

Original article:

Study of evaluation of morphological and physiological changes in extra cranial portion of carotid arteries by using high resolution ultrasound & color Doppler in asymptomatic individuals

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Abstract:

Introduction: The human carotid arteries, located on each side of the neck, have the key role of carrying blood to the head. They divide into an external branch supplying the neck, face and other external parts and an internal branch, supplying the brain, eye and other internal parts.

Material and methods: This was an observational study. The present study was carried out on 120 individuals in the department of Radio-diagnosis. Inclusion criteria were -Age criteria for study are 40 years and above both sexes and All patients and volunteers, otherwise asymptomatic (No known H/O CVA, STROKE, IHD, MI) above 40 years of age.

Results: In this study total 120 asymptomatic individuals were studied out of these 120,62 were males and 58 were females of which 19 had no HT, DM, Smoking and Alcoholism. Considering overlapping factors 72 were hypertensive, 28 were diabetic, 52 were smokers & 16 had both diabetes and hypertension.

Conclusion: In asymptomatic individuals the extent of carotid artery disease was found to be more in males than in females.

Introduction:

The human carotid arteries, located on each side of the neck, have the key role of carrying blood to the head. They divide into an external branch supplying the neck, face and other external parts and an internal branch, supplying the brain, eye and other internal parts.¹

The carotid artery lends itself to study by high-resolution ultrasound devices because it is superficial in location, are relatively stationary, and runs parallel to the surface of the neck, at least to the level of the carotid bifurcation. Employing B-mode ultrasound, the 'double echo' pattern represents the combined width of the carotid artery intima and media, can be readily and reproducibly visualized in nearly all subjects.²

Material and methods:

This was an observational study. The present study was carried out on 120 individuals in the department of Radio-diagnosis.

Inclusion criteria

- Age criteria for study are 40 years and above both sexes.
- All patients and volunteers, otherwise asymptomatic (No known H/O CVA, STROKE, IHD, MI) above 40 years of age.

Exclusion criteria

- Patients below 40 years.
- Patients who have known history of CVA, STROKE, IHD, MI.
- Patients who have undergone Carotid procedures/surgery.

Appropriate consent from the **Institutional Ethical committee and Research Cell** was obtained for this study. The ultrasound and colour Doppler being a non-invasive and safe method of the consent was taken orally as per approval by the Institutional Ethical committee and Research Cell.

This study included total of 120 subjects, Hypertensive & diabetics were the patients attending the outpatient of medicine department for follow-up and without any symptoms.

Results:

In this study total 120 asymptomatic individuals were studied out of these 120, 62 were males and 58 were females of which 19 had no HT, DM, Smoking and Alcoholism. Considering overlapping factors 72 were hypertensive, 28 were diabetic, 52 were smokers & 16 had both diabetes and hypertension.

Table 1: Intima-Media Thickness in Total Individuals. (n=120)

Total	Mean Intima-Media Thickness
120	0.85 mm± 0.023mm
For Males	0.86 mm± 0.014m
For Females	0.83 mm± 0.21mm

The above table shows that the mean C-IMT was 0.85 mm± 0.023mm in total individuals, in males it is 0.86 mm± 0.014m, while in females it is 0.83 mm± 0.21mm

Table 2: Distribution of Plaque considering risk factors (n=120)

	No. of Patients	Plaque	Percentage
Total Hypertensive	72	28	38.9 %
Total DM	28	12	42.8 %
Total Smokers	52	26	50 %
Total Alcoholics	24	10	41.6%
Hypertensive + DM	16	10	62.5%

By applying Z test of difference between two proportions the Hypertension + DM is significantly higher in plaque as compared to other etiology (p<0.05).

Above table shows, majority of the individuals in the study who had a plaque in their carotid arteries were smokers and diabetics i.e. 50 % and 42.80 % respectively.

Table 3: Distribution of Plaque considering the individual risk factor

	No. of Patients	Plaque	Percentage
Only Hypertensive	33	6	18.2 %
Only DM	7	0	0 %
Only Smokers	9	2	22.3 %
Only Alcoholics	0	–	–

By applying Z test of difference between two proportions the only Hypertensive and only Smokers are significantly higher in plaque as compared to other risk factors ($p < 0.05$).

