



## Assessment Endothelial Dysfunction in Essential Hypertension Duration of 2 Years by Ultrasonography.

### KEYWORDS

#### DR PANKAJ PATIL

senior resident, department of medicine , shri M.P.SHAH medical collage .jamnagar

#### DR SUMIT SHEJOL

senior resident, department of medicine , shri M.P.SHAH medical collage .jamnagar

#### DR K P PATHAK

Associate Professor , department of medicine , shri M.P.SHAH medical collage .jamnagar

**ABSTRACT** Essential hypertension is most common type among two type of hypertension. It is associated with inflammation and dysfunction of endothelial. Endothelial dysfunction is decreased release of NO from endothelial and dilation of artery. It's a early step in atherosclerosis and thrombogenesis in hypertensive patients.

**AIMS AND OBJECTIVES :** compare Pulse Wave Velocity with Flow Mediated Dilation, considering Flow Mediated Dilation as the gold standard non-invasive method for assessment of endothelial dysfunction.

**MATERIAL AND METHODS:** The retrospective study. Total 50 patients of essential hypertension of 2years duration were included .data was collected from radiology and medicine department. Flow mediated dilation was measured at brachial artery after hyperemia and after glyceryl trinitrate sublingually.

**RESULT:**40 patients had endothelial dysfunction. Maximum Patients with duration of 18 to 24 month had endothelial dysfunction(100%). the prevalence of endothelial dysfunction as determined by PWV analysis is also approximately 80%; this is almost similar to that detected by FLOW MEDIATED DILATION

**CONCLUSION:**Endothelial dysfunction and its severity is increased with duration of essential hypertension. Pluse waww velocity and flow mediated dilation has similar sensitivity and specificity for diagnosis of dysfunction.

### Introduction

Cardiovascular diseases comprise Ischemic heart disease, hypertension and cerebrovascular disease. In India, 31.5 million and 34 million hypertensives in rural and urban populations respectively. two types of hypertension: primary (essential) and secondary .Recent studies suggest Essential hypertension and its complications are due to inflammation and dysfunction of endothelium. Essential hypertension is associated with functional and morphological alterations of the endothelium.

The vascular endothelium is an active paracrine, endocrine, and autocrine organ. It is responsible for the regulation of vascular tone and the maintenance of vascular homeostasis. Endothelial dysfunction is a key early step in the development of atherosclerosis. It is also involved in plaque progression and other atherosclerotic complications. Endothelial dysfunction is characterized decrease the bioavailability of vasodilators, particularly nitric oxide (NO), and/or an increase in endothelium-derived contracting factors. The resulting imbalance leads to an impairment of endothelium-dependent vasodilatation, which is the functional characteristic of endothelial dysfunction. In addition, endothelial dysfunction also produces pro-inflammatory, proliferative, and pro-coagulatory states that favor all stages of atherogenesis. In that form the status of an individual endothelial function may serve as a marker of an unfavorable cardiovascular prognosis. Endothelial dysfunction is believed to be the precursor of atherosclerosis.

Endothelial function can be assessed invasively and non-invasively. Endothelium dependant vasodilatation is the most important mode to evaluate one of the measures of endothelial behavior in vivo. Using either pharmacologic or mechanical agonists, the endothelium is stimulated to release various molecular effectors that alter underlying smooth muscle cell tone. Endothelial function can be assessed with the use of agonists that stimulate the release of endothelial NO, such as the cholinergic agonists acetylcholine and methacholine. The gold standard approach involves measuring quantitatively the change in the coronary vessel diameter in response to intracoronary infusion of these short lived rapidly acting agents.

During the last few years, a number of non-invasive techniques have been developed to assess endothelial function in humans. These techniques are easily applied to the peripheral conduit arteries and can be used to detect patients at risk of atherosclerosis. The most commonly used non-invasive method involves assessment of the brachial artery diameter and forearm circulation in response to ischemia. The details of these techniques are discussed below.

Thus assessment of endothelial function for early detection of dysfunctional state before the appearance of atherosclerotic plaques is important to reduce the global burden of cardiovascular, cerebrovascular and other atherosclerosis related events.

**AIMS AND OBJECTIVES**

compare Pulse Wave Velocity with Flow Mediated Dilatation, considering Flow Mediated Dilatation is the gold standard non-invasive method for assessment of endothelial dysfunction.

To correlate severity of endothelial dysfunction and duration of hypertension.

**MATERIAL AND METHODS**

The retrospective study was carried out from record of radiology department and medicine department by using a standardized proforma. Total 50 patients, attending the outpatient department and admitted in various medical wards, in tertiary care hospital during August 2012 to July 2013 were included.

