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Original Research Article

CORONARY ARTERY DISEASE IN PATIENTS OF PERIPHERAL ARTERIAL DISEASE: AN OBSERVATIONAL STUDY

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Abstract: *This study assessed the frequency of coronary artery disease in patients with peripheral arterial disease undergoing angiography. The study was carried out between January 2019 and June 2019, at the Department of Cardiology, MTI-KTH, Peshawar, on 149 patients who met the operational characteristics of PAD as stated were enrolled in the study through the outpatient and accident and emergency departments before being admitted to the cardiology ward for additional assessment. The patients were informed of the study's goals and advantages, and written informed consent was taken. Patients underwent coronary angiography in the same setting through the femoral or radial artery approach electively. The mean and SDs for age were 51 ±10.92, whereas the disease duration was 4±1.58. The mean and SDs for BMI were 29.4±1.07. 114 (76.51%) patients were found to be hypertensive, whereas 35 (23.48%) patients had normal blood pressure. 133 (89.26%) patients had diabetes, while 17 (10.73%) patients were non-diabetic. 91 (61.07%) patients were found to be smokers, whereas 58 (38.92%) patients were nonsmokers. 80 (53.69%) patients were recorded with coronary artery disease (CAD). It is concluded that scrutiny must be concentrated on the concomitant likelihood of coronary artery disease in patients with diagnosed severe peripheral arterial disease. Moreover, non-invasive coupled with invasive investigation must also be carried out to lessen the burden of this condition regarding morbidity and mortality.*

Keywords: Peripheral Artery Disease, Coronary Artery Disease, Diabetes Mellitus, Hypertension

Introduction

Atherosclerosis spectrum manifests itself clinically as coronary artery disease, cerebrovascular disease or peripheral arterial disease (Hong, 2010) Peripheral artery disease (PAD), a disease of arteries of the lower limbs, is a significant source of morbidity and health costs (Diehm et al., 2009) Prevalence of PAD is 12 to 14% in general population (Viles-Gonzalez et al., 2004) while the number of PAD patients with concomitant CAD is 55% (Hertzer et al., 1984; Hur et al., 2012) . PAD of long duration is symptomatically evident as claudication, which is an exertional discomfort w (Grenon et al., 2009; Hirsch et al., 2006).

It often coexists with coronary artery disease (CAD) or cerebrovascular disease (Duran et al., 2010). Moreover, early and late survival following vascular procedure is significantly lowered by an elated frequency of deaths due to cardiac events, particularly amongst those who have obvious proof of CAD at the time of primary investigation (Burnham et al., 1982).In Pakistan, it is estimations show that one in five individuals of middle age can harbor CAD.[10]The agents predisposing for PAD are reported as smoking, high blood pressure, diabetes mellitus, hyperlipidemia, metabolic syndrome, male gender and older age (Jafar et al., 2005). The risk factors for CAD are high blood pressure, diabetes, hyperlipidemia, smoking, family history of CAD, and older age (Shammas, 2007). Similar to those for PAD, Medical therapy targeting risk factors for atherosclerosis reduces the risk of cardiovascular events, which are major causes of death in patients with PAD (Andican et al., 2008; Grenon et al., 2009). Pakistan has a heavy burden of atherosclerotic disease and its related complications. Many papers which have been reporting the risk factors for CAD reveal that the incidence of diabetes, hypertension, and metabolic syndrome in this population is much higher than in Caucasians or African nations (Bennett et al., 2009; Iqbal et al., 2004; Sarangi et al., 2012).

This study showed the frequency of CAD in patients of PAD undergoing angiography. The results of this study are shared with other health professionals and can be used for other research work.

Methodology

The study was conducted in the Department of Cardiology, Khyber Teaching Hospital, Peshawar, between Jan 30, 2019 and Jun 30, 2019. Were subjected to a descriptive cross-sectional study based on non-probability consecutive sampling. The sample size was 149, with 55% prevalence4, 14% CAD in patients of PAD, a confidence interval of 95% a margin of error of 8%. All patients presenting with angiographic evidence of PAD who were in the age range 18-65 years of any gender were included in the study. Patients who have already been diagnosed CAD (based on angiography), with renal compromise (based on laboratory investigations), with ACS (ECG criteria and positive cardiac enzymes), with decompensated heart failure (based on clinical examination), or those with a history of burgers disease were ruled out of the study.

