

## **Assessment of Carotid Artery changes in Hypertensive Patients Using Doppler Ultrasound in Sudan**

Alsafi Abdella Bala<sup>1</sup>, Syed Amir Gilani<sup>2</sup>, Seif.E.Hassan<sup>3</sup> Caroline.E.Ayad<sup>1</sup>, Abdelmoniem Suliman<sup>1</sup>, Omer M.A,A<sup>1</sup>, Gar-elnabi M.E.M<sup>1</sup>.

<sup>1</sup>College of Medical Radiologic Science, Sudan University of Science and Technology, Khartoum-Sudan. <sup>2</sup> Asio-African Institute Lahor-Pakistan, <sup>3</sup> Khartoum Teaching Hospital.

### **Abstract**

The aim of this study is to evaluate the accuracy of Doppler ultrasound in detecting the impact of essential hypertension on carotid arteries. This study had been done among 40 Sudanese hypertensive patients from Khartoum North province. All patients were under medical treatment. The average age of these patients is 56 years and 50% of them are males.

All patients were suffering from essential hypertension and those with secondary hypertension were excluded from the study. Diabetic hypertensive patients were not excluded from the study and their total number was six.

The study depends on practical scanning of the carotid arteries of all the patients and based on different parameters which are: Intima-Medical-Thickness (IMT), Caliber, Resistive Index (RI) and Pulsatility Index (PI) of the carotid arteries and the correlation between these parameters.

The results showed increased IMT in 65% of the patients (26 patients), while 20% of the patients (8 patients) showed marginal thickness (normal value of IMT is less than 0.08 cm). In this study the IMT ranges from 0.05 cm to 0.18 cm (mean 0.086 cm) for the right CCA artery, and from 0.04 cm to 0.16 cm (mean = 0.091 cm) for the left CCA. The caliber of the right CCA ranges from 0.48 cm to 1.02 cm (mean 0.74 cm) and the caliber of the left CCA ranges from 0.46 cm to 0.91 cm (mean 0.73 cm). A good correlation between the IMT and the caliber in both carotid arteries was noted (IMT is inversely proportional to caliber). The resistive index (RI) and the pulsatility index (PI) which both corresponds to the impedance of the blood flow in the vessels were calculated by the ultrasound machine.

For the right CCA the (RI) ranges from 0.51 to 1.0 and the PI ranges from 1.01 to 4.82 while for the left CCA the RI ranges from 0.41 to 0.99 and the PI ranges from 0.44 to 4.25.

The study showed a good correlation between the IMT and the RI and between the IMT and PI in both common carotid arteries (the IMT is directly proportional to the RI and to the PI). Also the study showed a good correlation between the caliber of CCA and both the RI and the PI. For the right CCA, the caliber is directly proportional to the RI and to the PI, while the correlation is reversed for left CCA. This means the two blood vessels behave differently in hypertensive patients. Finally the study showed atherosclerotic plaques in two patients. In one patient the plaques were seen at the origin of the right CCA and for the other patient at the origin of the left CCA.

**Key words:** CCA, Doppler Ultrasound, Hypertension.