



Original Article

Prevalence and pattern of lower limbs peripheral artery disease detected by Duplex ultrasonography in patients having coronary artery blockage.

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Abstract

Introduction : Atherosclerosis is a systemic disease which may affect coronary arteries, carotid arteries and peripheral arteries. Patients having coronary artery disease may also have lower limb peripheral arteries involvement due to atherosclerosis. This study is to see the prevalence and pattern of lower limb arteries involvement in patients having CAD.

Methods: Duplex ultrasonic evaluation of peripheral arteries were done in 210 patients of CAD. Ultrasonic evaluation was done by B Mode image and on the basis of haemodynamic change.

Result : Mean age of respondents was 51.3 ± 10.4 years. 90% patient did not show any clinical sign or symptoms of PAD. 5.2% of patient has critical level of stenosis in one or multiple segments of lower limb arteries, 0.5 % patients had stenosis below the critical level. All the patients suffering from PAD were male patients. No statistical significant relation was found between occurrence of PAD and severity of CAD.

Conclusion : Patient of CAD may have hidden PAD without any clinical presentation. Duplex ultrasonography can be a non invasive initial study to rule out the possibility of lower limb arterial insufficiency.

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Introduction

Peripheral artery disease (PAD) is part of the atherosclerotic disease process which is also the cause of coronary artery disease (CAD). So co-existing of PAD and CAD can be expected¹. Coexistence of PAD with other atherosclerotic disorder was reported by many authors. In a study among 468 persons with PAD, 270 (58%) had coexistent CAD². Another study showed 68% persons with PAD had coexistent CAD³. Sheehan.P (2004) stated peripheral arterial disease of lower extremities as a marker of atherothrombotic disease in other vascular bed⁴.

But most of the study were done on PAD patients. Study with CAD patients were limited. Dieter et al found 40% patients of CAD patients had coexistent of PAD⁵. Sabeti *et al* (2007) reported more than 50% of CAD positive patients could have active progressive plaque in peripheral arteries¹. Based on ABI <0.9, PAD was diagnosed in 32 of the 182 (18%) patients from a study in India conducted in randomly selected indoor patients >45 years of age with one or more risk factors for PAD admitted in the cardiology and medicine wards in a tertiary care institute.⁶.

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The major targets of atherosclerosis are carotid arteries, aorta and arteries of lower extremities. The symptoms of peripheral artery disease depend upon the location and extent of the blocked arteries. The most common symptom of lower limb peripheral artery disease is intermittent [claudication](#), manifested by pain, usually in the calf that occurs while [walking](#) and disappears at rest. This is due to the increased [oxygen](#) demand in muscles with use in the setting of inadequate blood flow. Other symptoms and signs range from cold feet, bluish discoloration to gangrene of toes and feet, absence of peripheral pulses. If the condition is not reversed, the affected body part is injured and eventually starts to die. It's important to find narrowed arteries before damage occurs. .

High-resolution B-mode ultrasonography has been shown to be a valid and reliable method for detecting structural atherosclerotic changes in the arterial walls and Colour Doppler, Duplex ultrasound to see hemodynamic change which indicates the presence of stenosis in lower limb arteries^{7,8,9}. Ultrasonography is safe, easily available, low cost, and hazard free technique. Our study was a cross sectional descriptive study to see the status of peripheral arteries in the patients who suffered from CAD with or without any clinical presentation of PAD involving lower limb arteries.

Material and Methods

The study was conducted at Cardiology Department of Rajshahi Medical College Hospital, Rajshahi, Bangladesh. Prior to the commencement of the study, the research protocol was approved by the Ethical committee of Rajshahi Medical College, Bangladesh. We examined lower limb arteries of 210 patients diagnosed as having CAD, based on presence of more than 50% stenosis in a major coronary artery by coronary angiography. Medically stable patients were requested to participate in the study prior to discharge. After informed written consent general history and history regarding risk factors for atherosclerosis were noted. Duplex ultrasonography on both sided major lower limbs arteries were carried out using a

Toshiba Neimo ultrasound scanner with a 7.5 MHz transducer with the use of a standard examination technique. The external iliac, the common femoral, the superficial femoral, the popliteal, anterior tibial and posterior tibial arteries were examined. For purpose of analysis, the entire respondent group was subdivided into single vessel disease, double vessels disease and triple vessels disease on the basis of number of coronary arteries involved^{10,11}. Lower limb arterial stenosis were evaluated by seeing the hemodynamic status. (Velocity, Doppler indices and shape of waveform). Normal velocities in lower limb arteries were considered 120mm/sec in the iliac segment, 90mm/sec in the superficial femoral segment and 70mm/sec in popliteal segment¹². Arterial disease in the lower extremities were classified into 4 categories on the basis of ultrasound findings, including 1) 1%-20% stenosis, 2) 20-49% stenosis, 3) 50-99% stenosis, and 4) total occlusion (100% stenosis)¹³.

