Co-relation of carotid artery disease in patients with significant ischemic heart disease ,single centre experience.

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Abstract .

Objective: To determine the co-relation of significant carotid artery stenosis in patients with significant ischemic heart disease.

Methods: Carotid artery stenosis was measured in common carotid artery or its main branches using high-resolution B-mode ultrasonography in 100 patients with coronary artery disease who were having significant coronary artery disease on the basis of history and conventional coronary angiography. Statistics analysis was done with SPSS v 11.

Results: There were 67 male and 33 female patients. Mean age was 53.36 years (SD±10.99). Significant echographic carotid stenosis was observed in 35 out of 100 patients (35 %). Among those, the distribution of carotid stenosis was 22.22%, 29.62%, 38.77% and 66.66% in patients with single, double, triple vessel and left main stem disease, respectively. Statistical analysis showed that age, risk factors (DM, HTN, smoking and hyperlipidemia) and the extent of CAD were significantly related to the presence of carotid stenosis.

Conclusion: There is strong co-relation between significant carotid artery stenosis in patients with ischemic heart disease in southern Punjab, screening of carotid artery stenosis should be recommended in patients with CAD.

KEY WORDS: single vessel disease, double vessel disease, triple vessel disease and left main stem disease.

Introduction

Ischaemic heart disease is the leading cause of death in both developing as well as developed countries.[1] Their incidence increases with age and mostly occurs due to atherosclerosis[2-3].During the last three decades there is a decline in the incidence of the disease in the Western population while the burden of the disease in South Asian countries (India, Pakistan, Bangladesh and Sri Lanka) has inclined and is expected to rise further.[4]

The Non-modifiable risk factors are age, sex, family history, race and ethnicity and the modifiable risk factors include hypertension, cardiac disease, diabetes mellitus hyperlipidaemia, cigarette smoking, alcohol abuse, physical inactivity, carotid stenosis, and transient ischaemic attack.[5]

Atherosclerosis is a systemic disease process and large sections of the arterial tree will suffer from atherosclerosis, especially when exposed to elevated risk factor levels[6.] Thus atherosclerosis in the carotids should reflect coronary involvement, a fact that has been confirmed histologically by autopsy studies. Extracranial carotid arteries provide excellent and reproducible sites for IMT assessment because of accessibility, adequate size, and limited movement. Studies in Western patients have suggested that raised carotid IMT is an excellent predictor of the risk of future cardiovascular events, and it can also detect the presence of CAD.

It is imperative to shift the focus to disease prevention rather than palliation. Prevention requires early identification of individuals at risk of developing cardiovascular disease but still clinically asymptomatic, so that intensive preventive measures may be instituted to arrest the progression of disease.

Duplex ultrasonography is currently the principal and undoubtedly the most accurate non-invasive diagnostic modality available for evaluation of carotid artery stenosis. It provides information about the degree of carotid stenosis, the velocity and character of blood flow and plaque morphology.[7]Carotid intima media thickness independently predicts future vascular events like myocardial infarction and stroke. Its predictive value is at least as high in younger subjects as in older subjects.[8-9] The management strategy of combined coronary and asymptomatic carotid stenosis should be decided case by case, considering the degree of systemic atherosclerosis, cardiac conditions, and plaque morphology.[10]

Very few studies have so far been conducted to determine the frequency of carotid artery stenosis in patients with ischemic heart disease in southern punjab Pakistan who differ from the Western population in cardiovascular risk profile, morbidity and mortality.[11–15]

METHODS

One hundred individuals from the inpatient and outpatient departments of the institute with significant coronary artery disease which was defined as ≥50% stenosis in Left main stem or in any one of the three major epicardial vessels or their main branches (single vessel, double vessel or triple vessel disease), on conventional coronary angiography in Ch. Pervaiz Elahi Institute of Cardiology Multan were enrolled in the study. Sampling technique was non- probability purposive technique and study design was cross-sectional. Informed consent was obtained from all patients. Patients with symptomatic cerebrovascular disease, any carotid procedure, prior percutaneous coronary intervention or coronary artery bypass grafting and peripheral vascular disease were excluded.

Biochemical assessment included fasting and postprandial blood sugar, and fasting lipid profile. Patients were evaluated for the presence and duration of conventional cardiovascular risk factors (hypertension, diabetes mellitus, family history of premature CAD, dyslipidemia, and current smoking). Hypertension was defined as systolic blood pressure > 140 mm Hg, or diastolic blood pressure > 90 mm Hg, or previous use of antihypertensive medications. Diabetes mellitus was considered when subjects gave history of diabetes mellitus and/or were on oral hypoglycemic drugs or insulin treatment or had random blood sugar > 200mg on two occasions. Dyslipidemia was defined as low-density lipoprotein > 130 mg•dL^{-1}, or high-density lipoprotein < 40 mg•dL^{-1}, or triglycerides > 200 mg•dL^{-1}. Family history was coded as positive if a first-degree relative had a coronary event before the age of 55 years in males or 65 years in females. Current

smoking or tobacco use in any form was also considered a conventional risk factor.

