ARTERIAL STIFFNESS AN EARLY INDICATOR OF ATHEROSCLEROSIS IN DIABETICS

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ABSTRACT : Introduction: The incidence of coronary mortality in DM2 patients is four times greater than in the general population.**Material & Methods:** Study comprised of 100 subjects,out of these, 50 were diabetic and 50 were non-diabetic. **Results**: Both C-F PWV and CIMT increased in diabetic and in non-diabetic, with advancing age, but both were found higher in diabetics as compared to non-diabetics and was statistically significant. **Conclusion:** Increase in carotid-femoral pulse wave velocity (C-F PWV) and carotid intima-media thickness (CIMT) indicate the risk of atherosclerosis in diabetics as compared with non-diabetics and was statistically significant.

Keywords: Carotid-femoral pulse wave velocity (C-F PWV), carotid intima-media thickness (CIMT), atherosclerosis, diabetics, arterial stiffness.

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INTRODUCTION

Diabetes is a risk factor for a number of non-communicable diseases. Cardiovascular diseases are the main causes of mortality among diabetic patients[1.] The incidence of coronary mortality in DM2 patients is four times greater than in the general population[2,3] . On the other hand, the prevalence of arterial hypertension (AHT) in DM2 is practically twice as high as in the non-diabetic population. Moreover, the concomitant presence of both conditions (AHT and DM2) increases cardiovascular morbidity-mortality, with an increased incidence of coronary, cerebrovascular, and peripheral vascular disease, renal failure, heart failure and diabetic retinopathy, and a greater risk of death due to cardiovascular disease[4].

Cardiovascular risk increases 3 to 7 fold in women compared to 2-3 fold in men due to greater adverse effect on lipoprotein level.[5] Endothelial erosion rather than plaque rupture appears to be the dominant mechanism underlying coronary thrombosis.[6] In diabetic patients, several factors contribute to pathogenesis of CAD. [1]-Increased VLDL production by liver, [2]-decrease lipoprotein lipase activity, [3]-increase in plasma glucose level, [4]-hypertension increases risk 34%, [5]-increase level of fibrinogen and PAI-1 with decrease fibrinolysis predispose to deposit fibrin and exacerbate accumulation of LDL, [6]-increase lipoprotein (a), [7]-oxidative stress and advanced glycation end products causing activation of nuclear factor beta overproduction of inflammatory cytokines.[7]

Strict control of diabetes also has shown to be associated with decreased thromboxane A_2 that is platelet aggregator. Insulin is a growth factor and may stimulate smooth cell proliferation. Elevated fasting insulin levels are predictor for development of atherosclerosis in non-diabetic persons.[8]

Pulse wave velocity is the gold standard for assessing the stiffness of the large arteries, and is an important predictor of cardiovascular events [9]. A recent review [10] has shown it to be correlated to patient age and arterial pressure, though its association to diabetes is not so clear.

WHO recommended diagnostic criteria for diabetes

Fasting plasma glucose - 126 mg/dl

2–h plasma glucose - 200mg/dl

MATERIAL AND METHOD: The present study comprised of 100 subjects residing nearby in the city. 50 are normal and 50 diabetics.

NUMBER OF CASES STUDIED:- 100.

INCLUSION CRITERIA:- 1.Healthy individuals with no atherosclerotic risk factors like high BP,smoking, hyperlipidemia etc.

2.Male subjects of age greater than or equal to 40 years are included in study.

DATA EVALUATION:- This is an observational cohort study and the data was analyzed using student's t test.

EVALUATION ON A PREFORMED PROFORMA HISTORY:- Complete clinical examination, routine biochemical analysis, and Pulse wave velocity and Intima-media thickness are measured.

METHOD*:*- Pulse wave velocity was determined by Periscope (M/S Genesis Medical Systems, Hyderabad, India) in an 8-channel real-time PC-based simultaneous acquisition and analysis system. Intima-media thickness (CIMT), a measurement of the thickness of artery walls, by external ultrasound, to track the progression of atherosclerotic disease in humans.

OBSERVATION:

DISTRIBUTION OF C-F PWV AND CIMT IN *DIABETES*

Age group	Normal	Diabetes	Av C-FPWV Normal	Av C-FPWV Diabetes	Av CIMT Normal	Av CIMT Diabetes
40 - 49	8	10	848.1 ± 454.2	1402.3 ± 237.1	0.65 ± 0.19	1.10 ± 0.56
50 - 59	12	14	954.1 ± 684.4	1418.4 ± 314	0.76 ± 0.22	1.14 ± 0.29
60 - 69	14	14	1058.9 ± 391.7	1505.4 ± 508.9	0.77 ± 0.24	1.16 ± 0.3
>70	16	12	1119.9 ± 302.3	1781.4 ± 984	0.78 ± 0.16	1.20 ± 0.33
	50	50	995.2 ± 458.15	1526.8 ± 511	0.74 ± 0.20	1.15 ± 0.37

Above table shows average C-F PWV and average CIMT according to advancing age in diabetes and non-diabetes. As age increases, there was increase in C-F PWV & CIMT in normal as well as in diabetes, but both were found higher in diabetics than non-diabetics and was statistically significant.

DISCUSSION

Discrepancies have been observed among different studies, and the recorded associations are weak[9]. Likewise, it is not certain that the different instruments used to assess arterial stiffness are equivalent. In this sense, a study in diabetic patients has concluded that pulse pressure and pulse wave velocity increase in diabetic individuals, though this is not associated to the augmentation index, and such parameters may not be reliable as a measure of arterial stiffness in diabetics [11]. In this same line, another study comparing different procedures for assessing arterial stiffness in diabetic subjects has concluded that further research is needed to clarify their usefulness in diabetic patients[12].

SUMMARY AND CONCLUSION

Increase in carotid-femoral pulse wave velocity (C-F PWV) and carotid intima-media thickness (CIMT) indicate the risk of atherosclerosis in diabetics as compared with non-diabetics and was statistically significant.

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