Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/155haf17

UTILITY OF CAROTID INTIMA-MEDIA THICKNESS AS A PREDICTOR OF CORONARY ARTERY DISEASE

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Abstract

Background: Carotid intima-media thickness (IMT) is a recognized surrogate marker of systemic atherosclerosis and has been proposed as a predictor of coronary artery disease (CAD). This study assesses the utility of carotid IMT in predicting CAD in patients undergoing percutaneous coronary angiography.

Methods: A total of 50 patients were evaluated with Ultrasonography to measure carotid IMT. Patients were divided into CAD-positive (n=29) and CAD-negative (n=21) based on angiographic findings. Risk factors and IMT readings were analyzed comparatively.

Results: Raised IMT was significantly more frequent in CAD-positive patients (86.2%) than CAD-negative patients (9.5%). Hypertension and dyslipidemia were more prevalent in CAD-positive patients. IMT also correlated with the severity of coronary involvement.

Conclusion: Carotid IMT is strongly associated with the presence and severity of CAD and may serve as a reliable, non- invasive predictor in clinical assessments.

Keywords: Cardiovascular risk, Carotid intima-media thickness (IMT), coronary artery disease (CAD), Ultrasonography

Introduction

Coronary artery disease (CAD) is regarded as one cause of death around the world. Hypertension, diabetes, fibrinogen, low-density lipoprotein cholesterol, and smoking are common risk factors for CAD [1]. These traditional risk factors are reported to be weak predictors of CAD [2]. Coronary angiography is commonly performed before valve surgery in most patients older than 35 years old [3]. It remains the gold standard for assessing the degree of coronary atherosclerosis. However, this invasive method is related with non negligible morbidity, especially for the patients with inconstant hemodynamic variables. Thus, it is urgent to explore noninvasive screening method for diagnosing CAD patients.

More recently, intima-media thickness (IMT) of the common carotid artery has been suggested as quick, noninvasive, and reproducible marker for CAD [4–7]. IMT is usually assessed by quantifying the distance between the echogenic media-adventitia layer and the echogenic lumen-intima layer with B-mode ultrasound images [8]. It is regarded as a marker predicting early stages of atherosclerotic process and related with the occurrences of cardio-/cerebrovascular events and

cardiovascular outcomes [9–11]. In addition, it has been demonstrated to be correlated with the coronary risk factors including smoking, sex, diabetes, hypertension, and cholesterol [12–14]. Besides, IMT could predict the severity of CAD.

Carotid intima-media thickness (IMT), assessed by high-resolution B- mode ultra sonography, serves as a surrogate marker for systemic atherosclerosis and has demonstrated predictive value for cardiovascular events in asymptomatic and symptomatic populations.

Studies such as the Atherosclerosis Risk in Communities (ARIC) and the Rotterdam Study have emphasized the correlation between carotid IMT and future cardiovascular events. This study aims to evaluate the predictive value of carotid IMT in detecting the presence and severity of CAD, validated against coronary angiography findings.

Materials and Methods

This cross-sectional observational study was conducted at a tertiary care hospital with institutional ethics approval. A total of 50 adult patients referred for elective coronary angiography were recruited. Exclusion criteria included prior myocardial infarction, stroke, or known carotid artery disease. Carotid IMT was measured using a 7.5–10 MHz linear probe on a high-resolution B-mode ultrasound system. Measurements were obtained from the distal 1 cm of the common carotid artery on both sides. An IMT value greater than 0.9 mm was considered raised. Coronary angiography was performed using standard Judkins technique and interpreted by experienced cardiologists. Based on angiographic findings, patients were classified into CAD-positive and CAD-negative groups. Data on cardiovascular risk factors—diabetes mellitus, hypertension, dyslipidemia, and smoking—were collected. Statistical analysis was performed using chi-square test and independent t-tests as appropriate, with a p-value <0.05 considered significant.

Results

The study population consisted of 22 males and 28 Female patients.

