



Prevalence of peripheral arterial disease and associated factors among diabetic patients on follow up at Saint Paul's Hospital Millennium Medical College

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ABBREVIATIONS

ACC-American College Of Cardiology

AHA-American Heart Association

ASCVD-Atherosclerotic Cardiovascular Disease

ABI-Ankle Brachial Index

CHD-Coronary Heart Disease

CV-Cardiovascular

CVD-Cardiovascular Disease

CLI-Chronic Limb Ischemia

CKD-chronic kidney disease

DM-Diabetes Mellitus

FBS-Fasting Blood Sugar

HTN-hypertension

IC-Intermittent Claudication

LMIC-Low/Middle Income Country Regions

MI-Myocardial Infraction

OPD-Out Patient Department

PAD-Peripheral Arterial Disease

SPHMMC-Saint Paulo's Hospital Millennium Medical College

Abstract

Introduction

The epidemiological transition that is happening in Ethiopia: a disease burden transition from predominantly infectious disease to non-communicable disease. as result CVD is among the five leading cause of age standardized mortality. Global attention has been devoted to understanding CVD; however little observance has been dedicated to PAD AS few epidemiological studies have been conducted especially in low or middle income countries. In the present study we made an attempt to evaluate the prevalence of PAD among patient with diabetes mellitus.

Objective

The aim of this study was to determine the prevalence of peripheral arterial disease (PAD) and associated factors among patient on follow up at diabetic clinic at st.paul's Hospital millennium medical college (SPHMMC).

Method and material

Cross sectional observational study was conducted among 213 diabetic patients seen at sphmmcout patient department clinic from February 2018 to march 2018. Data was collected by the investigator using questionnaires for cardiovascular risk factor and for intermittent claudication with Edinburgh claudication assessment tool. ankle brachial index (ABI) was measured using portable Doppler ultrasound and $ABI \leq 0.9$ was defined as PAD. Descriptive statistics and binary logistic regression were used for data analysis and interpretation.

Results

The overall prevalence of PAD was 66(31%). Intermittent claudication was present in only 2.3% of PAD patients. Prevalence of PAD was two times more common in hypertensive diabetic patients with statistically advanced age and exercise less than 3 week was predictive of PAD (OR 1.71; 95% CI 1(0.508-3.265) and (OR 4.875(1.657-14.340) respectively.

Conclusion

This study documents high prevalence of PAD among diabetic patients on follow up. claudication symptoms were not sensitive for determining PAD. strategies for aggressive ABI screening should be emphasized in diabetic patients.

1. INTRODUCTION

1.1. Background

Peripheral arterial disease is an indicator of wide spread systemic atherosclerosis characterized by progressive narrowing of arteries in the lower extremities and it is one of the macro vascular complication highly prevalent in adult diabetic patients. The majority of diabetic patients with PAD have concomitant coronary artery disease (1) and additionally, it is an independent risk factor for morbidity and mortality in patients with cardiovascular disease(CVD) and all causes such as cerebral vascular disease, renal disease and diabetes mellitus(2,3) .

PAD is primarily caused by atherosclerosis; accumulated atheroma in the walls of arteries eventually leads to inadequate tissue perfusion. Atherosclerosis is complex process involving endothelial dysfunction, thrombosis, platelet activation, lipid disturbance, oxidative stress and genetic factors. The clinical manifestation of arterial insufficiency are due to lack of blood flow to the musculature relative to its metabolism, which results in pain in the affected muscle groups , however the clinical spectrum is wide it includes individuals who are asymptomatic as well as those with leg symptoms, notably intermittent claudication in which pain in the calf occurs on exercise and relived by rest.at the severest end of the clinical spectrum is critical limb ischemia(CLI) which consists of rest pain, ulceration and gangrene, and can lead to amputation(4) on most occasions the clinical evolution of PAD is fairly stable, due to the development of collateral circulation, the metabolic adaptation of the muscle masses involved and the use of non-ischemic muscle group. In patient with claudication the best predictor of disease progression is ABI.

The ankle brachial index is used widely as screening and diagnostic test for PAD in both epidemiological studies and clinical practice. it is the ratio of the tibial systolic arterial pressure to brachial systolic arterial pressure and it is preferred than clinical inspection of lower limbs and palpation of the feet. $ABI \leq 0.9$ is diagnostic for PAD. high $ABI > 1.4$ is indicative of stiff vessel in whom around two thirds have PAD.(4) A low ABI has been consistently associated with increased risk of cardiovascular morbidity and mortality however compared with other

manifestation of cardiovascular disease, PAD is under diagnosed due to lack of awareness of the disease among patients and the limited health service for screening

