Relation of Age and Sex with Carotid Intima Media Thickness in Adults in Local Indian Population of Lower Income Group

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ABSTRACT *Background :- Several studies have clearly indicated a relationship between Carotid Intima-Media Thickness (CIMT) and Coronary Ischaemic heart disease (IHD) and Cerebrovascular Episode (CVE) or Stroke (1), (2). CIMT varies across different age groups and is an independent risk factor for IHD and CVE(5).*

Aim:- The aim of this study is to describe the mean values of CIMT and how it increases with age and its relation with sex in local Indian population of low income group.

Results: -Mean CIMT was 0.6836mm with a SD of 0.12980mm; Median of 0.70mm, minimum of 0.4mm and maximum of 1.10mm. CIMT was lowest in the group I i.e. 45 years or less. It gradually increased from 45 years to 60 years. After this age there is very slow rise in CIMT. Yearly increment in CIMT in both models was 0.006mm (95% CI 0.005 to 0.008) irrespective of sex.

Conclusion and discussion:- The data of present study of local Indian population of low income group in and around Pune confirms the findings of previous studies in general Indian population (3). Hence it has been found in the present study that age associated increase in CIMT in local Indian population of low income group is similar to the previous study conducted in general Indian population irrespective of sex.

Introduction :-

The high incidence of CVE and IHD in individuals with atherosclerosis is a well documented fact. Atherosclerosis is an independent risk factor of CVE or IHD. Atherosclerosis generally occurs all over the arterial tree in the body and more or less equally in coronary, cerebral and carotid arteries. Hence Carotid Intima Media Thickness (CIMT) measurement can give a fair idea of atherosclerosis in carotid artery themselves and coronary arteries and cerebral arteries. Hence evaluation of CIMT is a reliable method of assessing atherosclerosis. Carotid B Mode ultrasound Imaging is an accurate, non-invasive, cost effective, easy, widely available, easily reproducible method for assessing CIMT [4]. CIMT corresponds to histologic intima and media. It can roughly quantify atherosclerotic burden in the body.

CIMT is defined as the area of tissue starting at the luminal- intimal interface and media-adventitia interface of CCA; or more precisely defined as the double line pattern visualized by B Mode vascular ultrasound formed by two parallel echognic lines representing junction of the vessel lumen with the intima; and media- adventitia interface.

The normal CIMT values vary with age. They also differ in different ethnic and racial groups. So the CIMT values are expected to differ in Indian population as compared to the other racial groups assessed in earlier published studies. Some previous studies have been done in Indian population also. The present study is done in local Indian population of low income group in and around Pune. It describes the mean values of CIMT and how it increases with age and differs in sexes in this group.

Materials and Methods :-

A descriptive study was conducted. Prospective data was collected over a period of 11 months from December 2014 to October 2015. Low income group individuals reporting to our institution, Smt Kashibai Navale Medical College and General Hospital, Pune were considered for this study. Their demographic features (age, sex), diagnosis and a documented history of cerebrovascular disease, ischaemic heart disease or the presence of vascular risk factors were collected and subjects without these risk factors were included in this study. Patients with diabetes, hypertension, smoking habits & tobacco in all forms and those with current or past history of alcohol consumption, dyslipidemia and obesity were excluded from this study. Subjects in the age group of 27 to 84 years of both sexes were included in the study. Carotid artery ultrasonography was performed on all these subjects. Institute's permission to carry out the study was taken and a consent from the subjects was obtained.

Ultrasound Protocol:-

All the carotid ultrasound examinations were done on Siemens Acuson X 300 and Siemens Acuson S 2000 ultrasound machines with high frequency probes of more than 7.5MHz frequency. Both ultrasound operators were the above mentioned first two investigators in this study; both Radiologists having 20 years of experience in conducting B Mode ultrasound and colour Doppler studies of carotid arteries. Interobserver and intraobserver errors were eliminated by strict adherence to examination protocol as follows.

Each patient (subject) was explained the procedure and ensured that the patient was comfortable and cooperative during the procedure. As CIMT of CCA (common carotid artery) has better reproducibility than that of ICA(internal carotid artery) or carotid bifurcation due to ease of access and proximity to the surface and CCA being relatively parallel to skin, measurement of CIMT was done at this site on far wall of CCA in all patients (image 1 and image 2). Both sonologist and patient were positioned properly to obtain high quality images. CIMT measurement was done in supine position with head of patient resting comfortably and neck slightly hyperextended and rotated in direction

opposite to the probe. A wedge pillow at an angle of 45 degrees was used to standardize the lateral rotation. Images were optimized by adjusting patient's neck position and rolled towels were given under neck for comfort.

The six values of mean CIMT (three on each side) were obtained and averaged to get mean CIMT. Thus a single mean CIMT value was obtained in each subject.
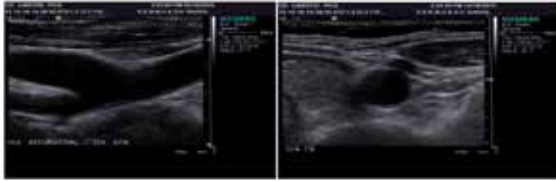
Images 1 & 2

Statistical Analysis:-

Total number of subjects (males and females) included in the study was 67. Age group of patients included in this study was from 27 years to 84 years with a mean of 58.5522 years with a standard deviation of 13.52247 years & Median of age group was 61.000 years. Number of females in the group was 23 (34.3%) and number of males in the group was 44 (65.7%).