With consent from the ethical and scientific council of the institution, the study was carried out.

Patients underwent elective coronary angiography through a femoral or radial artery approach. The obtained data were collected by analyzing the angiograms by two interventional cardiologists.

The patients were all managed in accordance with the convention of the ward under the umbrella of cardiologists. Moreover, the inclusion and exclusion criteria were religiously observed to prevent bias. These findings and calculations have been carried out under the supervision of CPSP team cardiology fellows.

Coronary angiography was also conducted in the same setting as peripheral angiography of the lower extremities using 6-French-sheathed right-to-left diagnostic catheters in the femoral artery. Significant stenosis for coronary artery disease was defined as a value of more than 50%. Data collected were analyzed using SPSS version 20. Means ± SDs were calculated for numerical variables like age, duration of disease, and BMI. Different statistical parameters like frequency were computed for categorical variables (like gender, hypertension, diabetes mellitus, smoking, and coronary artery disease). To study the various effects, CAD was stratified according to age, gender, disease duration, BMI, hypertension, diabetes mellitus, and smoking. A paired student t-test after stratification was used, with a P value of 0.05 considered significant. Tables were used to present all of the results.

Results

This study was carried out on 149 patients at the Department of Cardiology, MTI-KTH, Peshawar. 27 (18.12%) patients were recorded in the 18-30 age group. 122 (81.87%) patients were recorded in the 31-60 age group. 99 (66.44%) patients were male, and 99 (66.44%) were female. The mean and standard deviation (SDs) for age was 51 ±10.92, whereas the disease duration was 4±1.58. The mean and SDs for BMI were 29.4±1.0. 114 (76.51%) patients were found to be hypertensive, whereas 35 (23.48%) patients had normal blood pressure. 133 (89.26%) patients had diabetes, while 17 (10.73%) patients were non-diabetic. 91 (61.07%) patients were found to be smokers, whereas 58 (38.92%) patients were nonsmokers. 80 (53.69%) patients were recorded with CAD. Stratification of CAD concerning age, gender, BMI, duration of disease, diabetes, hypertension, and smoking status can be seen in Table 2.

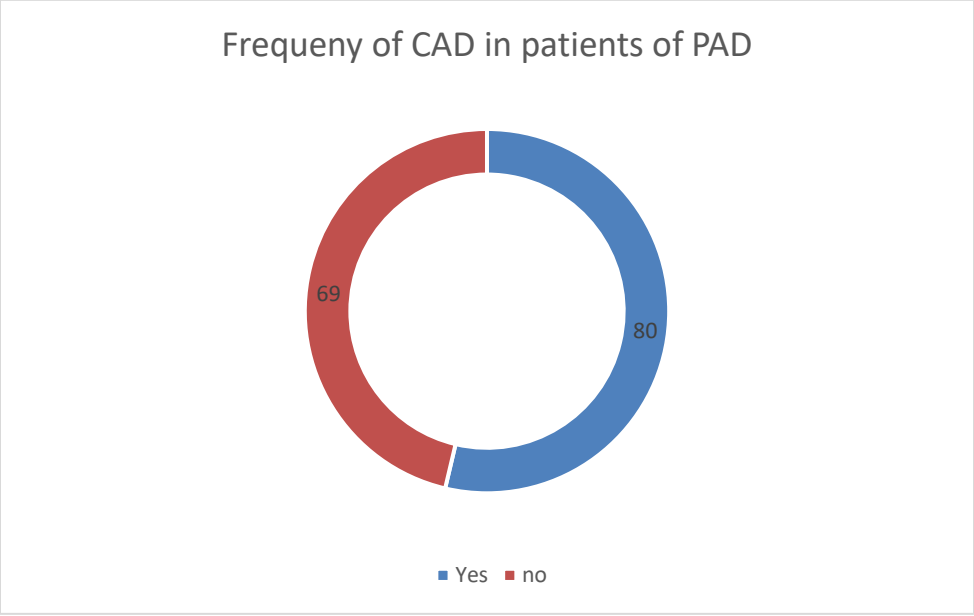

Figure 1 Occurrence of Coronary artery disease in patients with peripheral artery