The global prevalence of peripheral arterial disease has increased over the last decade by 24%, it is estimated that 202 million in the world are affected with PAD ,in addition 45 million people are expected to die from coronary or cerebrovascular disease over 10 year period. the number of individual with PAD increased by 29% in low /middle income regions and 13 percent in high income regions from 2000 to 2010 compared with the preceding decade.in LMICS, prevalence rates seemed to be higher in women than in men, with more pronounced relative difference at younger ages(5)

Compared with prevalence ranging from 4% to 20% in the general population, patients with diabetes have an increased prevalence, reported to be as high as 30%(6). the risk of PAD increase with the severity of diabetes for every 1% increase in hemoglobin A1C level, the risk of PAD increase by 26%.inaddition studies point out that the duration of diabetes and use of insulin are associated with increased risk. Compared to diabetes hypertension association with PAD has not been strong. Among the traditional cardiovascular risk factors, cigarette smoking and diabetes are the strongest and most consistently related to an increased risk of PAD.(7)

1.2. Statement of the Problem

The prevalence of PAD varies between 4.5 to 57% and 10-50% in western and African population respectively. Patients with PAD have increased risk of cardiovascular events and death, irrespective of disease symptomatology. Five year morbidity and mortality rates from all cause is approximately 30% justifying the need for early identification of patients allowing early intervention and reducing their increased risk of cardiovascular related mortality.(1) ABI screening test should be utilized in general practice because it is ,reliable, easily assessable and accurate for detection of PAD.

Patients with PAD often have concomitant coronary and cerebral artery disease.in the REACH registry involving 44 countries worldwide,39% of patients with PAD also had coronary artery disease,10% also had cerebral artery disease, and 13% had both conditions in addition to PAD

In western countries, PAD patients are at high risk of MI, stroke, amputation, and cardiovascular disease related death.1 year incidence of all major CVD events in the REACH registry was 1/3 higher in patients with PAD than those in those with coronary or cerebral artery disease (16,17). despite this, many patients with PAD are asymptomatic therefore screening for PAD helps in early detection leading to curtailment of progression and improved treatment of overall cardiovascular risk.

Though the prevalence and associated risk factors for PAD have been established in the western world, data from low income countries are limited .PAD is rarely diagnosed in both diabetic and non-diabetic patients consequently, neither is the prevalence nor its associated factors well understood in resource poor countries. Better understanding of PAD in population with diabetes and high CVD risk may help guide further research and may allow for the institution of relatively simple and low cost medical therapies.

1.3. Significance of the study

The aim of this study was to determine the prevalence and associated factors for the development of PAD in diabetic patient on follow up. This was the first study done in our hospital and also first probably in our country with this title and help as an advancement for further studies

The finding assesses frequency of detection of peripheral arterial disease in our hospital and common associated risk factors Therefore it will be used as a basis and guide for our hospital to develop strategies for early detection , early intervention and follow up on population at risk ,thus will ultimately improves quality of health and decrease health care cost and PAD related morbidity and mortality by early detection and management.

2. LITERATURE REVIEW

2.1. Prevalence and associated factors

Prevalence of PAD worldwide is between 3 and 12 %. the majority of individual with PAD (70%) LIVE IN LOW /middle income regions of the world .the number of individual with PAD increase by 29% in low/middle income regions from 2000 to 2010 comparing with preceding decade. The American college of cardiology /American heart association (ACC/AHA) guideline identified old age >70 year, age 50 to 69 years with history of smoking or diabetes, leg symptoms suggestive of claudication with exertion or ischemic pain at rest and known atherosclerosis at other site were associated with increased prevalence of PAD and earlier onset of symptomatic PAD. Risk factors that favor the development of PAD are similar to those that promote the development of coronary heart disease (5)

Epidemiological data on prevalence and associated factor of PAD in Ethiopia is scarce. So far there is no study done in the clinical setting; however there is single community based cross sectional study on the prevalence of PAD and associated factor. Study was conducted over two month period and it enrolled 178 sampled individuals aged 40 years and above in Jimma town, south west Ethiopia .the study was Published in 2017 and it revealed that the overall prevalence of PAD was 10.8%. in this study none of the subject who were found to have PAD fulfill the diagnostic criteria for intermittent claudication.in conclusion it states that subclinical PAD is prevalent among Ethiopian population. Female sex, current smoking and diabetes mellitus were significantly associated with increased risk of PAD. In addition it recommends further large scale comprehensive studies are required to supplement the finding (6). IN sub-Saharan Africa, the prevalence of PAD varies from 1.7-52.5%(6-13) with higher prevalence noted in studies that use Doppler based means of diagnosis as opposed to clinical evaluation. Despite this varied prevalence, data on prevalence and screening of PAD among diabetic patient in SSA is exiguous (11, 13).)