Ultrasonographic scanning of the carotid arteries was performed using a tomographic ultrasound system with a high frequency (7.5MHz) linear transducer. Scanning of the extracranial carotid arteries in the neck was performed bilaterally in three different longitudinal projections and not on transverse scans. Carotid artery stenosis was considered significant when there was ≥50% stenosis of common carotid artery or its main branches, on Carotid Dopplerscan.

Descriptive statistics were analyzed by SPSS version 11.The quantitative variables such as age were recorded as mean ± S.D. and qualitative variables like gender, coronary angiographic findings (single, double, triple vessel or left main stem disease) and carotid Doppler findings (significant stenosis of common carotid artery or its main branches) were recorded as frequencies and percentages.

Results

We studied 100 patients, who had undergone coronary angiography because of suspicion of CAD and had significant coronary artery disease. There were 67 (67%) male patients and 33 (33%) female patients . Mean age was 54.36years (SD±10.99) with age range of 20-80 years.

The risk factors like smoking, diabetes, hypertension and hyperlipidemia were studied. From these factors, hypertension and smoking were the most common risk factors in our patients contributing 65 %(n=65) and 60 %(n=60) respectively, others were DM 48 %(n=48) and hyperlipidemia 35 %(n=35) (Figure 1).

Among 100 patients of significant coronary artery disease, 18 patients (18.0%) had single vessel disease, 27 patients (27.%) had double vessel disease, 49 patients (49%) had triple vessel disease and 6 patients (6%) had left main stem disease(Figure 2).

Out of 100 patients with significant CAD, 35 patients were found to have significant carotid artery stenosis (≥50%) ,(Table 1).

There were total of 67 males and 33 females, among them, 80% males and 20% females had significant carotid artery stenosis . Males had significantly more carotid artery disease as compared to females. (p<0.05).

The distribution of echographic carotid stenosis in the groups with degree of CAD was 22.22%, 29.62% , 38.77% and 66.66% of patients with single, double triple vessel and left main stem disease, respectively (Table 2). The overall frequency of significant carotid artery stenosis in patients having significant CAD was 35 % . The extent of CAD was an independent predictor of the presence of significant carotid artery stenosis.(p<.05) .

Figure 1. **Distribution of patients by Risk Factors**
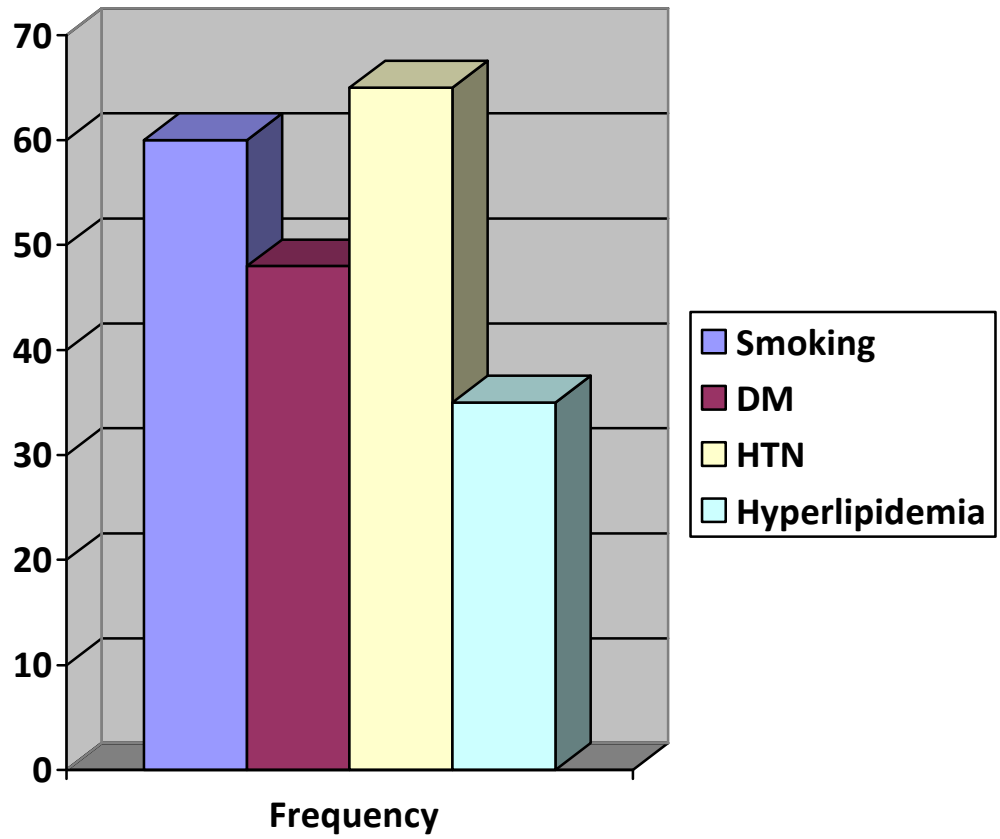
Figure 2 . Distribution of patients by extent of Coronary Artery Disease.
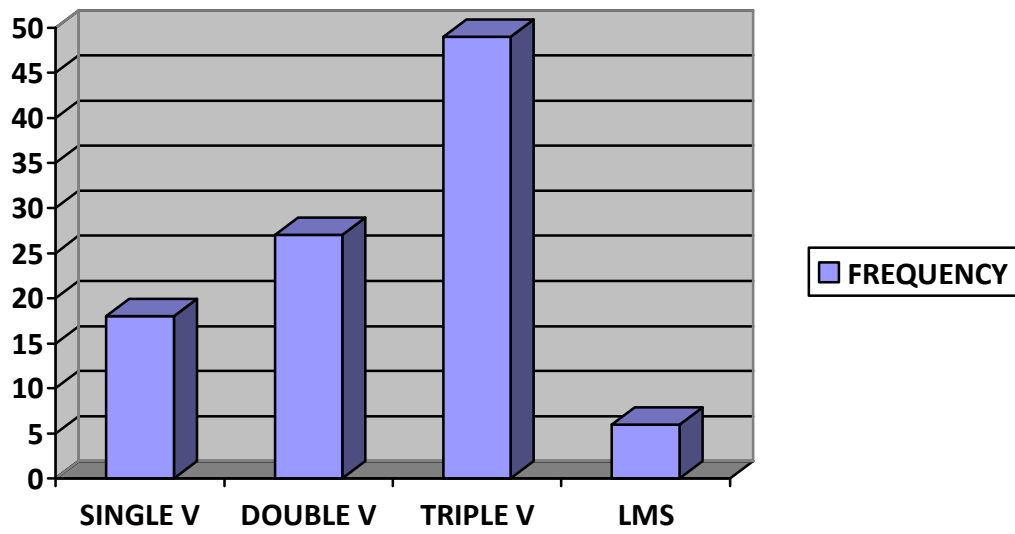
Table 1. Distribution of Carotid Doppler findings

