)	11(13.4%)	27(32.9%)	15(18.3%)	82(80.4%)
CX	24(42.1%)	9(15.8%)	15(26.3%)	9(15.8%)	57(55.8%)
RCA	16(28.6%)	8(14.3%)	20(35.7%)	12(21.4%)	56(54.9%)

Abbreviations: CAD: coronary artery disease, STEMI: -ST Elevation Myocardial Infarction, NSTEMI: -Non-ST Elevation Myocardial infarction, LAD:- Left anterior descending artery , CX: Circumflex artery, RCA:- Right Coronary Artery.

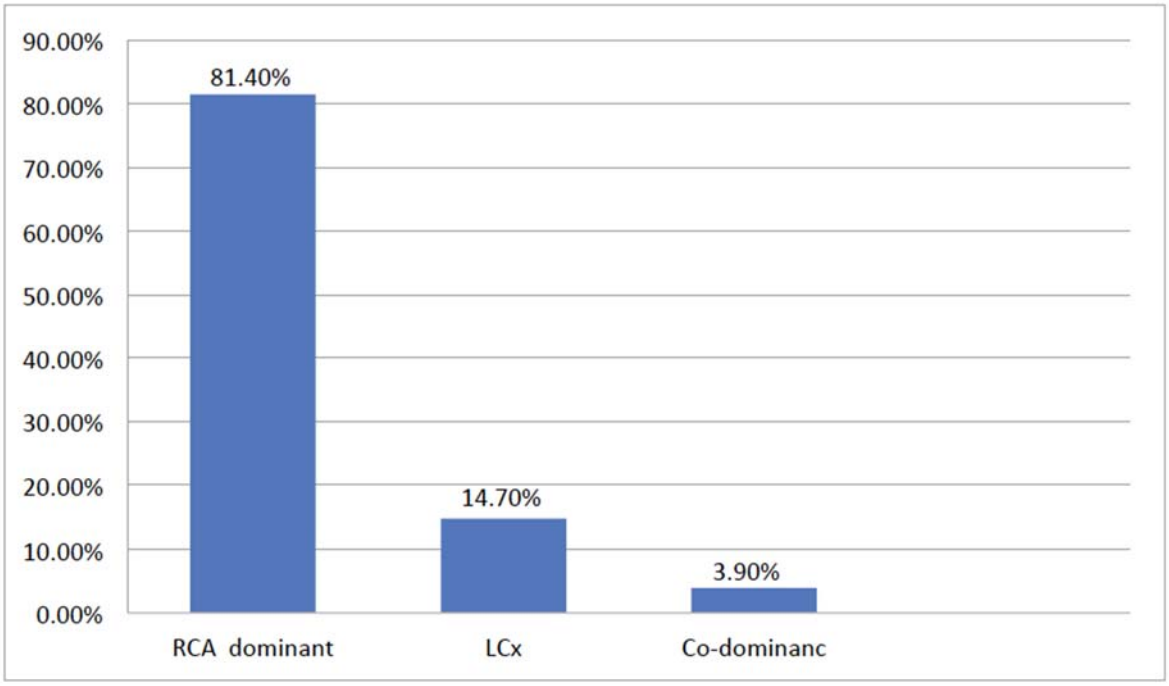

Figure 2. Dominant artery in patients who have undergone coronary angiography.

Table 4. Procedure related complications among patients underwent coronary artery intervention.

Vascular (puncture site) complication	10.8%
• Hematomas	8%
• Pseudoaneurysms	2%
• Arteriovenous Fistulas	0.8%
Coronary complications	1.9%
• Hyper acute stent thrombosis	0.98%
• İatrogenic coronary artery dissection	0.98%

4. DISCUSSION

Over one-third of all deaths are caused by coronary artery disease, which is the primary cause of mortality and morbidity in both men and women [16]. It has more than a 20-fold variation in mortality rates between countries, which is higher in low- and middle-income countries than in high-income countries [17, 18]. Although the epidemiology of heart disease in Africa, which focuses primarily on hospitalized patients, may not accurately reflect the actual distribution of heart disease on the continent, it does point to a significant burden of undertreated conditions like tuberculous pericarditis, cardiomyopathies, and rheumatic vascular disease [19].

Over the last decades, coronary heart disease (CHD) mortality has gradually decreased in Western countries. However, it still accounts for roughly one-third of all deaths in people over the age of 35 [20].

Although it has a different presentation, most patients experience chest pain before a severe MI [21]. Even though CAD is more among women, there is a persistent misconception that CAD is a man's disease and more than one-third of all deaths from CAD are female in India ([22, 23]. The attributable factors include atypical presentation of coronary artery disease, less smoking, eating healthy foods, endogenous es-

trogen, lower low-density lipoprotein (LDL) cholesterol levels in women than men, and higher high-density lipoprotein (HDL) cholesterol levels [24, 25].

Coronary artery disease may be attributed to smoking, physical inactivity, dietary habits, alcohol consumption, and obesity [26]. Each year, 1.3 million deaths worldwide result from physical inactivity [**27**]**.** Although obesity was not prevalent in our studied group, 2/3 of the patients [66.7%) have not participated in physical activity.

The frequency of risk factors for coronary artery disease varies with the geographical area. One study conducted in Africa showed that in Kenya, hypertension was the most common risk factor in 50% of patients and smoking in 25% of patients; one-third of patients had type 2 diabetes. [28]. It has presentations ranging from no symptoms to sudden cardiac death. Although chest pain was the most common symptom in our study, approximately 32% of patients with ACS did not experience chest pain [29]. Females were more affected by atypical or angina equivalent, which is more related to the poor prognosis [30]. A prospective cohort study in UK primary care found that SOB symptoms were more common than chest pain [31].

Coronary angiography is the gold standard test for determining the existence and severity of atherosclerotic coronary artery disease [32]. The left anterior descending coronary artery (LAD) had a slightly higher prevalence of coronary lesions in all clinical presentations compared to the right coronary artery (RCA) and left circumflex artery (Cx) [33]. In our study, the LAD was the most involved artery.

CONCLUSION

Due to a lack of well-established health centers in the last three decades in Somalia, there are now few catheterization laboratory centers. This was the first study of angiography findings at a tertiary care level that focused on patterns of ischemic heart disease and risk factors to develop preventive and management strategies. Due to the high prevalence of the disease among these populations and lack of awareness, we suggest that the disease should be evaluated with significant prospective research.

AUTHORS' CONTRIBUTIONS

The author confirms sole responsibility for the following: study conception and design, data collection, analysis and interpretation of results, and manuscript preparation.

CONSENT FOR PUBLICATION

Not applicable.

FUNDING

None.

DATA AVAILABILITY

This data is available from the corresponding author upon request.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest regarding the publication of this paper.

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