Result:

The study population comprised of total 210 patients who had definite evidence of CAD, proved by coronary catheter angiography. Mean age was 51.3±10.4 yrs. Among them 196 (93.3%) was male and 14 (6.7%) were female.

Only two (1%) patients complained intermittent claudication. None of the patient had any complaint of leg pain at rest. Peripheral arterial pulsation could be felt in all patients from Femoral to Arteria Dorsalis Pedis. No leg ulcer was found in any patient.

On duplex study, total 17 (8.1%) patients were found having some degree of stenosis in single or multiple segments of both lower limbs. All the patients suffering from PAD are male, none of the female suffered. Among them, 11(5.2%) had critical stenosis, 06(0.5%) had non critical stenosis. Segmental distribution were, 09(4.2%) in femoral segment, 06(0.5%) in popliteal segment, and 09(4.2%) in tibioperoneal segment (Table 1).

Table 1 : Segmental Distribution of PAD involvement.

Segment of Lower Limb Arteries	Non Critical	Critical	Total
Stenosis in Rt Common Femoral Artery	3	2	5
Stenosis in Lt Common Femoral Artery	3	1	4
Stenosis in Rt popliteal Artery	2	1	3
Stenosis in Lt popliteal Artery	1	2	3
Stenosis in Rt Anterior Tibial Artery	1	0	1
Stenosis in Lt Anterior Tibial Artery	1	3	4
Stenosis in Rt Posterior Tibial Artery	0	0	0
Stenosis in Lt Posterior Tibial Artery	1	3	4

*Some patients had multiple involvement.

The association between severity of CAD and involvement of lower limb arteries were assessed using chi square test.(Table2)

Table 2. Relationship between severity of CAD and Lower limb arteries

CAD	Lower limb arteries n (%)		Total
	Yes	No	
Single Vessel	7 (6.1)	107 (93.9)	114 (100)
Double Vessel	04 (10.0)	36(90.0)	40 (100)
Triple Vessel	6 (10.7)	50 (82.1)	56 (100)
Total	17 (13.3)	193 (86.7)	210 (100)

$$X^2 = 1.29, df = 02, p = .523$$

Discussion:

Our study was a cross sectional descriptive study to see the status of peripheral arteries in the patients who suffered from CAD. We examined peripheral arteries of 210 patients diagnosed as having CAD, based on presence of more than 50% stenosis in a major coronary artery by coronary angiography.

Occurrence of major lower limb artery stenosis was found in 8% of CAD patients. However if only critical stenosis was considered the prevalence was only 0.5%. We found 7.6% patient who had plaques in their wall and narrowing of lumen but haemodynamically stable condition. These findings do not match with other study in other part of the world though limited information can be obtained regarding this. Most of the studies were done on PAD patients, study on CAD

patients were limited. Presence of PAD in 40% patients of CAD patients was reported by Dieter et al (2003) which was much higher than the rate found in our study but their sample size was lesser than that of us, only one hundred patients were recruited for their study⁵.

From the history it was found that only two patients had intermittent claudication. But 10 patients were found having critical stenosis involving one or more segments of lower limbs arteries. Criqui (2001) stated that prevalence of IC in people more than 50 years were 2% to 7% in men and 1.2% in woman, which underestimates the presence of PAD¹⁴. PAD is two or five times more common than is suggested by a history^{15,16,17}. This study also revealed that 8 out of 10 patients (80%) did not complain any leg symptoms though they had stenosis in leg arteries. This result is in good agreement with those reports.

A slight increase in percentage of lower limb involvement is seen in double and triple vessels disease than patients suffering from one vessel disease but it was not statistically significant.

The recommendation from the findings of present study is that probability of PAD should not be ruled on the basis of history of intermittent claudication only. Although intermittent claudication is the classic symptom of PAD, the vast majority of those affected are asymptomatic. As PAD is part of the atherosclerotic disease

process and can coexist with CAD and cerebrovascular disease, a screening for PAD by duplex ultrasound should be done in all CAD and cerebrovascular patients. Screening of CAD patient for PAD with duplex ultrasound should be a routine procedure. This study was on prevalence of PAD on CAD patients. Further study to see the prevalence of CAD on PAD patient is recommended to find out the exact correlation between two diseases.

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