FREQUENCY OF INCREASED CAROTID ARTERY INTIMAL MEDIAL THICKNESS AMONG PATIENTS WITH DIABETES MELLITUS

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ABSTRACT

Introduction: Diabetes mellitis is the fifth leading cause of death worldwide and a major risk factor for cardiovascular disease. Sonographic measurement of carotid artery intimal medial thickness may be used as a predictor of cardiovascular risk. The objective of our study was to determine the frequency of increased carotid artery intimal medial thickness among patients with diabetes mellitus.

Methods: This was a descriptive study conducted at Radiology Department Rehman Medical Institute Peshawar from Jan 10, 2014 to July 10, 2014 (6 months). We enrolled 174 patients with age >30 years having diabetes for at least 5 years, excluding patients with history of stroke, myocardial infarction or any ischemic event. After informed consent, all patients were subjected to 7 MHz B-mode ultrasound to detect high CIMT which was defined as the distance of >0.9mm between lumen-intima and media-adventitia interfaces. The data including age, gender and high CMIT were recorded in a pre designed proforma. Data was analyzed using SPSS version 10. Quantitative variable like age was described in terms of means $\pm$ standard deviation. Categorical data like gender and increased CIMT were described in the terms of frequency and percentages. All results were presented as tables and diagrams.

Results: Mean age was 53.07years$\pm$11.83SD. Male to female ratio was 0.76:1. There were 33(18.97%) patients having increased CIMT diagnosed through ultrasound.

Conclusion: There is a high prevalence of increased CIMT in our patients with diabetes.

Key Words: Carotid artery stenosis,carotid artery intima media thickness, Coronary artery disease, diabetes mellitus.

INTRODUCTION

Diabetes mellitus is the fifth leading cause of death worldwide and causes about 3 million deaths per year[1]. Prevalence of diabetes in the urban areas of Pakistan is 6% in males and 3.5% in females, where as in the rural areas the estimated prevalence in males is 6.9% and 3.5% in females[2]. It is one of the major risk factors for cardiovascular disease. Stroke in diabetes, has a two to four fold increase in its relative risk compared to non diabetics[3,4]. Atheroma develops faster in diabetes; thickening of the intima is an early change[9]. Preventive treatment of high-risk asymptomatic individuals depends on accurate prediction of a person's risk to develop a cardiovascular event[5].

Type 2 diabetes mellitus (T2DM) patients often have higher CIMT values than the general population[6]. Carotid artery intima-media thickness (CIMT) is increasingly used as a surrogate marker of early atherosclerosis, and in a recent review it was shown that CIMT is a strong predictor of future vascular events such as myocardial infarction and stroke[7] and it is related with ethnicity, age, sex, traditional and non-traditional risk factors. Some studies also indicated that CIMT <0.8 mm is seen in normal healthy individuals, and a value of CIMT at or above 1 mm is associated with atherosclerosis and a significantly increased cardiovascular disease (CVD) risk in any age group[8].

The current study was designed to review the frequency of increased CIMT in our local population with diabetes. As mentioned above, CIMT measurement is an effective non invasive tool which can assist in identifying people with diabetes who are at higher risk of developing micro and macro vascular complication and may help to evaluate various treatment strategies used to treat patient with diabetes, and through a thorough literature search, we couldn't find any local study done in this regards. This study may provide us with local statistics about high CIMT in diabetic individuals to draw suggestions for future research and follow up of patients.

OBJECTIVE

To determine the frequency of increased carotid artery intimal medial thickness among patients with diabetes mellitus.

OPERATIONAL DEFINITIONS

Diabetes Mellitus

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Disease when patients have fasting blood glucose of more than 126mg/dl or random blood glucose of more than 200mg/dl and have history of intake of anti-diabetic drugs for at least 05 years.

Increased Carotid Artery Intimal Medial Thickness

CIMT was measured with a 7 MHz B-mode ultrasound system. The IMT was defined as the distance between lumen-intima and media-adventitia interfaces and was measured at the diastolic phase. The B-mode scanning protocol included scanning of the right and left common carotid arteries (3 cm before the carotid bifurcation), as well as of the internal carotid artery 2 cm distal from the carotid bifurcation. It was expressed in mm and a value of more than0.90mm was considered high.

This was a descriptive study conducted at Radiology Department Rehman Medical Institute Peshawar from Jan 10, 2014 to July 10, 2014. We enrolled 174 patients with age >30 years having diabetes for at least 5 years. Diabetic patients with history of stroke, myocardial infarction or any ischemic event, body mass index >25 and patients who have undergone Coronary artery bypass grafting were excluded from the study. After informed consent, all patients were subjected to 7 MHz B-mode ultrasound to detect high CIMT which was defined as the distance of >0.9mm between lumen-intima and media-adventitia interfaces.

Data Collcetion Procedure

The study was conducted after approval from research and ethics board of the institute. All patients meeting the inclusion criteria i.e. presenting with diabetes mellitus (as per operational definition) were included in the study through OPD. The purpose and benefits of the study were explained to obtain an informed written consent. All patients were subjected to 7 MHz B-mode ultrasound system to detect high CIMT as defined in operational definition. All the above mentioned information including name, age, gender and address were recorded in a pre designed proforma. Strictly exclusion criteria were followed to control confounders and bias in the study results.

Data Analysis Procedure

Data was analyzed using SPSS version 10. Quantitative variables like age was described in terms of means $\pm$ standard deviation. Categorical data like gender and increased CIMT were described in the terms of frequency and percentages. Increased CIMT was stratified among age, gender and duration of diabetes to see the effect of modifications. All results were presented as tables or diagrams.