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Table 1: Demographic and Clinical Characteristics of the Study Population

Characteristic	Number of Patients (n=149)	Percentage
Age Group		
18-30 years	27	18.12%
31-60 years	122	81.87%
Gender		
Male	99	66.44%
Female	99	66.44%
Age (Mean ± SD)	51 ± 10.92	
Duration of Disease (Mean ± SD)	4 ± 1.58	
BMI (Mean ± SD)	29.4 ± 1.0	
Blood Pressure		
Hypertensive	114	76.51%
Normal	35	23.48%
Diabetes		
Yes	133	89.26%
No	17	10.73%
Smoking Status		
Smokers	91	61.07%
Nonsmokers	58	38.92%
Coronary Artery Disease (CAD)		
Yes	80	53.69%

Table 2: Stratification of Coronary Artery Disease (CAD) with Respect to Demographic and Clinical Variables

Variable	CAD Present (n=80)	CAD Absent (n=69)
Age Group		
18-30 years	12	15
31-60 years	68	54
Gender		
Male	48	51
Female	32	18
BMI		
Normal (≤25)	15	25
Overweight (25-29)	34	26
Obese (≥30)	31	18
Duration of Disease		
≤5 years	42	27
>5 years	38	42
Diabetes		
Yes	65	68
No	15	1
Hypertension		
Yes	70	44
No	10	25
Smoking Status		
Smokers	47	44
Nonsmokers	33	25

Hypertension, diabetes, smoking, and disease duration significantly correlate with coronary artery disease in patients with peripheral artery disease.

Discussion

Atherosclerosis spectrum manifests itself clinically as CAD, PAD, or cerebrovascular disease (Hong, 2010). A significant contributor to morbidity and medical costs is peripheral arterial disease (PAD), which affects the large and medium arteries in the lower limbs (Diehm et al., 2009). Prevalence of PAD is 12 to 14% in the general population (Viles-Gonzalez et al., 2004) while the number of PAD patients with

concomitant CAD is 55% (Hertzer et al., 1984; Hur et al., 2012). In our study, 27 (18.12%) patients were recorded in the 18-30 age group, and 122 (81.87%) patients were recorded in the 31-60 age group. 99 (66.44%) patients were male, and 99 (66.44%) were female. The mean and SDs for age were 51 ±10.92, whereas the disease duration was 4±1.58. The mean and SDs for BMI were 29.4±1.07. 114 (76.51%) patients were found to be hypertensive, whereas 35 (23.48%) patients had normal blood pressure. 133 (89.26%) patients had diabetes, while 17 (10.73%) patients were non-diabetic. 91 (61.07%) patients were found to be smokers, whereas 58 (38.92%) patients were nonsmokers. 80 (53.69%) patients were recorded with CAD. Claudication, which is exertional pain associated with exercise-induced ischemia of the lower extremities, or critical limb ischemia, which is characterized as rest pain, skin ulceration, or gangrene, are signs of symptomatic chronic PAD (Grenon et al., 2009; Hirsch et al., 2006).

It often coexists with CAD or cerebrovascular disease (Duran et al., 2010). Moreover high frequency of recurrent cardiac fatalities, particularly in individuals who had evident signs of CAD at the time of initial diagnosis, significantly reduces early and late survival after vascular treatment (Burnham et al., 1982). The prevalence of underlying CAD among middle-aged adults in Pakistan is predicted to be one in five (Jafar et al., 2005). The risk factors for PAD are reported as smoking, hypertension, diabetes, dyslipidemia, metabolic syndrome, male gender, and older age (Jafar et al., 2005; Shammas, 2007). Hypertension, diabetes, dyslipidemia, smoking, a family history of CAD, and older age are risk factors for CAD (Shammas, 2007). Similar to those for PAD, medical treatment aimed at atherosclerosis risk factors lessens the likelihood of major cardiovascular events, which are the reasons for mortality in cases of PAD (Andican et al., 2008; Grenon et al., 2009).

