

# **Study of Prevalence of Peripheral Arterial Disease among Attendances of Diabetes Clinic at Ain Shams Hospital**

*Thesis*

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*By*

**Dina Anwar Ibrahim**  
(M.B.B.Ch)

*Supervised by*

**Prof. Dr. Salah Shelbaya**

*Professor of Internal Medicine & Endocrinology  
Faculty of Medicine - Ain Shams University*

**Assist. Prof. Dr. Yara Muhamed Eid**

*Assistant Professor of Internal Medicine & Endocrinology  
Faculty of Medicine - Ain Shams University*

**Assist. Prof. Dr. Merhan Samy**

*Assistant Professor of Internal Medicine & Endocrinology  
Faculty of Medicine - Ain Shams University*

**Faculty of Medicine  
Ain Shams University  
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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا إِلَّا مَا عَلَّمْتَنَا  
إِنَّكَ أَنْتَ الْعَلِيمُ الْحَكِيمُ

صدق الله

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## List of Abbreviations

Abb.	Mean
<b>A1C</b>	Glycated hemoglobin
<b>ABI</b>	Ankle Brachial Index
<b>ACCORD</b>	Action to Control Cardiovascular Risk in Diabetes
<b>ADA</b>	American Diabetic Association
<b>ADVANCE</b>	Action in Diabetes and Vascular Disease: Preterax and Diamicron Modified Release Controlled Evaluation
<b>AngII</b>	Angiotensin II
<b>CGM</b>	Continous glucose monitoring
<b>CLI</b>	Critical limb ischemia
<b>CRP</b>	C reactive protein
<b>CSIT</b>	Continous subcutaneous insulin infusion
<b>DAG</b>	Diacyl glycerol
<b>DCCT</b>	Diabetes control and complications trial
<b>DCCT</b>	The Diabetes Control and Complications Trial
<b>DM</b>	Diabetes Mellitus
<b>DPP4-I</b>	Dipeptidyl peptidase-4 inhibitor
<b>e NOS</b>	Endothelial Nitric oxide synthase
<b>EDIC</b>	Epidemiology of Diabetes Interventions and Complications
<b>ESRD</b>	End Stage Renal Disease
<b>FFA</b>	Free fatty acid
<b>FPS</b>	Fasting blood sugar
<b>GLP-1-RA</b>	Glucagon Like Peptide-1 receptor agonist
<b>HDL</b>	High density lipoprotein

<b>Abb.</b>	<b>Mean</b>
<b>IC</b>	Intermittent claudication
<b>IL-1 <math>\beta</math></b>	Interleukin -1 $\beta$
<b>IL-6</b>	Interleukin -6
<b>LDL</b>	Low density lipoprotein
<b>LP(a)</b>	Lipoprotein( a)
<b>MCP-1</b>	Monocyte Chemoattractant protein-1
<b>MI</b>	Myocardial infarction
<b>NF</b>	Nuclear factor
<b>NGSP</b>	National glucose standardization program
<b>NO</b>	Nitric oxide
<b>NOX</b>	NAD(P)H Oxidase
<b>OGTT</b>	Oral glucose tolerance test
<b>Ox LDL</b>	Oxidized Low density lipoprotein
<b>PAD</b>	Peripheral Arterial Disease
<b>PAI-1</b>	Plasminogen activator inhibitor-1
<b>PI</b>	Phosphatidylinositol
<b>PKC</b>	Protein kinase C
<b>PWV</b>	Pulse Wave Velocity
<b>RAAS</b>	Renin Angiotensin Aldosterone System
<b>RAGE</b>	Receptor for advanced glycation end products
<b>RANTES</b>	Regulated on activation normal T cell Expressed and secreted
<b>ROS</b>	Reactive oxygen species
<b>SMBG</b>	Self monitoring of blood glucose
<b>SMCs</b>	Smooth muscle cells
<b>SU</b>	Sulfonylurea
<b>TNF <math>\alpha</math></b>	Tumour Necrosis Factor alpha

<b>Abb.</b>	<b>Mean</b>
<b>TZD</b>	Thiazolidinedione
<b>UKPDS</b>	United Kingdom Prospective Diabetes Study
<b>USA</b>	United States of America
<b>VADT</b>	Veterans Affairs Diabetes Trial
<b>VCAM</b>	Vascular cell adhesion molecule 1
<b>VEGF</b>	Vascular endothelial growth factor
<b>VLDL</b>	Very Low density lipoprotein
<b>VSMCs</b>	Vascular smooth muscle cells

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## Introduction

Diabetes is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both. The chronic hyperglycemia of diabetes is associated with long-term damage, dysfunction, and failure of different organs, especially the eyes, kidneys, nerves, heart, and blood vessels (**ADA, 2015**).

Peripheral arterial disease (PAD) is a disease characterised by narrowing and blockade of peripheral arteries, usually based on underlying obliterating atherosclerosis (**Maly and Chovanec, 2012**).

PAD is common in diabetes, but most of the cases are asymptomatic (**Pradhan and Ridker, 2002**). According to the results of large epidemiological studies, the risk of PAD in patients with diabetes mellitus (DM) is fourfold higher compared to non-diabetic population. Patients with DM and PAD have a high risk of cardiovascular morbidity and mortality. Diabetes worsens the prognosis of patients with PAD; the onset of PAD in diabetics occurs at an earlier age, the course is faster than in non-diabetic patients and the disease is often diagnosed at its advanced stages (**Leng et al., 1996**). A range of factors

(higher age, arterial hypertension, smoking, obesity, hyperfibrinogenaemia, insulin resistance etc.) contribute to the development of PAD in DM (**Maly and Chovanec, 2012**).

The presence of PVD, apart from its increased risk of claudication, ischemic ulcers, gangrene and possible amputation, is also a marker for generalized atherosclerosis and a strong predictor for cardiovascular ischemic events. However, despite the recognition that PVD is associated with increased ischemic event rates and death, particularly in diabetic patients, this specific manifestation of systemic atherosclerosis is largely underdiagnosed and undertreated (**Huysman and Mathieu, 2009**).

Measurement of the ankle-brachial index is a simple, reliable, and noninvasive test to diagnose PAD that can be used in a primary care setting. A low ABI of 0.9 or  $< 0.9$  is a useful diagnostic tool for detecting PVD and it is also considered as a strong predictor of the cardiovascular morbidity and mortality (**Maly and Chovanec, 2012**).

Early diagnosis and treatment of PAD in patients with diabetes is critically important in order to reduce the risk of cardiovascular events, minimize the risk of long-term disability, and improve quality of life (**Marso and Hiatt, 2006**).

## **Aim of the Study**

To assess the prevalence of peripheral arterial disease in Diabetic patients attending Diabetes clinic at Ain Shams hospital and to evaluate risk factors associated with PAD in these patients.