For analyzing the age related changes in CIMT this group of 67 patients was divided into four groups as follows Group I :- less than or equal to 45.14 years; Group II:- 45.15years to 58.56 years, Group III :- 58.57 years to 71.98 years & Group IV:- 71.99 years and above. This classification was based on Mean age +- 1 SD.

Continuous variables were represented as mean + or – standard deviation (SD). Analysis of variance (ANOVA) was used to compare the means. To check the effect of age and sex on increment in CIMT, we established two models using linear regression.

Model 1 – adjusting for age and Model 2 – adjusting for age and sex.

Significance level of 0.05 was used & 95% confidence intervals (CI) were calculated. We used IMB SPSS statistics 20 for the analysis.
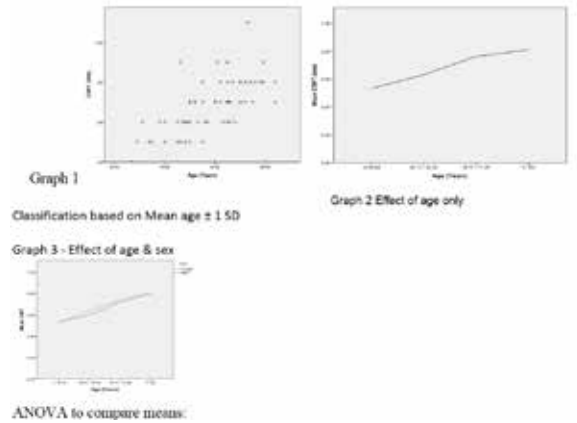
Total records analyzed (n = 67)

Table 1 - Report

	Age yrs	CIMT mm
Mean	58.5522	.6836
N	67	67
Std. Deviation	13.52247	.12980
Median	61.0000	.7000
Minimum	27.00	.40
Maximum	84.00	1.10

Table 2 - Frequencies:

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	23	34.3	34.3	34.3
	Male	44	65.7	65.7	100.0
	Total	67	100.0	100.0	

Sex

Graph 1

Classification based on Mean age ± 1 SD

Graph 2 Effect of age only

Graph 3 - Effect of age & sex

ANOVA to compare means:

Results:-

Mean CIMT for the complete group (males and females together) was 0.6836mm with a SD of 0.12980mm; Median of 0.70mm, minimum of 0.4mm and maximum of 1.10mm. CIMT was lowest in the group I i.e. 45 years or less. It gradually increased yearly from 45 years to 60 years. After this age there is very slow yearly rise in CIMT. Mean CIMT in males was 0.6886mm & 0.6739mm in females.

Yearly increment in CIMT both models was 0.006mm (95% CI 0.005 to 0.008) irrespective of sex. That means CIMT increment per year of age was 0.006mm adjusting only for age and adjusting for both age and sex. Interesting finding as shown in graph 3 indicates that there is less yearly rise of CIMT in females in fertile age group whereas in postmenopausal age group there is no significant difference in the yearly CIMT increment in both sexes.

Conclusion and discussion:-

The data of present study of local Indian population of low income group confirms the findings of previous large scale population based studies in general Indian population. Hence it has been found in the present study that age associated increase in CIMT in local Indian population of low income group is similar to the previous study conducted in general Indian population. In our study females appear to enjoy some kind of protection from atherosclerosis in fertile age group but in menopausal age group yearly CIMT increment (which reflects cardiovascular risk) in females catch up with males in the same age group; which may be worthwhile studying further.

REFERENCE 1. Stein JH, Korcarz CE, Hurst RT, Lonn E, Kendall CB, Mohler ER et al. Use of carotid ultrasound to identify subclinical vascular disease and evaluated cardiovascular disease risk: A consensus statement from the American Society of Echocardiography Carotid Intima-Media Thickness Task Force. Endorsed by the Society for Vascular Medicine. J Am Soc Echocardiogr 2008; 1:93-111. 2. Society of Atherosclerosis imaging and prevention developed in collaboration with the international atherosclerosis Society. Appropriate use criteria for carotid intima media thickness testing. Atherosclerosis 2011;214:43-6. 3. V Madhuri, Suman Chandra and Afzal Jabbar. Indian J Physiol Pharmacol 2010; 371-375. Age associated increase in Intima Media Thickness in adults 4. Ravi R Kasliwal, Manish Bansal, Devang Desai, Maya Sharma. Indian J Endocr Year 2014: Volume: 18; Issue 1, Page : 13-22. Carotid intima-media thickness: Current evidence, practices, and Indian Experience 5. Matthias W. Lorenz, MD; Stefan von Keglar, MD; Helmuth Steinmetz, MD; Hugh S. Markus, FRCP; Matthias Sitzer, MD. Stroke.2006;37:87-92 Corresponding author & address for correspondence:- Dr Prashant Naik, 801 B, Pride Panorama, Behind ICC trade tower, Senapati Bapat Road, Pune 411016