Table 1: IMT Distribution in CAD vs Non-CAD Patients

Group	Number of Patients	Raised IMT	Normal IMT
CAD Positive	29	25	4
CAD Negative	21	2	19

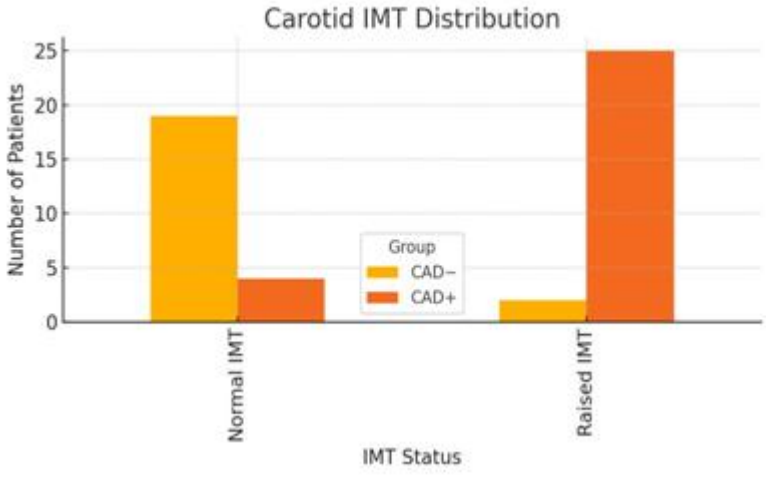
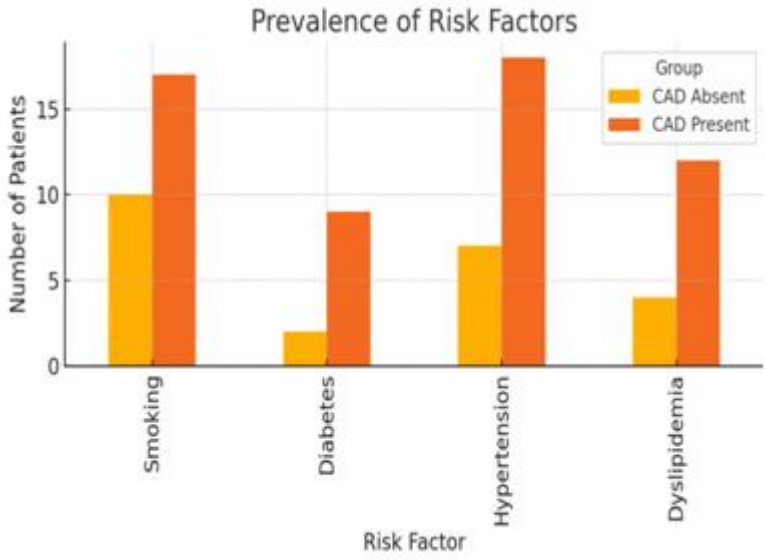
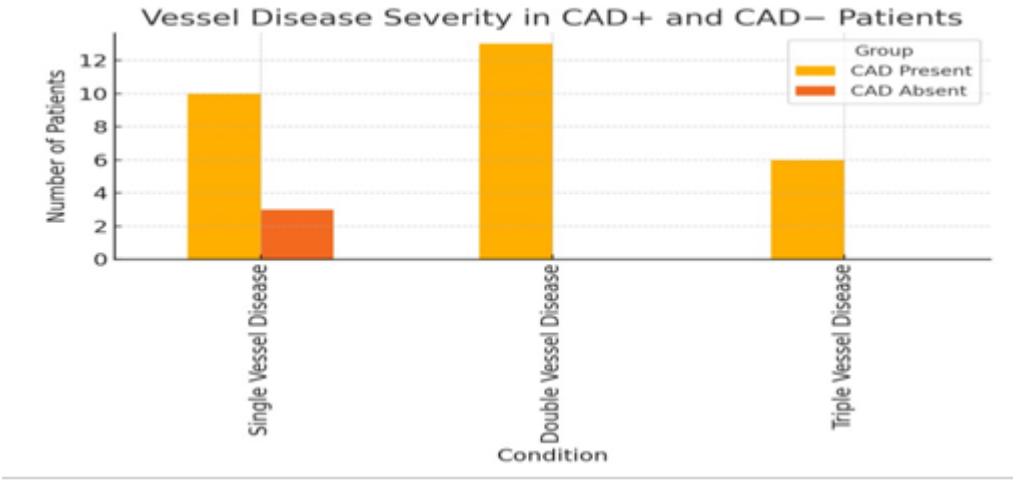