Health professional follow up study, prospective study conducted to estimate the degree to which the 4 conventional ASCVD risk factors of smoking, hypertension, hypercholesterolemia, and type 2 are associated with the risk of PAD among men enrolled 44,985 men in us without history of CVD at baseline for median follow up of 24.2 years, there were 537 cases of incident PAD. each risk factor was significantly associated with higher risk of PAD after adjustment of the

other three risk factors and confounders.(17) similar study evaluating data from the united states national health and nutrition examination survey(NHANES) examined a total of 7058 subjects 40 year or older that completed interview, medical examination and ankle brachial index measurement highest prevalence of PAD was observed among elderly, non-Hispanic blacks and women.in multivariable age, gender and race/ethnicity adjusted model HTN, DM, CKD, and smoking were retained as PAD risk factors.(18)

Compared with other manifestation of cardiovascular disease, PAD is underdiagnosed due to lack of awareness of the disease among patients and limited health service allocated to the diagnosis of PAD. In addition patients are subject to relatively poor control of cardiovascular risk factors. PARTNERS program (PAD awareness, risk, and treatment ;New resources for survival multicenter, cross sectional study was designed to assess the feasibility of detecting PAD in primary care clinics, patient and physician awareness of PAD, and intensity of risk factor treatment and use of antiplatelet therapies in primary care clinics. conducted at 27 sites in 25 cities and 350 primary care practices in united states. Patients older than 70 years or aged 50 to 69 with smoking history or DM were evaluated by ABI and claudication history .PAD was detected in (29%) Overall, 13% had PAD only, 16% had PAD and CVD, 24% had CVD only, and 47% had neither PAD nor CVD (the reference group). Among patients with PAD, classic claudication was distinctly uncommon (11%). Patients with PAD had similar atherosclerosis risk factor profiles compared with those who had CVD. The results of this study demonstrate that though the prevalence of PAD is high, physician awareness about PAD diagnosis is relatively low (18)

Randomized study conducted at Manchester royal ,to quantify the distribution of peripheral arterial disease in the diabetic and non diabetic population attending for angiography and to compare severity and outcome between both groups of patients.it analyzed 136 arteriogram obtained over 4 years period. diabetic patients had greater severity of arterial disease , greater number of amputation and high mortality as compared to non diabetic patients

descriptive cross sectional study, conducted at the diabetic outpatient clinic of Mulago national referral and teaching hospital, Kampala Uganda The aim of this study was to determine the

prevalence and associated clinical factors of PAD in adult ambulatory diabetic patients attending the outpatient diabetic clinic PAD was prevalent in 57 (39%) study participants. Of these, 34 (59.6%) had symptomatic PAD. The noted clinical factors associated with PAD in this study population were presence of symptoms of intermittent claudication and micro albuminuria. This study documents a high prevalence of PAD among adult ambulatory Ugandan diabetic patients. It recommends Aggressive screening for PAD using ABI measurement in adult diabetic patients should be emphasized in the presence of symptoms of intermittent claudication and micro albuminuria.(19)

Population based cross sectional study was conducted in 36 municipalities from department of Cauca, Colombia. The study enrolled 10.000 subjects aged >40 years and overall prevalence was found to be 4.4%.PAD was equally prevalent in urban and rural communities .diabetes was found to be most prevalent risk factor ,PAD was also significantly associated with hypertension, dyslipidemia , obesity increasing disease risk 17.2 times among individuals self reporting a history of acute myocardial infraction or stroke, PAD prevalence was 31.0% and 8.1% respectively in addition the study shows that cigarette smoking was weakly associated to PAD however, data on the number of cigarettes and years of exposure were not collected in conclusion it recommends ABI measurement to be routinely performed as screening test in intermediate and high risk patients for CVD prevention.(20)

3. OBJECTIVE

3.1. General objective

- 1, To assess the prevalence of PAD and associated factors among diabetic patients seen at SPHMMC OPD clinic

3.2. Specific objective

- 1, To determine the prevalence in diabetic patients
- 2, To identify the common associated factors for development of PAD
- 3, To determine the prevalence of intermittent claudication in patient with PAD

4. METHOD AND MATERIALS

4.1. Study Area and period

The study was conducted in St. Paul's Hospital Millennium Medical college, in diabetic patients on follow at outpatient clinic. St. Paul's hospital is located at Addis Ababa Ethiopia and it is one of the largest tertiary referral hospitals in the capital under the Federal ministry of Health. the hospital has 350 beds sees an annual average of 300,000.it has catchment population of more than 5 million. medical college was added in 2007 and currently there are over 13 departments . one of them being department of internal medicine, under the department there are number of subspecialties. among this endocrine specialty unit is one of the center areas where both outpatient and inpatient services as well as academic activities is strongly accomplished.

