# Clinical Profile of Peripheral Artery Disease of Patients Attending Shahid Gangalal National Heart Center, Janakpurdham, Nepal

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## ABSTRACT

**Background:** Peripheral artery disease is an important vascular disease. There is an increased incidence of acute limb ischemia in cases of peripheral artery disease. Objective of this study was to assess the prevalence of peripheral artery disease among high-risk patients attending out patient department in Shahid Gangalal National Heart Center, Janakpurdham.

**Methods:** A total of 386 high risk patients for Peripheral Artery Disease were included in the study. Informed consent was taken from patients undergoing the study. Patients underwent ankle brachial index calculation to make a diagnosis of peripheral artery disease. Patients having ankle brachial index of <= 0.9 was considered to have peripheral artery disease. Patients diagnosed with peripheral artery disease further underwent doppler study.

**Results:** The study showed the prevalence of peripheral artery disease to be 17.4% among high-risk patients attending Shahid Gangalal National Heart Centre, Janakpurdham. The prevalence of peripheral artery disease was more in females as compared to male which was statistically significant. Most of the high-risk patients were patients with hypertension at Shahid Gangalal National Heart Centre.

**Conclusions:** Peripheral artery disease prevalence is significant among high-risk patients attending Shahid Gangalal National Heart Centre, Janakpurdham. High risk patients should undergo evaluation of peripheral artery disease for early detection and treatment.

**Keywords:** Ankle brachial index; chronic kidney disease; coronary artery disease; hypertension; peripheral artery disease.

## INTRODUCTION

Peripheral Artery Disease (PAD) is an important vascular disease. There is an increased incidence of acute limb ischemia in cases of PAD.[1,2] Increased mortality has been reported in cases of PAD due to diabetes. Patients with chronic kidney disease (CKD) have increased mortality because of asymptomatic PAD. [3,4] There is a strong association between PAD and coronary artery disease (CAD) as well.[1] Since PAD tends to be asymptomatic most of the time, its prevalence is underestimated. Ankle Brachial Index (ABI) is a very simple method to know the possibility of PAD.[5,6] It is a surrogate of vascular imaging in detecting PAD with high specificity.[7] On basis of this index, the prevalence of PAD in high-risk patients ranges from 14-26%. [8-12] With the increased incidence of hypertension, diabetes mellitus, and aging, it has become important to study the prevalence and associated factors of PAD in the context of Nepal. Additional therapeutic options are proposed for such patients as per the new trials involving such cases[13-16] Such trials were prematurely stopped for their clear benefit[14]. This study will not only help in gaining knowledge of the present scenario of PAD in a local Nepalese context but also help in bringing therapeutic changes in the management of patients with PAD. Detecting PAD and its treatment with new therapeutic options will help in decreasing the disease burden in the Nepalese population.

## METHODS

A descriptive cross-sectional research design with non-random consecutive sampling was conducted at the

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Department of Cardiology, Shahid Gangalal National Heart Center (SGNHC), Janakpurdharm, Nepal from the 2nd of March 2022 to the 11th of April 2022. A total of 386 patients were included as a sample for this study considering the prevalence of PAD as 50% with a 5% margin of error and 95% confidence limits. Patients presenting to SGNHC between the ages 18-75 years with documented history of having any of the following risk factors of PAD namely hypertension, Type 2 Diabetes Mellitus, Dyslipidemia, CAD, CKD, smoking, or symptoms of claudication were included. Patient reluctant to get involved in the study or not providing written consent were excluded.

The study was conducted after obtaining the Institutional Review Committee (IRC) approval from Shahid Gangalal National Heart Center, Bansbari, Nepal. The IRC number is 2-2022. Written informed consent was obtained from each participant. Before obtaining the consent, the purpose of the study was well explained with full right to participate or withdraw participation from the study. Respondent anonymity was maintained by using an identification number in data analysis. The privacy of the respondents was ensured.

Measurement of ABI

All outpatients were first interviewed for high risk and the ones falling in the criteria were asked for consent for getting enrolled in the study The patients were allowed to rest for 10 minutes and systolic blood pressure was measured in all four limbs with the help of a handheld vascular doppler. The frequency of the doppler was 8Mhz. The highest of the two upper arms' systolic blood pressure was taken as the denominator for both lower limbs. Dorsalis pedis and posterior tibial artery systolic blood pressure were taken with the help of vascular doppler and higher between the two value was taken into account to calculate respective limb ABI. The overall lower ABI of the two limbs defined the ABI for the patient. The patient having an ABI of less than 0.9 in any one of the two lower limbs was classified as having PAD. The blood pressure was measured by nurses and ABI was calculated by medical officers of SGNHC. Finally, the data were entered by primary investigator. The patients having ABI<= 0.9 underwent a doppler study by a radiologist who was given a set of parameters to be seen during the examination. Patients with the diagnosis of PAD were advised to come for follow up visits for 2 years for clinical symptoms of PAD and ABI. The patients were advised further investigations after judging the clinical scenario or clinical sign of PAD. The cases having borderline ABI and having symptoms of claudication or other clinical signs of PAD were asked to seek further assessment at higher centre. The demographic data for the patient were taken including age, sex, height, weight, BMI, history of smoking, and symptoms of claudication.

