

# The Severity and Complexity of Coronary Artery Disease in Khat User Somali Patients: A Study in a PCI-Capable Tertiary Center in Somalia

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**Introduction:** Coronary Artery Disease (CAD) is the leading cause of death and disability adjusted life years worldwide, primarily in low- and middle-income nations. The study aims to determine if khat use is linked to a more complicated form of CAD and a larger lesion burden. The SYNergy between Percutaneous Coronary Intervention with TAXus and cardiac surgery (SYNTAX) score is used to assess CAD severity and degree.

**Methodology:** This observational, hospital-based descriptive study enrolled patients referred for coronary angiograms from August 2022 to May 2023. Data was collected from Khat and Non-Khat users, and analyzed using the SYNTAX score. The study compared demographics, clinical presentations, coronary angiographic findings and lesion complexity between Khat and Non-Khat users.

**Results:** This study enrolled 177 participants, with a khat chewer group being (45.2%) compared to non-khat chewers (54.8%). The age distribution was similar, with 79.7% male and 20.3% female. Smoking was more common in the khat group (38.4%). Risk factors included hypertension, diabetes mellitus, dyslipidemia, and chronic kidney disease. There was no significant difference in lesion complexity between khat users and non-khat users. Khat chewing patients had a higher incidence of acute coronary syndrome (54% vs 24%) and higher incidence of spontaneous coronary dissection.

**Conclusion:** The research suggests that khat use could be harmful to the cardiovascular system, including the coronary arteries. More research is required to completely understand the underlying mechanisms of action and evaluate the impact of khat on coronary arteries.

**Keywords:** khat chewing, coronary artery disease, percutaneous coronary intervention, Somalia

## Introduction

The leading cause of death and reduction in Disability Adjusted Life Years (DALYs) globally is coronary artery disease (CAD). This burden is primarily felt in low- and middle-income nations. This places a significant economic burden on the entire world as it results in over 7 million deaths and 129 million DALYs each year.<sup>1</sup> The importance of conventional and innovative risk factors and indicators of subclinical disease in the prediction of CAD has been demonstrated through ecological and population-based longitudinal studies carried either globally or within particular nations.<sup>2</sup> In the 1960s, middle-aged men's coronary heart disease mortality rates in Somalia were among the highest in the world. Beginning in 2000, the mortality rate for middle-aged males decreased by about a quarter of its peak level. It was projected that more than 12,000 Somalis per year pass away from coronary artery disease in 2016.<sup>3</sup> Khat, also known as “qaad” or “jaad” in Somalia, is a plant whose leaves and stem tips are chewed for its energizing properties. The most widely used narcotic in Somalia is khat, which is used by an estimated 75% of all males there.<sup>4</sup> Cathinone, the main constituent of khat leaf, has an indirect sympathomimetic action and has been linked to increased risk of hypertension, acute cardiovascular events, and cardiovascular complications in patients with Acute Coronary Syndrome.<sup>5</sup> Heavy khat users had a relative risk of 5.0

(confidence CI 1.9–13.1) and a 39-fold higher risk of myocardial infarction than non-users, according to a case-control study conducted in Yemen.<sup>6</sup> Based on coronary anatomic risk factors, the SYnergy between Percutaneous Coronary Intervention with TAXus and cardiac surgery (SYNTAX) score is a semi quantitative angiographic measure used to assess the severity and degree of CAD. It has recently been evaluated to predict major adverse cardiac events (MACE) after percutaneous revascularization in patients with left main disease and/or multivessel CAD. It is derived from the coronary anatomy and lesion characteristics.<sup>7</sup> Our study's objective is to determine whether khat use is linked to a more complicated form of coronary artery disease and a larger lesion burden.

## Methods

The method of this study was an observational, hospital-based, descriptive study. Patients who had been referred for coronary angiogram were enrolled during an 11-month period from August 2022 to May 2023. Doctors interviewed all patients; consent was obtained and a predesigned questionnaire was filled out. The time for interviewing the patients was just before the catheterization procedure. The study procedures were clearly explained, and consents were obtained and approved. Data were collected from patients who presented with coronary artery disease and underwent coronary angiographic study in Mogadishu Somali Turkey Training and Research Hospital. Patients were divided into Khat user and non-Khat users. Data, including demographics, clinical presentations, and Coronary angiographic findings, lesion complexity, and prognosis were analyzed using the SYNTAX score and compared among the 2 groups. Lesion complexity and severity were divided into three groups according to the SYNTAX score were divided into tertiles as low ( $\leq 16$ ), intermediate (16–22) and high ( $> 22$ ).