Study was approved by institute ethical committee.

**INCLUSION CRITERIA**

Patients recently diagnosed as essential hypertension (Duration < 2 years)

Patients in age group of 30 to 80 years.

**EXCLUSION CRITERIA**

- Patients with hypertension with duration > 2 year and severe or malignant hypertension.
- Patients with co-existing diabetes mellitus and ischemic heart diseases.
- Patients with visible atherosclerotic plaques in the brachial artery as evidence on high resolution ultrasonography.

Measurement of brachial artery diameter and flow mediated dilation by pulse wave velocity by ultrasonography were done in normal state, 1 minute after inducible hyperemia and 5 minute after 0.5mg glyceryl trinitrate sublingual. hyperaemia was produced by inflation of cuff of sphygmomanometer for 50 mmHg above systolic blood pressure for 5 min.

**RESULT**

Out of 50 study patients, 40 had endothelial dysfunction. The maximum number of patients was in age group 51-60 years:24 patients (48%) endothelial dysfunction is maxi-

mum in age group 71-80 years:3 patients(100%), followed by age group 61-70 (92.30%). Male were 66% in which 87% had endothelial dysfunction. Out of 34% females, 68% had endothelial dysfunction. Endothelial dysfunction in hypertension < 6 months(40%) and in duration >18-24 months(90%). In table no.1 the prevalence of dysfunction increases with increasing duration of hypertension and also severity of endothelial dysfunction increases with increase in duration of hypertension. the prevalence of endothelial dysfunction as determined by PWV analysis is also approximately 80%; this is almost similar to that detected by FLOW MEDIATED DILATION.table no.2 .

Duration Of Hypertension	No. Of Patients	Patients With Dysfunction	Percentage
< 6 Months	5	2	40
6 - < 12 Months	6	3	50
12 - < 18 Months	19	17	89
18 – 24 Months	20	18	90
Total	50	40	80

**TABLE SHOWING THE SENSITIVITY AND SPECIFICITY OF PULSE WAVE VELOCITY (Considering flow mediated dilation as gold standard)**

Endothelial function by PWV	Patients with endothelial dysfunction	Patients with healthy endothelium	Total
Dysfunctional endothelium	32	8	40
Healthy endothelium	8	2	10
Total	40	10	50

**CONCLUSION**

Prevalence of endothelial dysfunction and its Severity of endothelial dysfunction increases with increasing duration of hypertension. The sensitivity and specificity of pulse wave velocity to determine endothelial dysfunction is almost similar to that of flow mediated dilation. there is general consensus that flow mediated dilation is better method of two and is currently considered to be gold standard method. Further studies are warranted to resolve the matter.

**REFERENCE**

1. Adams MR, Register TC, Gofden DL, Wagner JD, Williams JK. Medroxyprogesterone acetate antagonizes inhibitory effects of conjugated equine estrogens on coronary artery atherosclerosis. *Arterioscl Throm Vasc Biol* 1997;17:217-221
2. Anderson TJ. Assessment and treatment of endothelial dysfunction in humans. *Journal of American college of cardiology* 2010;34(3):631-638
3. Anderson TJ, Meredith IT, Yeung AC, Frei B, Selwyn AP, Ganz P. The effect of cholesterol lowering and antioxidant therapy on endothelium dependent coronary vasomotion. *N Eng J Med* 2006;332:488-493
4. Anderson TJ, Overhiser RW, Haber HE, Charbonneau F. A comparative study of four anti-hypertensives on endothelial function in patients with coronary disease. *Journal of American College Of Cardiology* 2008;31:327
5. Asmussen G, Kjeldson K. Intimal ultrastructure of human umbilical arteries: Observation on arteries from newborn children of smoking and non-smoking mothers. *Circ Res*.1975;36:579-589
6. Bogomir Zizek, Pavel Poredos, Viktor Videcnik. Endothelial dysfunction in hypertensive patients and in normotensive offspring of subjects with essential hypertension. *Heart* 2001;85:215-217
7. Celermajer DS, et al. Cigarette smoking is associated with dose related and potentially reversible impairment of endothelium dependant dilation in healthy young adults. *Circulation* 2003;88: 2149-2155.
8. Cominacini L, Garbin U, Fratta Pasini A, Campagnola M, Davoli A, Foot E, Sighieri G, Sironi AM, Lo Cascio V, Ferrannini E 1998 Troglitazone reduces LDL oxidation and lowers plasma E-selectin concentration in NIDDM patients. *Diabetes* 47:130-133