Carotid artery stenosis	Frequency	%	
≥50	35	35	
≤50	65	65	
Total	100	100	

Table 2 .   Frequency of carotid artery stenosis according to extent of

Coronary artery disease.

Carotid Artery Stenosis (≥50)

Extend of Coronary Artery Disease	No.	Frequency	%
Single Vessel Disease	18	04	22.22
Double Vessel Disease	27	08	29.62
Triple Vessel Disease	49	19	38.77
Left Main stem Disease	06	04	66.66

Carotid Artery Stenosis (<50)

Extend of Coronary Artery Disease	No.	Frequency	%
Single Vessel Disease	18	14	77.77
Double Vessel Disease	27	19	70.37
Triple Vessel Disease	49	17	61.22
Left Main stem Disease	06	02	33.33

Discussion .

Atherosclerosis is a systemic disease process and large sections of the arterial tree will suffer from atherosclerosis, especially when exposed to elevated risk factor levels [16,17]. Non-modifiable risk factors for atherosclerosis include age, sex, family history, race and ethnicity. Modifiable risk factors include hypertension (HTN), diabetes mellitus (DM), hyperlipidemia, smoking, alcohol abuse and physical inactivity. Coronary, carotid, and peripheral arterial disease each reflects advanced atherosclerosis.

Cardiovascular diseases are the major cause of mortality all over the world, being responsible for about 50% of all adult deaths. The majority of these deaths are from coronary heart disease.[18] One hundred thousand individuals suffered from an acute MI in Pakistan in year 2002.[19]

Screening of carotid stenosis in patients with CAD seems insufficient in local population at present, probably because the prevalence rate of asymptomatic carotid stenosis has been considered to be low.

In our study, the mean age of the patients was 54.36years (SD±10.99) and there were 67% male and 33% female patients. A study by Protack at al. [20] there were 64% male and 36% females and De Weerd at al.[21] showed that men at all ages has the higher prevalence estimates; our study also supported these previous studies.

Previously in few studies[, 22-23] , significant relation between carotid artery stenosis and severity of CAD in patients undergoing coronary bypass surgery was observed and similar relevant findings were observed in our study,significant carotid artery stenosis in patients with significant CAD was 35%.

In a study Mathiesen et al.[24] reported that age, male gender, diabetes ,smoking, total cholesterol, HDL cholesterol (inverse), and systolic blood pressure are all independent predictors of carotid artery stenosis. Tanimoto et al.[5] also reported that the following factors were associated with severity of carotid artery stenosis: age, hypertension, diabetes mellitus, past history of myocardial infarction, previous CABG, and the extent of CAD. In our study, 35 % patients had history of hyperlipidemia, 65% had HTN, 48 % had DM and 60 % had smoking and all are significantly associated with carotid artery stenosis.

Therefore, it should be recommended that all the patients with CAD, especially those with multivessel CAD having risk factors for atherosclerosis, undergo carotid ultrasonography for screening of carotid atherosclerosis before treatment for CAD.

Conclusion

In conclusion, frequency of significant carotid artery stenosis in patients with CAD is high in local population and age, risk factors (DM, HTN, smoking and hyperlipidemia) and the extent of CAD were significantly related to the presence of carotid stenosis. Therefore, screening of carotid artery stenosis should be recommended in patients with CAD, especially in older patients with multivessel CAD.

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