Statistical analysis

All collected data were coded and entered into Statistical Package for Social Sciences (SPSS) version 25. After coding, entering, and clearing data, descriptive statistics were applied for quantitative variables like age, height, weight, and body mass index (BMI). Frequency and percentages were calculated for patients having PAD for independent variables like age, gender, BMI, hypertension, dyslipidemia, and type 2 diabetes mellitus. Association among the above variables were explored using the Chi square test. The strength of the associations was presented in terms of odds ratio (OR) and 95% confidence intervals. P value ≤ 0.05 were considered statistically significant.

## RESULTS

The study showed the prevalence of PAD to be 17.4% among high-risk patients attending SGNHC, Janakpurdham. The mean age of the population was 58.3 years (SD=12), mean weight was 61.3kg (SD=13), and mean height was 158.1cm (SD=8). Among the patients241 (62.4%) were male and 176 (43.3%) had ever smoking history. History of hypertension, CAD, dyslipidemia, claudication and CKD was present in 315(82%), 116(30.1%), 101(26.2%), 31(8.3%) and 4(1%) of the patients respectively (Figure 1). PAD was more than 3 times more likely in women as compared to men which was statistically significant (Table 1). Doppler study showed calcification, plaque and triphasic flow in most of the patients having ABI <=0.9. But Doppler showed >50% occlusion in very few patients. The findings of the Doppler study are mentioned in table 2.

| Table 1. Association of different variables with ABI. (n=386) | | | | |
|---|---|---|---|---|
| **Characteristics** | **ABI < and = 0.9 n (%)** | **ABI > 0.9 n (%)** | **Odds Ratio (95% CI)** | **p-value** |
| **Sex** | | | | |
| Male | 23 (9.5) | 218 (90.5) | 4.13 (2.36-7.19) | <0.001 |
| Female | 44 (30.3) | 101 (69.7) | 1 | |
| **Claudication** | | | | |
| Absent | 62 (17.5) | 292 (82.5) | 1 | 0.78 |
| Present | 5 (15.6) | 27 (84.4) | 1.1 (0.42-3.09) | |
| **CAD** | | | | |
| Absent | 46 (17) | 224 (83) | 1 | 0.80 |
| Present | 21(18.1) | 95 (81.9) | 0.92 (0.52-1.6) | |
| **CKD** | | | | |
| Absent | 67 (17.5) | 315 (82.5) | - | 0.35 |
| Present | 0 (0) | 4 (100) | - | |
| **Type 2 DM** | | | | |
| Absent | 49 (17.8) | 226 (82.2) | 1 | 0.70 |
| Present | 18 (16.2) | 93 (83.8) | 1.1 (0.62-2.02) | |
| **Hypertension** | | | | |
| Absent | 13 (18.3) | 58 (81.7) | 1 | 0.81 |
| Present | 54 (17.1) | 261 (82.9) | 1.08 (0.55-2.11) | |
| **Dyslipidemia** | | | | |
| Absent | 50 (17.5) | 235 (82.5) | 1 | 0.87 |
| Present | 17 (16.8) | 84 (83.2) | 1.05 (0.57-1.92) | |
| **Smoking** | | | | |
| Non-Smoker | 34 (16.2) | 176 (83.8) | 1 | 0.50 |
| Smoker (Ever and Current) | 33 (18.8) | 143 (81.2) | 0.83 (0.49-1.41) | |

| Table 2. Findings from the Doppler Study of lower limbs. (n=39) | | |
|---|---|---|
| | Right Lower Limb (%) | Left Lower Limb) |
| Plaque | 76.9 | 79.4 |
| Calcification | 89.7 | 92.3 |
| Triphasic Flow | 97.4 | 94.8 |
| Occlusion | 7.7 | 5.1 |
| Collaterals | 2.5 | 0 |
| Peripheral Artery Disease | 92.3 | |