RESULTS

A total of 174 patients, mean age of 53.07 years$\pm$11.83SD, 56.32% were females and 43.68% were males. Out of 174 diabetic patients, 33 (18.97%) patients showed increased CIMT. (Figure 1). Age wise distribution showed that as the age increased, CIMT increased as well, as shown in table 1. The patients with age ranging from 30-40 years, 40-50years, 50-60 years and above 60 years had increased CIMT in 12.1%, 16.3%, 20.5% and 24.5% respectively.

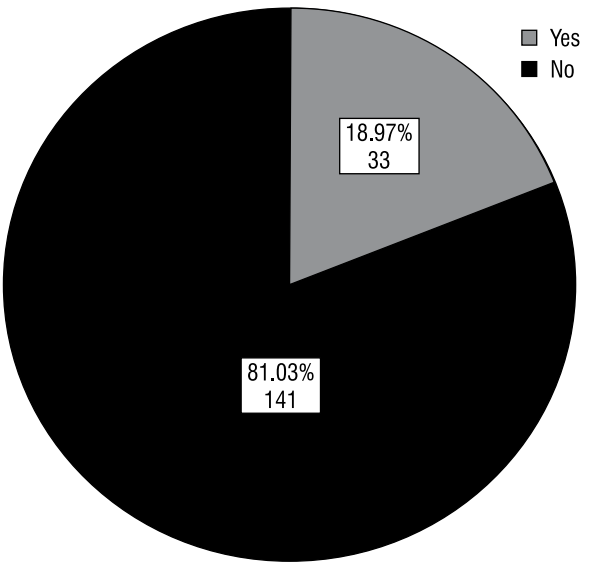

Figure 1: Percentage of increased CIMT in patients with Diabetes.

Table no 1: Age wise distribution of increased cimt among patients with diabetes mellitus

		Increased CIMT		Total
		Yes	No	
Age (in years)	<= 40.00	4	29	33
		12.1%	87.9%	100.0%
	41.00 - 50.00	8	41	49
		16.3%	83.7%	100.0%
	51.00 - 60.00	8	31	39
		20.5%	79.5%	100.0%
	61.00+	13	40	53
		24.5%	75.5%	100.0%
Total		33	141	174
		19.0%	81.0%	100.0%

DISCUSSION

Vascular complications due to atherosclerosis are a major cause of morbidity and mortality in type 2 diabetic patients.[9] It has been suggested by the atherosclerotic risk project that the atherosclerotic process occurs at the same time in carotid, cerebral and coronary arteries.[10] The intima media thickness (IMT) of the carotid artery (CIMT) can be measured with a high degree of accuracy and reproducibility by B mode ultrasonography which provides a reliable and

valid estimate of the arterial wall thickness.[11]

In a study of healthy Taiwan population, CIMT was significantly higher in men than in women (0.558 vs 0.527 mm, P = 0.012)[12]. Kablak-Ziembicka et al confirmed this result in subjects without cardiovascular disease(men vs. women 1.05 vs. 0.93 mm, P<0.001)[13]. CIMT in our study was higher than that in Taiwan healthy population, while was lower than that in population without CVD[13] or with normal glucose tolerance[14].

Midha and Khurana et al[15] followed up 76 patients with type 2 DM and found that the change in the pattern of microalbuminuria did not correlate with the age, sex and duration of diabetes and those who showed decrease in microalbuminuria had good glycemic control. On the other hand Saini et al[16] noticed that microalbuminuria was more common in patients with longer duration of diabetes, a poor glycemic control.

The mean value of carotid artery intima media thickness in this study was 0.938mm. Similar mean value of 0.95 mm was reported earlier in a Chennai based study.[17] Females had a relatively lower value of CIMT as compared to males possibly due to the protective effect of female hormones and/or male gender being at a higher risk of atherosclerosis. Similar results have been reported by Kraml et al[18] who also observed significant higher IMT in men than women. Doruk et al[19] noticed that there was no significant correlation between age and carotid artery IMT.

On the other hand Robin et al[20] reported that IMT was independently and positively related to age. It was also observed that the IMT increased with the duration of diabetes with a significant p value of 0.0218. The results obtained were similar to that of a Chennai based study[21] who observed increased IMT with increasing duration of diabetes. It was also noticed that as albuminuria increased, the proportion of patients with raised intima media thickness also increased. 83.33% in the macroalbuminuric group had increased carotid artery intima media thickness.

The risk factors for increased carotid artery intima media thickness in diabetic patients seem to be different in various studies. Geroulakos et al[22] found that none of the potential risk factors (age, sex, body mass index, smoking, duration of diabetes, systolic or diastolic blood pressure, lipid profile, glycosylated hemoglobin) were associated with increased IMT in type 2 diabetics in their study. On the other hand, Temelkova-Kurktschiev et al[23] noticed increased intima media thickness in diabetic patients with hyperlipidemia. Mohan Rema et al[100] observed a positive correlation between duration of diabetes and increased intima media thickness.

Epidemiologic studies have reported associations between a range of cerebrovascular risk factors and IMT; Temelkova Kurktschiev et al[23] also reported a trend between a greater number of risk factors, and a thicker intima-media.[24]

CONCLUSION

Assessment of carotid artery intima media thickness by ultrasound is a relatively inexpensive means of detecting subclinical atherosclerosis. Our study showed that there is high prevalence of carotid artery intima media thickness in our type 2 diabetic patients.

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