Pakistan has a heavy burden of atherosclerotic disease and its related complications. Many papers which have been reporting the risk factors for CAD reveal that the incidence of diabetes, hypertension, and metabolic syndrome in this population is much higher than in Caucasians or African nations (Bennett et al., 2009; Nicholls et al., 2011; Sarangi et al., 2012).

This study provides us with the latest information regarding the frequency of CAD in patients of PAD undergoing angiography. Males over 60 exhibited a prevalence of peripheral arterial disease of more than 10% because the illness can progress while undiagnosed or with unusual symptoms; the actual prevalence of PAD presumably surpasses the narrated figures.

The commonly implied method to assess the existence and extent of PAD is the ankle-brachial blood pressure index (ABI), which is calculated as the systolic blood pressure obtained at the lower limb around the ankle, which is divided by the systolic blood pressure obtained in the upper limb (brachial) in the supine position. The preferred reference standard for detecting PAD is widely thought to be an abnormal ABI value of 0.90, while normal values fall between 0.9 and 1.3 (Hur et al., 2012). The proportion of patients with an ABI score of less than 0.9 was 4.5% in a study that looked at 6172 individuals that had been chosen randomly from the community and had previously undergone procedures. It was determined that lower ABI was related to age, current smoking status, CAD, uncontrolled blood pressure, intermittent claudication in men, and diabetes in females (Grenon et al., 2009).

Different clinical forms of atherosclerosis, such as PAD and CAD, share some risk factors. The risk factors for CAD and CVD overlap with those for PAD. However, smoking and diabetes have a significant impact on PAD (Nicholls et al., 2011). Some risk indicators have been reported to be age (> 45 years in males, > 55 years in females), HT, and HPL (Members et al., 2013). Other risk factors that should be monitored include increased Lp(a) levels, homocysteine, LDL-cholesterol, acute phase proteins, coagulation, and fibrinolytic factor (Majithia and Bhatt, 2019). According to research of 952 patients at high risk for CVD, 86.2% of the cases had manifested symptoms of atherosclerosis, and to the minimum, two indicators for risk were present in those without symptoms. 42% of individuals with CAD also had PAD. Regarding risk profiles, there were no discernible variations between CAD and PAD patients (Duran et al., 2010). In our study, 27 (18.12%) patients were recorded in the 18-30 age group, 122 (81.87%) patients were recorded in the 31-60 y 99 (66.44%) patients were male patients while 99 (66.44%) patients were female patients.

The mean and SDs for age were 51 ±10.92, whereas the disease duration was 4±1.58. The mean and SDs for BMI were 29.4±1.07. 114 (76.51%) patients were found to be hypertensive, whereas 35 (23.48%) patients had normal blood pressure. 133 (89.26%) patients had diabetes, while 17 (10.73%) patients were non-diabetic. 91 (61.07%) patients were found to be smokers, whereas 58 (38.92%) patients were nonsmokers. 80 (53.69%) patients were recorded with CAD. According to the study, 29% (9474) of the 33629 PAD patients analyzed in a prior study had DM. In line with this, 27.4% of the individuals in our research who had PAD also had diabetes.

A lower value of ABI has been linked to older age, female gender, increased triglycerides, low HDL levels, DM, and smoking, according to recent research involving 3047 hypertensive patients. Compared to the one with normal ABI, in the cohort with abnormal ABI, survival rates were shown to be considerably lower. It has been proven that a lower ABI value is a