4.2. Study design

A cross sectional study was conducted over 2 month in diabetic patient on follow up at SPHMMC OPD

4.3. Population and sampling

4.3.1. Source population

All Diabetic patients on follow up at St. Paulo's hospital millennium medical college during the study period

4.3.2 Study population

Randomly selected diabetic patients at St.Paul's Hospital millennium medical college during study period that fulfill the inclusion criteria

4.4. Inclusion and exclusion criteria

4.4.1. Inclusion criteria

The inclusion criteria will be Diabetic patient age >40 years.

4.4.2. Exclusion criteria

The exclusion criteria will be

- Lower limb amputation
- Unilateral leg swelling
- Wound or ulceration proximal to metatarsal heads in the lower limb
- Constant calf muscle pain and pain on foot flexion
- Prior bypass surgery of the lower limb
- Suspected acute limb ischemia

4.5. Sample size determination and sampling technique

4.5.1. Sample size determination

The sample size for the study was determined using single population proportion formula.

$$n = \frac{(Z_{\alpha/2})^2 P(1-p)}{d^2}$$

Where: n = required sample size

Z $\alpha/2$ = Critical value=1.96(Standard normal deviation usually set at 1.96 which corresponds to the 95% confidence interval)

p=39% from similar study in Uganda hospital(11)

d= precision (marginal error) =0.05

N= (population size) $\approx$ 500

n_c= corrected sample size to number of population

n_f= Final sample size after considering none response rate of 5%

Therefore: $n = \frac{(1.96)^2 \cdot 0.39(1-0.39)}{(0.05)^2} = 369$

Since the source population is of this study is <10000, using the correction formula

$N_c = 369 / (1 + (369/500)) \approx 212$

Where n_c - corrected sample size to population number

If non response rate is 5%, then

$n_f = 222$ is the final sample size

4.5.2. Sampling procedure

A systematic sampling technique was used taking every second patients who come for follow up until the sample size is reached with in study period

4.6. Measurement and study variables

4.6.1. study variables

4.6.1.1. *Dependent variables*

- Prevalence of PAD

4.6.1.2. *Independent variable*

- Age, sex, duration of DM, smoking, dyslipidemia, CKD, IHD, ischemic stroke, physical activity

4.6.2. Data collection tools

Questionnaire consisting of sociodemographic status, comorbid illness history including duration and risk factor assessment was used to document the presence or absence of symptoms of intermittent claudication the EDINBURGH intermittent claudication questionnaire was used. anthropometric measurement and Mercury sphygmomanometer were used for BMI and BP measurement respectively. portable Doppler blood flow detector was used to detect systolic pressure on bilateral dorsalis pedis, posterior tibialis and brachial arteries.

4.7. Data quality control

pretest was done two weeks before actual data collection on 20 patients, on follow up at zewditu memorial hospital. data collected was used to correct the questionnaire and it was not included in the analysis. data collectors were trained for two weeks on measurement of ankle brachial index.daily checking of the collected was made and questionnaire was checked daily for completeness and accuracy to determine their validity.

4.8. Data collection procedure

After verbal consent form, each volunteer was interviewed to establish socio-demographical characteristics (age, gender and educational level), personal clinical history (HTN,DM, dyslipidemia, obesity, acute myocardial infarction and brain ischemia), and smoking habits (never, former, current). During examination, height, weight, and resting blood pressure was measured to establish the presence of cardiovascular risk factors. Thus, arterial hypertension considered when having systolic arterial pressure ≥ 140 mm Hg and/or a diastolic arterial pressure ≥ 90 mm Hg. Body mass index (BMI) was calculated as weight divided by squared height (kg/m²). Subjects were divided in three weight categories: normal weight (BMI less than 25), overweight (25---29.99) and obesity (≥ 30). In order to corroborate the presence of personal risk factors, for biochemical analyses medical records were reviewed for clinical diagnosis. Patients were asked to rest in a supine position for 10 min. Portable Doppler flow measurement was used to determine posterior tibial, dorsalispedis and brachial arteries systolic pressure of each lower and upper limb by trained health professional. ABI was calculated by taking the lowest ankle systolic pressure measurement as numerator and the higher of the two brachial systolic measurement as denominator. In conclusion Following verbal consent and screening for exclusion criteria, each individual participant was requested to respond to the questionnaire and some of the questionnaire data were collected from patient medical records. For Patient with low ABI record the treating physician was communicated and result was written on the chart.

4.9. Data processing and analysis

4.9.1. Data analysis

Data was analyzed using SPSS version 25. Pad was computed in overall group and analyzed as binary trait. Descriptive Result was reported using tables and graph. Binary logistic regression model was constructed according to the methodology of hosmer and lemeshow to estimate the

crude OR. to obtain adjusted OR adjustment were made for vascular risk factors sex, hypertension, and ischemic stroke.

4.9.2. Ethical consideration

Ethical clearance was obtained from Research Ethics committee of St Paul's Hospital Millennium Medical College. The benefit of the study was elucidated for the patient prior to measurement of ankle brachial index. Result with finding of PAD was documented on the chart and treating physician was communicated.

