

A Study of Current Status of Traditional and Non Modifiable Cardiovascular Risk Factors in Patients with Carotid Artery Disease

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ABSTRACT

Introduction: Importance of cardiovascular risk factors have well evaluated in the past for coronary artery disease but less studied for carotid atherosclerotic plaque and raised IMT. Due to continuous rising prevalence of non communicable disease we tried to find current status of traditional and non modifiable atherosclerotic risk factors prevalence for carotid artery disease in central India.

Materials and Methods: This prospective observational study was performed in 250 consecutive CAD patients, attended MYH, Indore, MP, for cardiology services from March 2017 to Feb 2018.

Results: Carotid artery disease was present in 45.5% females and 37.5% males in which at least one risk factor was present. Out of 213 patients, 88(41.3%) were having carotid artery disease but there was none significant (P value=0.233) correlation between gender and Carotid artery disease. All traditional and non modifiable atherosclerotic risk factors were statistically significantly (P value<0.05) associated with carotid artery disease. As the number of risk factors increases severity and prevalence of carotid artery disease also increases. Carotid plaque was present in 74(30%) of all coronary artery disease patients.

Conclusions: As the at least one risk factor developed, patient become more prone for carotid artery disease and its related complications and as the number of risk factors increases severity of disease also increases. Timely intervention is required to manage risk factors of atherosclerosis in early stage before development of its complications.

Keywords: Atherosclerosis, carotid artery disease, IMT

INTRODUCTION

Pathogenesis of atherosclerosis involves inflammation in the vessel wall¹. It mainly involve large and medium size artery, occlusion of which may lead to reduced blood supply to the specific area causing wide spread clinical features. In the artery, atherosclerosis affects mainly tunica media, which encroaches in tunica intima and some part of tunica media leading to vessel lumen stenosis and reduced blood supply. Common carotid artery is common large peripheral vessel which can lead to

atheromatous plaque formation and raised intima media thickness. Carotid intima media thickness (CIMT) has been associated with both prevalent and incident cardiovascular disease (CVD) and cerebrovascular disease^{2,3}. Due to widely availability of USG machine we can easily diagnosed carotid disease like carotid plaque and raised IMT and early diagnosed underlying cardiovascular disease.

Importance of cardiovascular risk factors have well evaluated in the past for coronary artery disease but

less studied for carotid atherosclerotic plaque and raised IMT. Due to continuous rising prevalence of non communicable disease we tried to find current status of traditional and non modifiable atherosclerotic risk factors prevalence for carotid artery disease in central India.

The impact of hypertension (HTN), diabetes mellitus (DM), hyperlipidaemia, cigarette smoking, obesity, age, sex, and family history of coronary artery disease on CIMT has already been well-established in several studies⁴. However, the association between carotid artery disease and cerebrovascular disease require further investigation to know the current trend of risk factors prevalence in carotid artery disease⁵.

MATERIALS AND METHODS

This Prospective Observational Study included 250 consecutive patients attending the cardiology services for coronary artery disease. Patients with stable coronary artery disease as well as those admitted to the ICCU for acute coronary syndrome are included. Detail clinical history and thorough clinical examination carried out. They subjected to routine laboratory investigation including CBC, blood urea, serum creatinine, serum electrolytes, fasting lipid profile, FBS, a 12 leads ECG recorded.

Methods of Collecting Data

Study design: Prospective observational study.

Study periods: March 2017 to February 2018.

Place of the study: Dept. of medicine, MGM Medical College and M.Y. Hospital, Indore.

Sample size: 250 consecutive patients having coronary artery disease are included.

Inclusion Criteria:

All consecutive patients with Coronary Artery Disease attending cardiology services who provide informed valid written consent for participation.

Exclusion Criteria:

1. Patients not giving consent.
2. Prisoners & Orphans not included.
3. Patient below 18 years of age.
4. Known cases of chronic kidney disease and chronic liver disease have been excluded from this study.

Statistical analysis:

Patients were divided in groups on the basis of clinical characteristics. Percentage analysis was used to describe demographic variables and presence of outcome events. The analysis was carried out using SPSS(Statistical Package for Social Science) for windows. Chi-square test was used for between-group comparisons of categorical variables. Mean and Standard Deviation was calculated with help of Microsoft Excel Office 2007 version. Probability values are two sided throughout and a P value of <0.05 was considered significant.

RESULTS:

As shown in table 1, 42(37.5%) out of 112 male patients with at least one another atherosclerotic risk factors have elevated CIMT and 46(45.5%) out of 101 female patients have elevated CIMT. But there was statistically none significant correlation between gender and carotid artery disease (P value=0.233).

Table 1: Distribution of carotid artery disease according to gender with at least one another risk factor

Clinical Characteristics		Total No.	Elevated CIMT	Normal CIMT	P value
Gender	Male	112	42 (37.5%)	70(62.5%)	0.233
	Female	101	46(45.5%)	55(54.5%)	
Total No.		213	88(41.3%)	125(58.7%)	

As shown in table 2, all traditional and non modifiable atherosclerotic risk factors have statistically significant correlation with carotid artery disease. In non modifiable risk factors, age and gender were highly significant risk factors for carotid artery disease as compare to family history.

Table 2: Correlation between risk factors and carotid artery disease

Risk Factor	Total No.	Carotid Artery Disease		p value
		Present	Absent	
HTN	110	59(53.6%)	51(46.4%)	0.00002
DM	80	38(47.5%)	42(52.5%)	0.00039
Smoking	77	37(48%)	40(52%)	0.00034
Dyslipidemia	84	40(47.6%)	44(52.4%)	0.00034
Obesity	54	36(66.6%)	18(33.4%)	0.000001
Age	183	128(70%)	55(30%)	0.00000
Gender	81	53(65.4%)	28(34.6%)	0.00000
Family H/O	14	7(50%)	7(50%)	0.0061

As shown in table 3, as the number of risk factors increases prevalence of carotid artery disease also increases. In no risk factor group only 5(13%) patients has carotid artery disease and in patients with four or more risk factors group 20(71.4%) patients has carotid artery disease(both elevated CIMT and carotid plaque).