## Ethical Consideration

Due to the fact that our hospital is a research hospital a general informed consent is obtained from every patient admitted to obtain their data for retrospective research purposes from the hospital medical records, and this study did not disclose any personal information. The study was approved by the research ethics committee of Mogadishu Somali Turkey Training and Research Hospital (Ethics Protocol No: MSTH/14518). The study was performed in line with the principles of the Declaration of Helsinki.

## Results

We enrolled one hundred seventy-seven participants in this study. Khat chewer group was 80 (45.2%) compared to 97 (54.8) of non-khat chewer group. The mean and SD of the ages of both participants was approximately the same (59.49+7 and 13.5 years). One hundred forty-one (79.7%) of the participants were male, and 36 (20.3%) were female. While smoking was more common among those in the khat group, 68 (38.4%) were smokers, while 109 (61.6%) were non-smokers (Table 1).

Regarding risk factors among study patients, 88 (49.7%) had hypertension, 68 (38.4%) had diabetes mellitus, 50 (28.2%) had dyslipidemia, and 14 (7.9%) had chronic kidney disease, but there was no significant difference in lesion severity or complexity between khat users and non-khat users. According to their coronary artery disease 87 (49.2%) stable (Chronic) coronary artery disease and 90 (50.8%) had acute coronary syndrome (ACS). Compared to stable coronary artery disease, the history of different types of acute coronary syndrome was more prevalent among khat chewer patients 54% of khat users vs 24% of non-khat users, and the P value was 0.003 when comparing both groups (Figure 1). Furthermore, spontaneous dissection was more prevalent in khat users as the etiology that caused acute coronary syndrome about 9% of khat users. The complexity of the syntax score was demonstrated in (Figure 2), with no significant differences in disease severity or complexity among different groups (p value of 0.07).

## Discussion

According to a Yemeni study, severe coronary artery disease is more common in khat users than in non-users.<sup>8</sup> Furthermore, a comprehensive review and meta-analysis conducted by another study revealed that khat usage was linked to an increased risk of stroke, myocardial infarction, and heart failure.<sup>9</sup> Although the underlying mechanisms of khat and cathinone's effects on the cardiovascular system are unclear, it is believed that they may cause coronary artery spasm.<sup>10</sup>

**Table 1** General Socio-Demographic Characteristics Among Different Patients

Parameters		Frequency (%)
Sex	Male	141 (79.7%)
	Female	36 (20.3%)
Age group	30–40	20 (11.3%)
	41–50	27 (15.3%)
	51–60	75 (42.3%)
	61–70	32 (18.1%)
	>70	23 (13%)
Smoking	Yes	68 (38.4%)
	No	109 (61.6%)
Daily exercise	Yes	68 (66.7%)
	No	34 (33.3%)
Khat chewers	Yes	80 (45.2%)
	No	97 (54.8%)
Smokers	Yes	68 (38.4%)
	No	109 (61.6%)
Comorbidities	HTN	88 (49.7%)
	DM	68 (38.4%)
	Dyslipidemia	50 (28.2%)
	Chronic kidney disease	14 (7.9%)

The prolonged consumption of khat has been linked to a range of detrimental health consequences, such as the accelerated development of coronary artery disease.<sup>11</sup> Research has demonstrated that the act of chewing khat has the potential to induce vasoconstriction in the coronary and aortic arteries, hence potentially playing a role in the pathogenesis of atherosclerosis.<sup>5</sup> Amphetamine use can contribute to coronary dissection, according to several studies that have looked into the subject. For instance, a patient was diagnosed with ischemic cardiomyopathy and amphetamine-induced spontaneous coronary artery dissection in a case report that was published in 2020.<sup>12</sup> Another case study from 2015 revealed a 22-year-old male who experienced coronary dissection after consuming the amphetamine derivative lisdexamfetamine.<sup>13</sup> Khat has a similar physiological mechanism as amphetamines. It is not entirely clear how exactly khat use causes these cardiovascular problems. But it's thought that khat causes coronary artery spasm, much like amphetamine does, which can cause myocardial ischemia and infarction.<sup>10</sup> Khat includes chemicals that imitate the actions of sympathomimetic drugs, raising blood pressure and heart rate, such as cathinone, ephedrine, and epinephrine.<sup>14</sup> Additionally, (2020) carried out a study to ascertain the degree and severity of coronary artery disease in Yemeni khat users. According to the study, khat smokers were more likely to have multiple vessel disease, more complicated lesions, and atherosclerotic coronary arteries. The researchers came to the conclusion that khat chewing increases the risk of coronary heart disease.<sup>15</sup> Our study did not find an association between multivessel disease and khat consumption.