4.9.3. Operational definition

- ✓ ABI-ankle brachial index calculated by using the lowest measured ankle systolic pressure as numerator for the index leg and higher brachial systolic pressure as denominator for both legs. ABI reported as abnormal (ABI<0.9),border line (ABI 0.91-0.99), normal (1.00-1.40) or non compressible (ABI>1.40).
- ✓ BMI; calculated as weight divided by squared height Normal BMI, overweight and obesity were defined as BMI of 18–24.9, 25–29.9 and >30 kg/m² respectively.
- ✓ Hypertension was defined as a blood pressure of >140/90 mmHg or being on anti-hypertensive treatment.
- ✓ Smoker-someone who smokes any tobacco product either daily or occasionally.
- ✓ Former smoker-smoked at least 100 cigarettes in their lifetime,but say they currently do not smoke.
- ✓ Current smoker-those who have smoked 100 cigarettes in their life time and currently smoke cigarette every day or someday.
- ✓ Physicalactivity-leisuretimephysical activity(walking,swimming.)transportation(walking or cycling).sport or planned exercise.
- ✓ Age –risk factor for PAD >40 year

5.RESULT

5.1 socio-demographic and clinical characteristics

Out of 222 patients screened 9 didn't meet the inclusion criteria and were excluded. among this 5 patients were age <40,two patients had leg edma.one had wound on the leg.majority(58.2%) of patients were females. The Median age was 60 year(IQR0.3-2.3).One hundred fifty (70.4%)patients were in the age range of 40-60 years followed by 56 (26.3%)patients who were between 61-74 years.of these,majority of men and women belong to the age category of 40-60 years.(table 1)

Hypertension was the major additional risk factor in our patient being identified in 127(59.6%) patients. Seventy-eight (37.1%) patients had dyslipidemia. Three (1.4%) were reported to be a smoker.(figure 2)Nine (4.2%),seven (3.3%), and ten (4.7%) patients reported to have chronic kidney disease (CKD), ischemic stroke and IHD respectively.(table1)

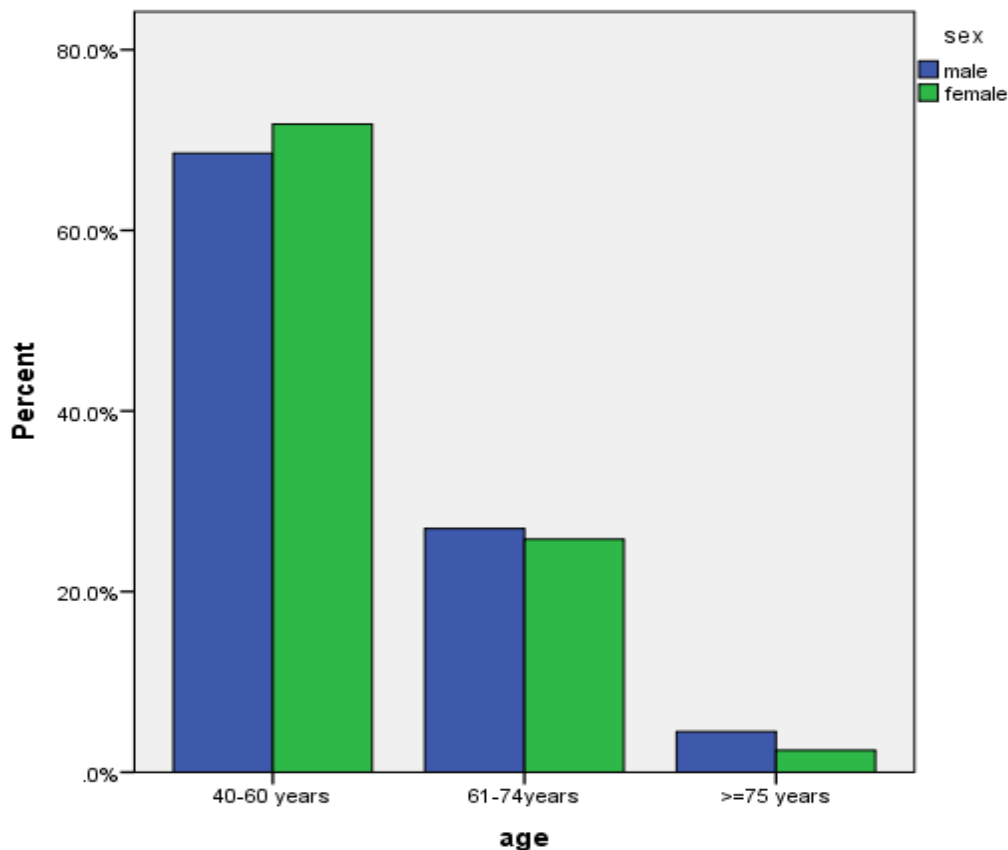


Figure 1 bar chart showing the percentage of gender and age

Table 1: Baseline characteristics and distribution of risk factor for peripheral artery disease.