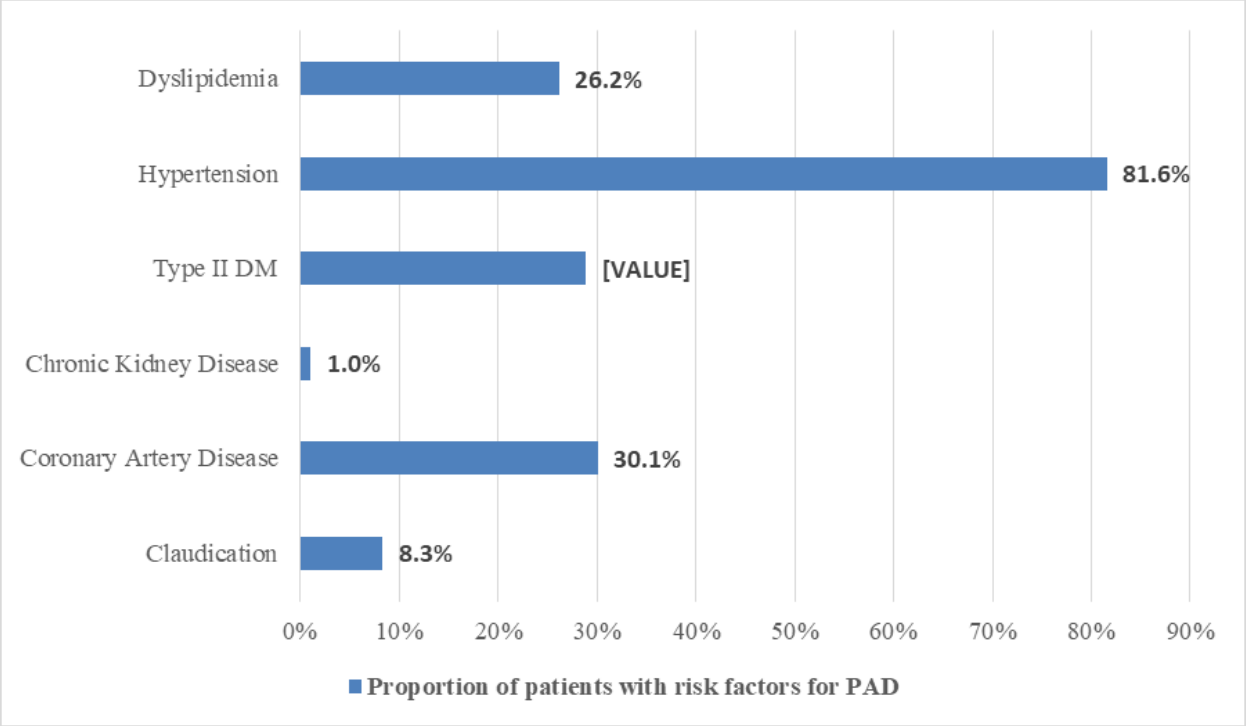


**Figure 1. Proportion of patients with risk factors for PAD. (n=386)**

## DISCUSSION

The prevalence of PAD was lower in our population as compared to a study done in India where it was estimated to be 26.7%.[17] The mean age of the population was slightly higher than in our study. The results with gender have been similar to other research showing more PAD males than females [17,18]. On the other hand, a study conducted in Spain showed the prevalence of PAD to be 7.6%.[19]There has been a strong association of PAD with high-risk population who underwent evaluation of PAD. In our study most of the patients included had hypertension as the risk factor. It was found that 17.4% of the patients with hypertension had PAD. This data is much high as compared to a study done in Bangladesh showing prevalence of 7%.[20] P value for correlation with risk factors were insignificant. Probably this was because of the sample size for the risk factor was inadequate. Diabetes is strongly correlated with PAD and its progression. Most of the cases of PAD were asymptomatic. Other studies have shown 50% stenosis on peripheral angiography for patients having ABI <=0.9 but very few cases 7.7% of the patients had significant stenosis.Not all the patients underwent doppler ultrasound for it was being outsourced for unavailability of radiologist at our center. It was not required as per the guideline but only for information purpose. The patients having PAD on ABI used as the diagnostic criteria should undergo peripheral angiogram to standardize the findings. Studies have shown high correlation of ABI with appearance of PAD on peripheral angiography. The high-risk cases with presence of PAD have much higher chances of cardiovascular mortality and morbidity[21]. Antiplatelets and statins have shown its beneficial effects. Meta-analysis of COMPASS trial has shown decreasing all-cause mortality and cardiovascular death with rivaroxaban with patients having PAD[22]. Recently FDA has approved low dose rivaroxaban for patients having PAD[23].

Since this study was conducted at a single cardiac care hospital, there was a limited sample size. As the study design is cross-sectional with non-random consecutive recruitment of patients, a causal association between PAD and associated factors may not have been established strongly. Further large-scale studies are required taking patients with individual risk factors to establish better correlation between PAD and specific risk factor. Smoking in our study had poor correlation to PAD. This was probably because we included all sorts of smokers and differentiation among occasional and heavy smoker was not made. ABI has a high specificity of 93% but low sensitivity in detecting mild forms of peripheral artery disease.[7] So, high risk patients having

normal ABI with mild to moderate forms of PAD may not be detected by ABI.

## CONCLUSIONS

Peripheral artery disease prevalence is significant among high-risk patients attending Shahid Gangalal National Heart Centre, Janakpurdham. It is underestimated for it is a less studied parameter. Patients having high risk should undergo ABI measurement. New therapeutic options of NOACS can be considered in high-risk patients.


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