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Age Related Changes In The Abdominal Aorta Of Southeast Nigerians.

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ABSTRACT

A total of one hundred and twenty-six (126) apparently healthy Nigerians of both sexes from Southeast Nigeria were randomly selected and had their abdominal aortic diameters determine by altrasonography. Abdominal aortic sizes were measured at the coeliac axis, renal artery and bifurcation, the results show that aortic diameters of females were generally smaller and more so significant ($p < 0.001$) at bifurcation.

Key Words: Age, Abdominal Aortic size, Ultrasound.

Normal values of aortic abdominal diameter among Caucasians have been extensively studied. (Horejs *et al*, 1988; Lannet-T *et al*; 1992; Pederson *et al*, 1993; Sonesson *et al.*, 1994; Wilmink *et al*, 1998). Some of these studies also establishes aortic diameter enlargement with advancing age (Dixon *et al.*, 1984; Horejs *et al.*, 1988). Likely causes of this gradual dilatation include degeneration of the vessel wall as well as increase in blood pressure (Toda *et al*, 1980; Schlatemanna *et al*, 1997). The essence of establishing normal values for the different age groups lies in its usefulness towards detecting deviations from the normal. This will make for closer monitoring and early intervention (Maloney *et al*, 1977; Nevitt *et al*, 1984). All of these studies were done in European and American whites. No established normal values for abdominal aortic diameter exist here in Nigeria, however abdominal aortic dilatation is being detected with increasing frequency within the last decade in Nigeria (Mgbor S.O.- personal communication).

This study therefore aims to establish normal values of abdominal aortic diameters for Southeast Nigerians and establish if any relationship exits between the aortic diameters and age.

MATERIAL AND METHODS

This study was carried out at a referral radioagnostic center situated at Enugu, the capital of former Southeast Nigeria. This referral centre has the whole of the geographical Southeast Nigeria as its catchment area.

One hundred and twenty six (126) healthy volunteers of both sexes aged between 18 75 years were randomly selected into the study.

The following were used as inclusion and exclusion criteria:

- Subjects without any history of cardiovascular or renal diseases
- Subjects not on any anti-hypertensive therapy or any other medication at the time of study.
- Subjects with serial blood pressure measurements below 140/90 mmHg
- Pregnant women and very obese subjects were excluded.

Subjects' sex and age in years were noted. Height, measured in centimeters with "Tape against-the-wall". Weight, in kilogram, measured with "Hanson Brand" weighing scale.

Table I: Relationship Between Age Range And Aortic Diameters At Coeliac Axis (a), Renal Artery (b) and at The Bifurcation (c): Female (F=57).

Age Range Yrs.	No. of Subjects	Aortic diameters (mm) at		
		A	b	c
18-25	22	14.83	13.18	12.13
26-30	12	14.98	13.83	1.3
31-35	3	16.77	14.15	13.48
36-40	4	17.63	16.39	14.93
41-45	8	16.7	15.16	13.63
46-50	1	14.2	14.35	15.95
51-55	2	24.0	23.43	14.85
56-60	1	17.15	15.2	13.05
61 65	2	1 9.48	17.9	16.6
66-70	0	-	-	-
71-75	2	24-15	22.63	18.88

Table 2: Relationship Between Age Range And Aortic Diameters At Coeliac Axis (a) Renal (b) And At The Bifurcation. (c) Male M = 69.

		Aortic diameters (mm) at		
Age Range Yrs.	No. of Subjects	a	b	c
18-25	91	15.38	14.42	14.15
26-30	8	17.89	15.63	14.33
31-35	6	19.7	16.89	15.5
36-40	10	24.42	24.21	14.86
41-45	4	13.00	14.95	14.76
46-50	6	19.55	17.3	17.1
51-55	5	18.05	16.55	16.16
56-50	6	17.97	16.48	13.13
61-65	2	16.15	16.43	16.38
66-70	2	18.5	15.65	13.28
71-75	2	22.65	15.9	16.8

A single examiner to exclude interobserver variability of result performed the ultrasonographic assessments of abdominal aortic diamters. The same linear-array ultrasonographic scanner (Philips Sterling) with Transducer of 3.5 mHz (which is very efficient for deep structure examination) was used thus eliminating inter-instruments variability. The aortic diameter was measured in millimeters (mm) at three different points i.e.

- Level of the coeliac axis
- Level of the renal artery
- Level of the aortic bifurcation.

RESULTS

Of the 126 volunteers, 57 (45%) females and 69 (55%) males. Males have a mean age of 37.9 years (SD ± 15) and females 33.84 years (SD ± 13.5). Total population mean was 36 years.

Table I shows relationship between age and aortic diameters at the 3 levels in females. The aortic diameter decreases significantly towards bifurcation in all the age group studied. There is gradual increase in aortic diameter with age with the 71 75 age group recording the longest diameter at each measurement level.

Table II shows the same relationship for males with a progressive decline towards the bifurcation. Figure 1 is a bar chart showing the relationship between age (x-axis) and mean aortic diameter (y-axis) for the entire study population. The chat depicts a progressive increase in abdominal aortic diameter with age. These results are indicative of the fact that the luminal diameter of the abdominal aorta at every level correlates linearly with age independently in both sexes.

DISCUSSION

This study establishes a mean aortic diameters of 17.22mm (males), 16.33mm (females) at the level of the coeliac axis, 15.7mm (males), 14.9mm (females), at the level of renal artery. 14.mm (males), and 13.6mm (females) at the level of bifurcation. Studies among Caucasians describe similar decrease in aortic diameter towards bifurcation, (Horejs et al 1988, Lanne-T et al 1992, Pederson et al 1993) and also higher values for males over females of corresponding age. These studies however record high aortic diameter values for Caucasians over their black counterparts at every measured level i.e. 23mm (males), 20mm (females) at the level of the coeliac axis; 20mm (males) and 16.5mm (females) at the level of the renal artery. These differences in aortic diameter may be attributable to genetic factors and environmental factors like better nutrition. The progressive decline in aortic diameter size towards bifurcation is probably an adoption designed to perform its biologic function (Pederson *et al.*, 1993). As flow volume decreases through the length of the aorta, the aorta narrows and histological elements change (Schlatmanna *et al.*, 1997), probably explaining the difference in the aortic diameter measures at various levels.

This study establishes age as a significant predictor of aortic size, a relationship also earlier described in whites (Dixon *et al.*, 1984; Horejs., 1988 and Dahnert and Dubis, 1990). This gradual dilatation may be as a result of both vessel wall degeneration as well as increase in blood pressure (Toda *et al.*, 1980).

CONCLUSION

In as much as we have described normal aortic diameter measurements for Southeast Nigerians, similar studies need to be done in other geographical zones of Nigeria to establish if any difference exits and formulate a national reference figure.

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