Table 3: Prevalence of carotid artery disease according to number of risk factors

No. of Risk Factors	Total No. of Patients	Carotid Artery Disease (Elevated CIMT and Carotid plaque)	
		Yes	No
No Risk Factor	37	5(13%)	32(87%)
01 Risk Factor	85	28(32.9%)	57(67.1%)
02 Risk Factors	73	28(38.3%)	45(61.7%)
03 risk Factors	27	18(66.6%)	9(33.4%)
≥04 risk Factors	28	20(71.4%)	8(28.9%)

As shown in table 4, carotid plaque was present in 74(30%) patients out of 250 patients.

Table 4: Distribution of Plaque in all CAD patients

Plaque	Total No. of Patients	% of patients
Present	74	(30%)
Absent	176	(70%)
Total	250	100

DISCUSSION

Ultrasound measurement of the intima-media complex offers the possibility of direct visualization of the presence of atherosclerotic plaque in the

carotid arteries. B-mode color Doppler ultrasonography of the carotid arteries offers the potential for effective evaluation of early atherosclerotic changes, such as thickening of the intima-media complex and brings into focus the possibility of monitoring atherosclerotic progress in peripheral arteries⁶. This imaging technique may also hold some potential for predicting atherosclerotic lesions in vital arteries, such as coronary arteries. The correlation between CIMT and classic risk factors is well established⁷. Measurement of the intima-media for the purpose of cardiovascular risk assessment in the general population was validated by many epidemiologic studies⁸. Because of availability and cost considerations, the color Doppler ultrasound CIMT measurement was not widely recommended as a screening tool to be used in a general population.

In our study, 42(37.5%) out of 112 male patients with at least one another atherosclerotic risk factors have elevated CIMT and 46(45.5%) out of 101 female patients have elevated CIMT. But there was statistically none significant correlation between gender and carotid artery disease (P value=0.233). Our finding is consistent with several other studies done in past in which there was no significant correlation between gender distribution and carotid artery disease. Our findings were consistent with findings of Zafar Ali Wani *et al*⁹, in which they studied 100 patients with CAD and found that there was no significant correlation between Carotid artery disease and gender distribution (P=0.295).

Older age is an important non modifiable risk factor, in our study we find that as the age advances prevalence of carotid artery increases. Our this finding is correlated with study done by Kamran Bagheri Lankari *et al*¹⁰, in which they found that patients with elevated CIMT had significantly (P=0.001) older age as compare to normal CIMT.

All traditional and non modifiable atherosclerotic risk factors have statistically significant correlation with carotid artery disease. In non modifiable risk factors, age and gender were highly significant risk factors for carotid artery disease as compare to family history. Modifiable risk factors for subclinical atherosclerosis are more important because we can modify, control their severity by pharmacological therapeutics and non pharmacological managements. Many investigators have evaluated associations

between the risk factors and mean CIMT, as well as between the changes in risk factor levels and progression or regression in the thickness of the intima-media complex in the carotid arteries¹¹⁻¹³. They found that the thickness of the intima-media complex increases with age, sex, hypertension, diabetes mellitus, hyperlipidaemia, smoking, obesity, and many other factors. Obesity was significantly correlated with carotid artery disease (p=0.000001). A study conducted by Kamran Bagheri Lankarani *et al*¹⁰, in which obesity (P=0.005), was significantly associated with elevated CIMT.

Diabetes mellitus was significantly associated with carotid artery disease (P=0.00039). A study done by Zafar Ali Wani *et al*⁹ included 100 patients, among whom 19.0% had significant carotid artery disease. In his study total diabetic patients were 78.94% and diabetes was significantly correlated with carotid artery disease. Our study findings were also consistent with study findings of Sedigheh Saedi *et al*¹⁴, in which they studied 100 patients with CAD.

In dyslipidemic patients, 47.6% patients had carotid artery disease. Dyslipidemia was significantly (p=0.00034) associated with carotid artery disease. Our study findings are consistent with study done by Martín Laclaustra *et al*¹⁵ in which they found that carotid artery disease was present in 55.5% patients with dyslipidemia and it was significantly correlated (P<0.001).

110 of 250 CAD patients included in the study were hypertensive, in which 59(53.6%) had carotid artery disease. HTN was significantly (p=0.00002) associated with carotid artery disease. These findings are similar with findings of Sedigheh Saedi *et al*¹⁴ study, in which there was significant correlation between HTN and CIMT (P=0.01).

In smokers, 37(48%) had carotid artery disease. It was significantly (P=0.00034) associated with carotid artery disease. Prevalence of smoking in patients with carotid artery disease was consistent with finding of Martín Laclaustra *et al*¹⁵, in which prevalence was 37%.

It is clear that prevalence of carotid artery disease is high in patients with cardiovascular risk factors as compare to those patients who had no cardiovascular risk factors. Severity of disease also depends on number of risk factors present. Increase in the

number of risk factors, is associated with significantly increased disease severity. Multiple numbers of risk factors has their additive effect on carotid artery disease, so as the number of risk factors increases, IMT and carotid plaque also increases.

CONCLUSIONS

As the at least one risk factor developed, patient become more prone for carotid artery disease and its related complications and as the number of risk factors increases severity of disease also increases. Timely intervention is required to manage risk factors of atherosclerosis in early stage before development of its complications.

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Disclosure

Ethical approval: The study was approved by the institutional ethics committee

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