

Short Communication

Endothelial Cell Dysfunction in Assessment (ECD) of Diabetes Mellitus (DM) as an Equivalent of Coronary Artery Disease (CAD)

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Abstract

Endothelial cell dysfunction is the earliest change in the arterial walls for development of atherosclerosis. Diabetes mellitus is now considered as an equivalent of coronary artery disease. To confirm this, we aim to determine whether the similar degree of endothelial cell dysfunction occurs in diabetes without coronary artery disease and in the patients of coronary artery disease without diabetes mellitus. We studied 50 adult patients in the age group of 37-75 years out of which 32 were males and 18 were females. The cases were divided into two groups -Group 1 – Documented cases of Diabetes Mellitus as per the WHO criteria but no coronary artery disease (25). Group – 2 Documented cases of coronary artery disease but without diabetes mellitus (25). The endothelial cell function was assessed by the method described by Celermajer et al., who estimated brachial artery flow mediated dilatation in forearm. We found that almost similar degree of brachial artery flow mediated dilatation was impaired in both groups thus confirming that the diabetes mellitus is an equivalent of coronary artery disease.

INTRODUCTION

Over last few decades, arterial endothelium has assumed a vital role. Earlier the endothelium was merely thought to be a smooth, intact non-thrombogenic lining of the arterial walls. But now it is clear that the endothelium produces important vasoactive substances which regulate vascular tone and structure [1]. It is our largest endocrine organ.

Nitric oxide (NO) is the most important molecule produced by the endothelium. It has a multifaceted role in the vessel wall [1]. It inhibits platelet aggregation, neutrophil adhesion, adhesion of cell molecules while causing vasodilatation and preventing smooth muscle proliferation. Thus NO is a very vital agent for protection against vasoconstriction and atherosclerosis [1].

Endothelin-1 is the most potent endogenous vasoconstrictor and growth promoting factor.

Healthy endothelium is not leaky, not sticky and is able to relax thus helps to regulate the homeostasis of the arterial wall. Risk factors such as hypertension, DM, CAD, hyperlipidemia and smoking cause ECD and induce vascular remodelling. Damaged endothelium is leaky, sticky and unable to relax [2].

MATERIAL AND METHODS

We studied 50 adult patients in the age group 37 to 75 years - Males – 32, Females -18.

Group 1 - Documented cases of DM as per WHO criteria but no CAD (25)

Group 2- Documented cases of CAD (H/o AMI or confirmation on coronary angiography) but without DM (25)

Technique for assessing ECF

Celermajer et al.[3], described the technique of assessing brachial artery flow mediated dilatation (FMD) which was done in all 50 cases.

Brachial artery flow mediated dilation (FMD)

It was done in all patients using 6.0 MHZ phased array linear transducer attached to Acuson Sequoia machine. The test was done in morning hours. All vasoactive drugs were withheld for 24 hours. With patient in supine position, sphygmomanometer cuff was tied over right arm. With brachial artery imaged in ante-cubital fossa, its diameter was measured 1.5 cms above the midpoint of ante-cubital fossa.

Measurements

The systolic and diastolic VTI (velocity time integrals) were recorded using pulsed wave doppler. The brachial artery was occluded with the cuff inflated to supra systolic BP for 5 minutes and then released. Reactive hyperemia occurs due to NO release. The brachial artery diameter was measured immediately within 15 seconds of the release of cuff. The brachial artery diameter was again measured at peak (1 minute of cuff release) to assess FMD.

Calculation of FMD

The difference between the peak value at 1 minute and the baseline diameter gives the assessment of FMD. The baseline flow in the brachial artery, reactive hyperemia flow and FMD were calculated by standard complex formulas.

DISCUSSION

Dogra et al.[4], YUHI et al.[5], Clarkson et al.[6], showed FMD significantly impaired in DM compared to controls and the degree of impairment was directly related to the duration of DM. Also they found that the degree of impairment of FMD in DM without CAD was similar to cases of CAD without DM. Our study is also in echo with Bhargava et al.[7], who found similar degree of FMD impairment in diabetics without CAD and CAD patients without DM

CONCLUSION

We concluded that Diabetes Mellitus is equivalent of coronary artery disease. Hence it is mandatory to achieve strict control of diabetes mellitus.

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