

Risk Prediction of Cardiovascular Events Using Thickness of Carotid Intima Media: An Institutional Based Study

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ABSTRACT

Background: The load of coronary artery disease is on the rise worldwide, developing countries, Like India, are accepting lifestyle alterations that predispose to cardiovascular disorders. The present study was conducted with the aim to determine the role of carotid intima media thickness in predicting cardiovascular events.

Materials and Methods: The present prospective study was performed in the Department of Cardiology, Dr. Ram Manohar Lohia Hospital & PGIMER, New Delhi, India. A detailed history of all the subjects including medical history, biochemical evaluation and ECG was performed amongst all the patients. The thickness of internal carotid artery and common carotid artery were measured bilaterally. A total of 3 readings were obtained and mean was calculated. All the data thus obtained was arranged in a tabulated form and analyzed using SPSS software.

Results: A total of 200 subjects were enrolled in the study, the mean age of the subjects was 44.87+/-3.89 years. There were 120 males and 80 females in the study. The mean thickness of right common carotid amongst cases was 0.12 ± .0085 and amongst control was 0.05 ± 0.0095. There was a significant

difference between the two as the p value was less than 0.05.

Conclusion: Association between intimal thickness and coronary artery disease is significant. Atherosclerosis is evenly distributed amongst vasculature and primarily responsible for heart diseases.

Keywords: Atherosclerosis, Coronary, Thickness, Lifestyle.

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INTRODUCTION

The load of coronary artery disease is on the rise worldwide, developing countries, Like India, are accepting lifestyle alterations that predispose to cardiovascular disorders.¹ In India, prevalence of coronary artery disease has doubled over the last few decades. Atherosclerosis is observed more or less equally amongst coronary, carotid and cerebral arteries and keeps advancing slowly without any observable symptoms affecting large portions of arteries.² Screening techniques to determine, subclinical atherosclerosis are crucial for preventing coronary artery diseases, stroke and peripheral vascular disorders. Carotid intima media thickness is a measure determining the level of atherosclerosis³ related with cardiovascular risk⁴ and with cardiovascular results.⁵⁻⁹ Elevation in thickness may be due to hypertrophy of intima or media layers or both as cellular molecular procedures that enhance thickness are also responsible for progression of atherosclerosis.¹⁰ Intima media thickness is basically the distance measured from the lumen-intima to media-adventitia of the wall of artery on non-invasive ultrasonographic

images of carotid arteries.¹¹ The present study was conducted with the aim to determine the role of carotid intima media thickness in predicting cardiovascular events.

MATERIALS AND METHODS

The present prospective study was performed in the Department of Cardiology, Dr. Ram Manohar Lohia Hospital & PGIMER, New Delhi, India. A detailed history of all the subjects including medical history, biochemical evaluation and ECG was performed amongst all the patients.

A total of 200 patients were included in the study, out of which 100 showed positive findings on ECG, chest pain and increased cardiac enzymes. The other 100 was taken as controls with no history of chest pain or elevated cardiac enzymes. Carotid B - mode USG with Philips 650 Clear view with 5 to 12 MHz linear probe was done amongst all patients. The study was approved by the institutional ethical board and all the subjects were informed about the study. All the measurements were taken

in supine position with patient resting comfortably and hyperextended neck and rotated to opposite direction. Images were optimized by adjusting the neck of the patient and towels were kept under neck for additional comfort. The thickness of

internal carotid artery and common carotid artery were measured bilaterally. A total of 3 readings were obtained and mean was calculated. All the data thus obtained was arranged in a tabulated form and analyzed using SPSS software.