Table 2: Prevalence of Risk Factors

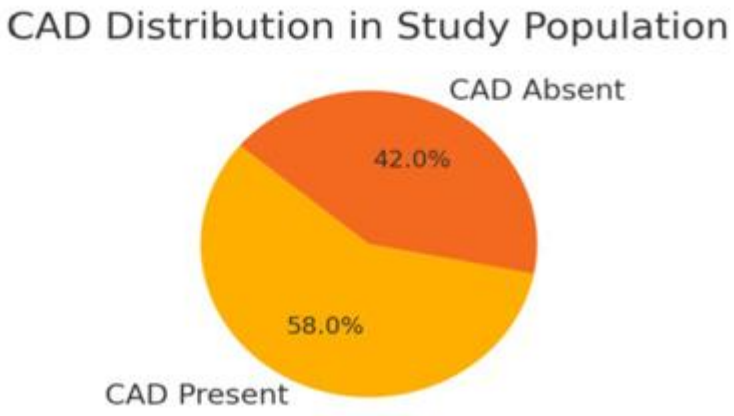
Risk Factor	CAD Positive (%)	CAD Negative (%)
Hypertension	65.5%	28.6%
Dyslipidemia	58.6%	19.0%
Diabetes	44.8%	23.8%
Smoking	37.9%	33.3%



Single vessel disease	Double vessel disease	Triple vessel disease
20%	26%	14%



CAD Present	58%
CAD Absent	42%



Discussion

It is commonly thought that atherosclerosis is a generalized disease, which mainly occurs in the early decades of life [15]. Coronary and carotid arteries are the two most common sites related with atherosclerosis [16]. The relationship of coronary and carotid atherosclerosis has been confirmed [17]. Carotid IMT is regarded as a marker of atherosclerosis. Previous studies have suggested that IMT would increase with hypertension, diabetes mellitus, hyperlipidaemia, age, sex, percentile, and population and other factors that are closely related with CAD [18-20].

There are many methods to evaluate the arteries' condition. Coronarography is the golden standard for diagnosis of coronary artery atherosclerosis. However, coronarography is invasive with a definite risk. IMT is a well-described marker for cardiovascular disease, and enhanced IMT is correlated with the development of CAD and stroke [21,22]. IMT more than 1 mm is correlated with a twofold increased risk of CAD in men and fivefold increased risk in women [1].

Our findings affirm the utility of carotid IMT as a non-invasive surrogate marker for coronary atherosclerosis. Raised IMT was strongly associated with angiographically confirmed CAD, consistent with earlier epidemiological studies. In particular, increased IMT was more prevalent among patients with multi-vessel disease, indicating its potential as a risk stratification tool. This supports prior work by Lorenz et al. and Polak et al.,[23] who noted similar associations. In this study, hypertension and dyslipidemia were also more frequent in the CAD- positive group, further supporting the role of IMT in systemic atherosclerosis. These results suggest that routine IMT screening may help identify patients who would benefit from early therapeutic intervention or more intensive risk modification strategies.

Conclusion:

Carotid IMT is a valuable, non-invasive tool for predicting CAD. It can assist in identifying individuals at high risk and aid in early intervention. The incorporation of IMT into routine evaluations could enhance cardiovascular risk stratification.

Limitations:

The study's sample size was relatively small and limited to a single center. Larger multi centric studies are needed to validate the findings and generalize the conclusions to a broader population.

Conflict of interest: Nil

Funding: Nil

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