- **Above table shows smoking was found to be the most powerful risk factor in the study responsible for development of atherosclerotic plaque in carotid arteries.**
- Only Hypertensive = Non-Diabetics, non-Smokers and non-alcoholics.
- Only Diabetes = Normotensives, non-Smokers and non-alcoholics.

Only Smokers = Normotensives, Non-Diabetics and non-alcoholics.

Table 4: I-M thickness in Total individuals Vs I-M thickness in total only smokers

	Intima-Media Thickness Mean \pm SD
Total (n=120)	0.85 mm \pm 0.02
Total only Smokers (n=9)	0.86 mm \pm 0.014

The above table shows that the mean I-M thickness in only smokers is more (0.86 mm \pm 0.014) compared to the total study group.

Table 5 : Prevalence of smoking in males and females

	No. of patients	Percentage
Males	48	92.3%
Females	4	7.6 %
Total	52	100 %

Above table shows, smoking is more prevalent in men than in women.

Table 6 : Intima-Media thickness in diabetic individuals (n=12)

Present study			
n = 12			
	MALES	FEMALES	TOTAL
Mean C-IMT, mm	0.87±0.034	0.83±0.034	0.84±0.036

The above table shows that mean –C-IMT in diabetics was 0.84±0.036 mm .In males it was 0.87±0.034 mm &0.83±0.034 mm in females.

While in individuals with no HT, DM, Smoking and Alcoholism the mean C-IMT was 0.82±0.08mm. In males it was 0.86±0.008 mm &0.82±0.08 mm in females in the present study.

Table 7 : Distribution of Plaque considering the individual risk factor in males (n=62)

	No.	Plaque	Percentage
Only Hypertensive	11	3	27.2 %
Only DM	0	0	0 %
Only Smokers	9	2	22.3 %
Only Alcoholics	0	–	–

- Above table shows hypertension was found to be the most powerful risk factor in males responsible for development of atherosclerotic plaque in carotid arteries.
- Only Hypertensive = Non-Diabetics, non-Smokers and non-alcoholics.
- Only Diabetes = Normotensives, non-Smokers and non-alcoholics.
- Only Smokers = Normotensives, Non-Diabetics and non-alcoholics.

Discussion:

This study was an observational study done on asymptomatic individuals above 40 years of age without any known H/O Cerebrovascular Accident/Coronary Artery Disease, to study the prevalence of carotid artery disease in asymptomatic individuals, to correlate various risk factors associated with development of carotid artery disease & to know the effect of these factors on Intima media thickness [IMT] of carotid arteries which can be effectively done using high frequency ultrasound and Color Doppler sonography.

In the present study the mean age in diabetic individuals was 57.8 years (n=12) while in the study conducted by AK Agarwal et al³ in 2008 (n=40), the mean age was 57.08 years. The present study showed a similar age wise distribution as that of previous study conducted by AK Agarwal et al⁴ in 2008

In the present study (n=120) showed mean carotid intima-media thickness 0.85 mm± 0.023mm. While in study conducted by Petar Nikic et al⁵ in 2006 (n=21) mean carotid intima-media thickness was 0.85 ±0.18 mm .Results obtained by both study groups are similar.

In the present study (n=120) the mean age was 57.1 ± 11.2 years. While in the study conducted by Petar Nikic et al⁵ in 2006 the mean age was 58.1 ± 12 yrs (n=21) years. The present study showed a comparable age wise distribution as that of previous study conducted by Petar Nikic et al⁵ in 2006.

In the present study (n=120) the percentage of hypertensive patients was 60% & that of smokers was 43.4%, while in study conducted by Petar Nikic et al⁵ in 2006 (n=21) the percentage of hypertensive patients was 52.4 % & that of smokers was 28.6%. The present study showed a different distribution as compared to previous study conducted by Petar Nikic et al.⁵

Conclusion:

In asymptomatic individuals the extent of carotid artery disease was found to be more in males than in females.

References:

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