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separate risk factor for both CVD and all-cause death. In our study, 58% of the cases had hypertension, which was "established as a risk factor" for both CAD and PAD. To achieve an early diagnosis, patients with hypertension should have their PAD closely monitored and examined using an ABI measurement. Similarly, coronary stent recipients underwent an investigation. Patients with or without PAD were divided into two subgroups. Compared to patients without PAD, the subgroup with PAD had a greater risk of HT, DM, and HPL, and those who have smoked, as well as an older age. In terms of poor procedural success and a high incidence of in-hospital complications, PAD has also been demonstrated to be a significant risk factor. On follow-up, a greater rate of negative cardiovascular events was seen in the group. Among the individuals who also had PAD, 79% had HT, 33% had diabetes, 76% had high blood pressure, and 70% had smoked previously. In a way that's in line with this study's results, 114 (76.51%) patients were found to be hypertensive, whereas 35 (23.48%) patients had normal blood pressure. 133 (89.26%) patients had diabetes, while 17 (10.73%) patients were non-diabetic. 91 (61.07%) patients were found to be smokers, whereas 58 (38.92%) patients were nonsmokers. 80 (53.69%) patients were recorded with CAD.

In a different investigation, the outcome of patients with PAD concurrent CAD presence or absence was examined. There were 479 patients with both PAD and CAD and 483 patients with PAD alone. For both categories, the mean age was 67.3 8.9 years, with 72.3% of the population being male. 49.6% of the patients had abdominal obesity, and 80.18 % were current smokers or had previously smoked. Over a 2-year follow-up period, the combined PAD and CAD arm was contrasted with PAD alone arm, but no appreciable changes were seen regarding death (4.6% vs. 5.5%), death due to cardiovascular events (3.7% vs. 3.9%), or myocardial infarction alone (1.9% vs. 2.7%). Regarding the stroke outcome, there was a substantial difference between the groups (4.4% vs. 2.0%, $p<0.05$) (Andican et al., 2008). Several investigations have been done to learn more about the overlap between CAD and PAD. According to this research, until shown otherwise, all patients with PAD should be considered to have CAD (Hur et al., 2012). According to several studies, CAD has been identified in 10–30% of patients with PAD (Bennett et al., 2009; Mehler et al., 2003). A 40% prevalence of PAD was found in a prior study undertaken in CAD patients hospitalized. It was found that 50% of the cases had never had PAD discovered before. According to the recommendation, patients who arrive with CAD should also be checked for PAD (Sarangi et al., 2012). It is possible for PAD patients to develop ischemia, which could result in amputation if the right care is not given, which has a substantial impact on morbidity and death. 27 (18.12%) patients were recorded in the 18-30 age group, and 122 (81.87%) patients were recorded in the 31-60 y 99 (66.44%) patients were male, and 99 (66.44%) were female patients. The mean and SDs for age were 51 $\pm$10.92, whereas the disease duration was 4$\pm$1.58. The mean and SDs for BMI were 29.4$\pm$1.07. 114 (76.51%) patients were found to be hypertensive, whereas 35 (23.48%) patients had normal blood pressure, 133 (89.26%) patients had diabetes while 17 (10.73%) patients were non-diabetic, 91 (61.07%) patients were found smokers whereas 58 (38.92%) patients were nonsmokers 80 (53.69%) patients were recorded with CAD.

An incidence of 15% for PAD was found in a study of people with CAD who had coronary angiography and other types of intervention but had no history of PAD. Regarding risk variables, the study compared patients with and without PAD. A higher prevalence of hypertension, diabetes, and cardiovascular events was found. The patients with PAD had greater prevalence of complex coronary artery disease involving left main or multiple coronaries and a coronary artery bypass surgery history among the 745 patients whose CAD diagnosis was confirmed by coronary angiography (Saleh et al., 2018).

Our investigation showed that widespread stenosis in the peripheral vessels was a substantial risk factor for coronary stenosis, and that the occurrence of PAD was highly associated with CAD. To reduce vascular morbidity and death, I conclude by advising vigilant surveillance for CAD amongst those having significant PAD.

Conclusion

It is concluded that scrutiny must concentrate on the concomitant likelihood of coronary artery disease in patients with diagnosed severe peripheral arterial disease. Moreover, non-invasive coupled with invasive investigation must also be carried out to lessen the burden of this condition regarding morbidity and mortality.

Conflict of interest

The authors declared absence of conflict of interest.

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