Characteristics		frequency	Percentage(%)
Sex	Male	89	41.8
	Female	124	58.2
Age	40-60 years	150	70.4
	61-74years	56	26.3
	≥75 years	7	3.3
Educational status	Can't read and write	30	14.2
	Less than high school	107	50.7
	High school	43	20.4
	College	31	14.7
Smoker	3		1.4
	Current	1	20
	Former	2	80
BMI category	Normal	56	40.6
	Overweight	52	37.7
	Obesity	30	21.7
Dyslipidemia	78		37.1
Duration of DM	3.5±1.3	80	37.6
	12±4.5	132	62.4
Hypertension	127		59.6
Physical activity	doesn't practice	58	27.5
	practice <3 days/week or <30 minutes	116	55
	practices > 3 days/ week or >30 minutes	37	17.5
IHD	10		4.7
Ischemic Stroke	7		3.3
CKD	9		4.2
Prevalence of PAD	Abnormal (PAD)	66	31
	Border line	19	8.9
	Normal	124	58.2
	non-compressible	2	0.9
Atypical claudication	2		0.9
Typical claudication	3		1.4

5.2 prevalence of PAD and intermittent claudication

Peripheral arterial disease ($ABI \leq 0.9$) was diagnosed in 66 patients giving the overall prevalence of 31%. It was higher among female(65.2%) patients as compared to male(34.8%)Patients with hypertension had high prevalence of PAD(71.2%) as compared to those who don't have hypertension(28.8%)The prevalence was found to be higher in those patients with physical inactivity and practicing less than 3 days physical activity(40%,52.3%respectively) as compared to those patients with optimal physical activity(7.7%).

About 23 (10.8%), 40 (18.8%) and 13 (6.1%) reported calf pain, thigh buttock pain and (hamstring, feet, shins and joints pain) respectively, among the symptomatic patients 33(47.1%) had PAD. but only 3(1.4%) and 2(0.9%) of them fulfilled the criteria for positive symptoms of typical claudication and atypical claudication.

5.3 association between PAD and associated factors

In bivariate regression analysis advanced age ,physical inactivity and hypertension were found to be predictors of PAD with statistically significant p value.PAD was two times more common in those with hypertension than those who haven't (2.072(1.110-3.866)Patients in the age group 61-74 were more likely to have PAD as compared to relatively younger age(1.984(1.040-3.782)Patients who doesn't practice any physical activity were 5.2 times more likely to have PAD than those who exercise on regular recommended basis.

However, smoking, dyslipidemia, CKD, BMI and ischemic stroke did not show a significant association with PAD. this could largely be because of the small sample size in our study.In multivariate regression analysis patients with physical inactivity and those with age 61-74 were were found to be significantly associated with PAD with (OR=4.445,95%CI1.456-13.560) and(OR=2.520,95%CI 1.064-5.969) respectively

Table 2: Bivariate logistic Regression analysis of predictors of Peripheral Artery Disease. OR: crude Odds ratio, CI: Confidence interval,

Variable		No PAD N=147(69%)	PAD N=66(31%)	COR(95%CI)	P value
Gender	Female	81(55.1)	43(65.2)	1.523(0.835-2.780)	0.170
	Male	66(44.9)	23(34.8)	1	
Age	40-60	111(75.5)	39(59.1)	1	
	61-74	33(22.4)	23(34.8)	1.984(1.040-3.782)	0.038
	≥75	3(2.0)	4(6.1)	3.795(0.813-17.71)	0.090
BMI	Normal	40(41.2)	16(39.0)	1	
	Obese	21(21.6)	9(22.0)	1.083(0.473-2.479)	0.850
	Overweight	36(37.1)	16(39.0)	1.097(0.412-2.918)	0.853
Dyslipidemia	Yes	54(36.7)	25(37.9)	1.050(0.576-1.913)	0.757
	No	93(63.3)	41(62.1)	1	
CKD	Yes	6(4.1)	3(4.5))	1.111(0.269-4.585)	0.884
	No	140(95.9)	63(95.5))	1	
IHD	Yes	6(4.1)	4(6.1)	1.516(0.413-5.56)	0.530
	No	141(95.9)	62(93.9)	1	
Ischemic stroke	Yes	3(2.0)	4(6.1)	3.097(.673-14.248)	0.147
	No	144(98)	62(93.9)	1	
Duration of DM	<5yr	59(40.1)	21(31.8)		
	≥5yr	88(59.9))	45(68.2)	0.704(0.380-1.305)	0.265
Hypertension	Yes	80(54.4)	47(71.2)	2.072(1.110-3.866)	0.022
	No	67(45.6)	19(28.8)	1	
Physical activity	Doesn't practice any physical activity	32(21.9)	26(40)	5.2(1.774-15.240)	0.003
	Practice <3 days/wk or <30 minutes	82(56.2)	34(52.3)	2.654(0.953-7.387)	0.062
	Practice >3 days/wk or >30 minute	32(21.9)	5(7.7)	1	
Cigarette smoking	Yes	2(1.4)	1(1.5)	1.115(0.099-12.521)	0.929