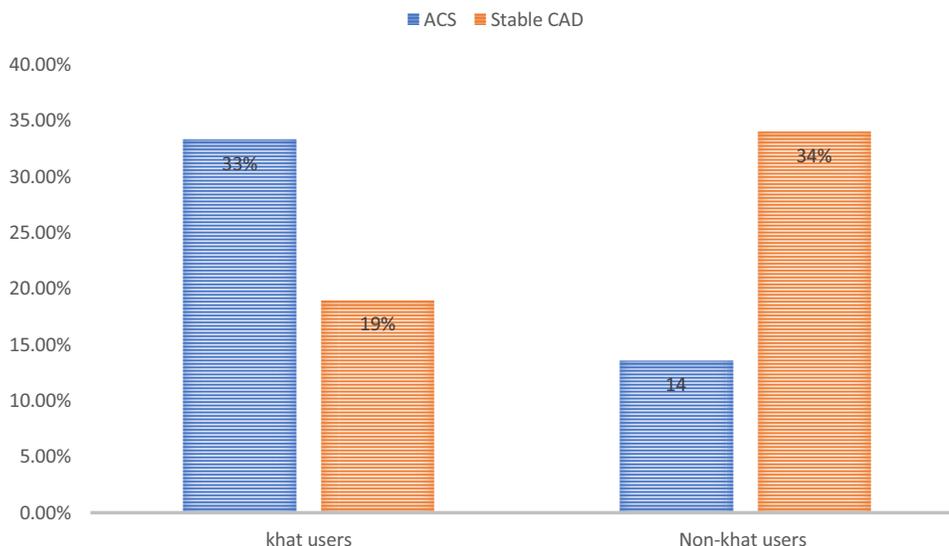


Figure 1 Comparison of different types of CAD among khat users vs non-khat users.

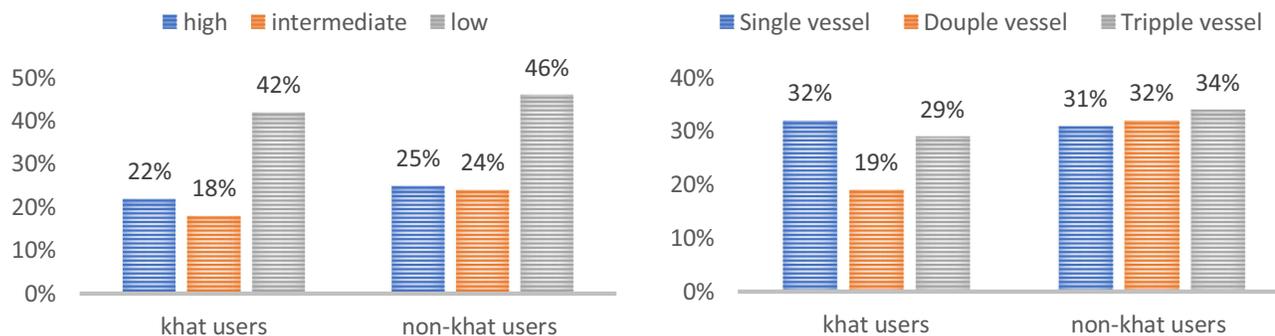


Figure 2 Complexity of syntax score and percentage angiographic findings among Different patients.

There is limited research on the effects of khat consumption on the progression of atherosclerosis in individuals with diabetes. However, the effect of diabetes on the progression of atherosclerosis has been investigated in numerous contexts. One study discovered that diabetes is associated with an increased risk of atherosclerosis and its complications.<sup>16</sup>

Atherosclerotic acute coronary syndrome is caused by spontaneous coronary dissection (SCD), which is more common in younger women.<sup>17</sup> Spontaneous coronary dissection was not studied as a cause of acute coronary syndrome among khat chewers but has been reported in a number of case reports.<sup>18,19</sup> Our study found there is an association between khat consumption and spontaneous coronary dissection supporting those reported case reports.

## Conclusion

The data point to the possibility that khat consumption may have detrimental effects on the cardiovascular system, including the coronary arteries. To fully comprehend the underlying mechanisms of action and assess the extent of khat's impact on coronary arteries, more research is needed.

## Limitations of Our Study

The absence of confounding factor control. The study is helpful in understanding the link between khat use and coronary artery disease, but they do not take into consideration other possible risk factors that can affect the results. The study for instance, do not account for elements like smoking, drinking, nutrition, obesity, and concurrent illness conditions. These complicating variables might have an impact on how severe and widespread coronary artery disease is among khat consumers. In order to better understand the specific contribution of khat chewing to the complexity of coronary artery disease, it is crucial to take these factors into account when interpreting the results of the studies and to undertake additional research with suitable control groups.

## Author Contributions

All authors made a significant contribution to the work reported, whether that is, in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

## Disclosure

The authors declare that they have no conflicts of interest.

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