Table 1: Thickness of intima media of common carotid artery

	Cases	Controls	P value
Right common carotid	0.12 ± .0085	0.05 ± 0.0095	<0.05
Left common carotid	0.12 ± .0094	0.05 ± 0.0091	<0.05

Table 2: Thickness of intima media of internal carotid artery

	Cases	Controls	P value
Right internal carotid	0.12 ± .0084	0.06 ± 0.0089	<0.05
Left internal carotid	0.12 ± .0081	0.06 ± 0.0090	<0.05

RESULTS

A total of 200 subjects were enrolled in the study, the mean age of the subjects was 44.87+/-3.89 years. There were 120 males and 80 females in the study.

Table 1 illustrates the thickness of intima media of common carotid artery. The mean thickness of right common carotid amongst cases was 0.12 ± .0085 and amongst control was 0.05 ± 0.0095. There was a significant difference between the two as the p value was less than 0.05. The mean thickness of left common carotid amongst cases was 0.12 ± .0094 and amongst controls was 0.05 ± 0.0091. There was a significant difference between the two as the p value was less than 0.05.

Table 2 illustrates the thickness of intima media of internal carotid artery. The mean thickness of right internal carotid amongst cases was 0.12 ± .0084 and amongst control was 0.06 ± 0.0089. There was a significant difference between the two as the p value was less than 0.05. The mean thickness of left internal carotid amongst cases was 0.12 ± .0081 and amongst controls was 0.06 ± 0.0090. There was a significant difference between the two as the p value was less than 0.05.

DISCUSSION

Bright mode ultrasound is a harmless, non-invasive, and cost-efficient technique to determine CIMT. B mode vascular ultrasound exactly defines thickness as the double-lined pattern is formed by two parallel lines that represent the junction of vessel lumen with intima and media-adventitia junction.¹² Increased thickness of the common carotid artery represents a type of atherosclerosis; the quantity of lesion in common carotid artery has been found to correlate with the extent of atherosclerotic plaques elsewhere in body.²

Arthrosclerosis may present as cardiovascular disease, cerebrovascular disorder or peripheral vascular events. Cardiovascular diseases are more crucial due to significant morbidity and mortality. The incidence of atherosclerosis is estimated by the mixture of acquired and hereditary risk factors. Prime risk factors for atherosclerosis cannot be modified are genetic issues, family history, age and gender and modifiable include hyperlipidemia, inflammation, diabetes and hypertension.¹³

In a study by Hansa et al¹⁴ they found association between intima media thickness with coronary artery disease and cardiovascular risk factors amongst Indian population. The thickness was significantly higher in the coronary group compared to the controls. The results indicated that increased values were related to the presence of coronary artery disease.

In the present study, the mean thickness of right common carotid amongst cases was 0.12 ± .0085 and amongst control was 0.05 ± 0.0095. There was a significant difference between the two as the p value was less than 0.05. The mean thickness of left common carotid amongst cases was 0.12 ± .0094 and amongst controls was 0.05 ± 0.0091. There was a significant difference between the two as the p value was less than 0.05. The mean thickness of right internal carotid amongst cases was 0.12 ± .0084 and amongst control was 0.06 ± 0.0089. There was a significant difference between the two as the p value was less than 0.05. The mean thickness of left internal carotid amongst cases was 0.12 ± .0081 and amongst controls was 0.06 ± 0.0090. There was a significant difference between the two as the p value was less than 0.05.

According to Polak et al¹⁵ measuring carotid intima media thickness is a safe, efficient method but it requires some experience. According to them subjects younger than 45 years should be taken into consideration as the tendency of primary prevention is greater.

In a study by Prati P et al¹⁶ a positive significant relationship between the severity of atherosclerotic lesions and various other factors like age, blood pressure, smoking, and cholesterol was observed. As per Takashi W et al¹⁷ increased thickness and plaque formation in extracranial carotid arteries associated with the prevalence of coronary artery disease.

CONCLUSION

Association between intimal thickness and coronary artery disease is significant. Atherosclerosis is evenly distributed amongst vasculature and primarily responsible for heart diseases. Estimation of intimal thickness is a reliable method of determining subclinical arteriosclerosis.

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