CKD: chronic kidney disease; IHD: ischemic heart disease; DM: diabetes mellitus

Table3 multivariate logistic regression of predictors of peripheral arterial disease;

Variable		No PAD	PAD	AOR(CI)	P-value
Age	40-60	111(75.5)	39(59.1)	1	
	61-74	33(22.4)	23(34.8)	2.520 (1.064-5.969)	0.036
	>=75	3(2.0)	4(6.1)	2.730(0.515-14.468)	0.238
Sex	Female	81(55.1)	43(65.2)	1.439(0.755-2.743)	0.269
	Male	66(44.9)	23(34.8)	1	
Hypertension	Yes	80(54.4)	47(71.2)	1.583 (0.806-3.108)	0.183
	No	67(45.6)	19(28.8)	1	
Ischemic stroke	Yes	3(2.0)	4(6.1)	2.403(0.473-12.200)	0.290
	No	144(98)	62(93.9)	1	-
	Doesn't practice	32(21.9)	26(40)	4.445 (1.456-13.560)	0.009

AOR adjusted odd ratio, CI: confidence interval

6,Discussion

The prevalence of PAD in diabetic patients in our study using ABI was 31%.the prevalence of PAD among diabetic patient as observed in different studies varies substantially. Using ABI as criteria the prevalence varies from as low as 3.5% in newly diagnosed diabetics to as high as 52.5 % (8) using similar criteria finding close to present study were studies from south Africa by Paul A et (11) and from Pakistan Akram et al. (2011) who reported the prevalence to be 29.3% and 31.6% respectively

The prevalence in our study was lower than what has been documented from Uganda (39%), Nigeria (52.5%) and Angola (42.6%). This high prevalence may reflect several factors such as the racial role in the early arterial stiffness (22), to PAD as target organ damage reflecting misdiagnosis, low treatment, and control of its main risk factors such as hypertension and diabetes.

This documented prevalence is higher than what is reported from other regions outside Africa. Data from Framingham heart study revealed prevalence of 20% in adult diabetic patient. Another multi-racial cross sectional study performed in Malaysia, Asia to determine the prevalence of ABI in 200 diabetic patients in primary care setting,the overall prevalence of PAD was 16 % .the prevalence was 5.8% in Malays,19.4% in Chinese and 19.8% in Indians. (23)

In multivariable adjusted analysisadvanced age and physical inactivity were predictive of PAD. Association of PAD with advanced age was reported as a risk in previous studies(24,25).this may be explained by the fact that the incidence of risk factors like hypertension and physical inactivity may be accentuated in the elderly .physical inactivity association with pad was not documented in African studies. However it was one of the predictors in Indian study(27) hypertension was not significantly associated with pad this finding is consistent with studies done in Africa and India(6,15,27)

Although dyslipidemia is well known risk factors for atherosclerotic disease,there was no significant difference seen between patients with and without dyslipidemia. This may be due to all our patients with dyslipidemia were on lipid lowering therapy.

In our study 35.7% patients were symptomatic but only 2.3% patients fulfill the criteria for claudication .This is consistent with the results of other studies that have come up with very low prevalence of intermittent claudication in patients with confirmed PAD and concluded that it is insensitive in diagnosing PAD (6, 8, 20) certain variables like smoking, ischemic heart disease and CKD didn't reveal significant association with PAD this can be due to small sample size

Limitation

The limitation of this study is it is small sample size and hospital based study that cannot be generalized to the general population. we didn't do toe brachial index for those with poorly compressed vessels. this study was done in diabetic patient on follow up only, diabetic patient who are admitted may have more concomitant predictors and increase prevalence.

Conclusion

The prevalence of PAD was high in our study. Diabetes by itself is high risk for cardiovascular complication. Advanced age and physical inactivity were predictors of PAD. Only 5 patients fulfilled the classic symptoms for PAD. the high prevalence of PAD with out symptoms may effectuate for low threshold to obtain vascular studies.

Recommendation

- Strategies should be implemented for aggressive screening by using non invasive portable Doppler study in diabetic patients.
- Portable Doppler study should be readily accessible in hospitals.
- Developing protocol for screening and initiating appropriate treatment to reduce CVD related mortality should be punctuated.
- Creating awareness about PAD and associated factors like physical activity should be emphasized by policy makers.
- Further large scale community level study should be carried out to determine the prevalence and associated factors of PAD.

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Annex 1: Written Consent Form

How do you do? My name is _____. I am a medical resident. This questionnaire is designed for a research work on Prevalence and associated factors of peripheral arterial disease among diabetic and hypertensive patients on follow up. I want to inform you that you have been selected randomly for the purpose of the study and you have the right to withdraw from participation at any time during the interview. The information you give will be kept confidential and your name will not be used in the analysis. The fact that you have participated in the study will not interfere with the service you are going to receive here. If you wish to participate in the study, please affirm it with your signature on the area provided below

I place my signature as a sign of agreeing to participate _____

Thank you for participation and cooperation!

የጥናቱ መግለጫ

ጤናይስጥልኝ፡፡ ይህ መጠይቅ የተዘጋጀው በቅዱስ ጳውሎስ ሆስፒታል ሚሊኒየም ሜዲካል ኮሌጅ በወስጥ ደዌየት ምህርት ክፍል ለድህረ ምረቃ ዲግሪ በስኳር እና በደም ግፊት ሕመም ተጥፋኝ ላይ ያለውን የደም ምግብ መታወክና አጋጭ ሁኔታዎች ላይ ለሚደረግ ጥናት ነው፡፡

እነዚህን ሁኔታዎች ማወቃችንን ግሩ ን ለመቀነስ ምን መደረግ እንዳለበት አመለካከት ይሆናል፡፡ ክቡር መላሻችን ለጥናቱ የሚረዱ የተለያዩ ጥያቄዎች ይጠየቃሉ፡፡

በዚህ ጥናት ላይ ተሳታፊ እንዲሆኑ የተደረገው የስኳር/

የደም ግፊት ሕመም ተጥፋኝ በመሆኖ ሲሆን ጥናቱ ላይ የሚሳተፉት ፈቃደኛ ከሆኑ ብቻ ነው፡፡

ይህን ቃለ መጠይቅ ሲሞሉ ስምዎን እንዲጽፉ አይፈለግም፡፡ በመሆኑም ለሚያደርጉልን ቀናት ብብር በቅድሚያ ከልብ እና መሰግናለን፡፡

የፈቃደኝነት መግለጫ

እኔ የጥናቱ ተሳታፊ የጥናቱን አላማ እና ጥቅም እንዲሁም ከእኔ የሚጠበቁትን ነገሮች ተረድቼ አለሁ፡፡ ስሜ እና የምስጢር ቸው መረጃዎች ለሶስተኛው ገንብ ላልፈው እንደማይሰጡም ተረድቼ አለሁ፡፡ ስለዚህም በጥናቱ ላይ ለመሳተፍ ፈቃደኛ ነኝ፡፡

የተሳታፊው ፊርማ _____ ቀን _____

የመረጃ ሰብሳቢው ስም _____ ፊርማ _____ ቀን _____

Annex 2: Data Collection Format

5.1. Sociodemographic Data

S. No	Questions	Response category
1		Card No _____
2	Age(in years)	A,40-60 B,61-74 C, ≥75
3	Sex	A, Male B, Female
4	Weight	_____ Kg
5	Height	_____ Cm
6	BMI	A,<25 B,25-29.9 c,≥30
7	Educational status	A, less than high school B, high school c, college
8	Dyslipidemia If yes on lipid lowering therapy	A,yes B,no A,yes B, no
9	CKD Ischemic heart disease Ischemic stroke	A,yes B,no A,yes B,no A,yes B,no
10	Do you have DM Duration of DM	A, yes B, no A,<5yr B,≥5yr
	on anti diabetic drugs or insulin	A, OHA B, insulin
11	Do you have Hypertension	A, yes B, no
12	Physical activity	A, Doesn't practice any physical activity B, Practice <3days/week or<30 min C, Practices >3days/week or >30 min
13	do you smoke cigar rete	A, yes B, no
	If yes current or former smoker	A, Current B, former
	Number of years of smoking	A,<10 year B,10-20 Year C, >20 year

EDINBURGH CLAUDICATION QUESTIONNAIREPAD

1, Do you get pain or discomfort in your legs when you walk

A, Yes

B, No

C, I am unable to walk

If you answered yes to question 1 please answer the following questions. Otherwise you need not continue

2, Does the pain ever begin when you are standing still or sitting

A, Yes

B, No

3, Do you get it when you walk uphill or hurry

A, Yes

B, No

4, Do you get it when you walk at an ordinary pace on the level

A, Yes

B, No

5, what happen to it if you stand still?

A, usually continues more than 10 minute

B, usually disappears in 10 minutes or less

6, where do you get this pain or discomfort? Mark the places with x on the diagram below

