

## A comparative study to find the effect of hypertension on physical parameters for intra cerebral hemorrhage buy using spiral CT- scan technique.

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### الملخص

يقدم جهاز المفراس قابلية تشخيصية عالية. هذا المشروع يدرس النزف داخل المخ وهو نزيف يحدث مباشرة في النسيج الحشوي للمخ. الهدف من هذا البحث هو دراسة تأثير الضغط على الوسائط الفيزيائية للمرضى الذين يعانون من نزف داخل المخ. الدراسة الحالية تضمنت مجموعتين: الأولى تتكون من 24 شخصا من المرضى الذين يعانون من نزف داخل المخ وبدون تأثير عوامل اخرى وتتكون من 10 من الذكور و14 من الإناث متوسط اعمارهم 61.25 . والانحراف المعياري كان 6.42 بأعمار تتراوح بين 41 – 75 سنة. المجموعة الثانية: وتشمل 20 شخصا من المرضى الذين يعانون من نزف داخل المخ بتأثير احد العوامل الخطرة (الضغط) حيث كانوا 12 من الذكور و8 من الإناث متوسط اعمارهم 59 . 45 . والانحراف المعياري كان 10 . 44 بأعمار تتراوح بين 40 – 75 . تم قياس العديد من الوسائط الفيزيائية وهي (قطر، طول، مساحة، حجم التجويف الجانبي)، نصف قطر الفص المخي، محيط الرأس. النتائج اثبتت ان علاقة الوسائط الفيزيائية مع العمر علاقة طرديا ماعدا نصف قطر المخ كانت العلاقة عكسية في المجموعتين المقاسة. الاتجاه الأيسر لكل الوسائط الفيزيائية اكبر من الاتجاه الأيمن عدا الحجم ومساحة التجويف الجانبي. علاقة عامل الجنس مع كل الوسائط الفيزيائية كانت علاقة ضعيفة اوضح التغيرات في الوسائط الفيزيائية تحدث في فترة (70 – 75).

### Abstract

CT offers high diagnostic capability. The project is related to the intra cerebral hemorrhage which means bleeding that occurs directly into the brain parenchyma. Hypertension high blood pressure (140 / 90 mmhg or higher) is the most important risk factor for all types of stroke; including cerebral infarction, irrespective of sex, race, or nationality.

The aim of this research is to study the effect of hypertension to the physical parameters for patients with intra cerebral hemorrhage (ICH).

The study enrolled 24 subjects without any problem (10 males and 14 females) with a mean age of (61.25 ± 6.4285) years with age between 41-72 years, and 20 subjects with hypertension (12 males and 8 females) with a mean age of (59.45 ± 10.44) years with age between 40-75 years. Many physical parameters have been measured (Lateral ventricle diameter, length, area, volume, cerebral radius, Head circumference, Left and right dilatation ratio). The results show that the physical parameters measurements with age have directly proportional except the radius and diameters which is

inversely proportional with subject 's age in two study groups. The mean value in left side of all physical parameters measurements is larger than right side except the lateral ventricular volume and area. Gender with all physical parameters measurements has weakly relation. Clear physical parameters measurements changes are with age period (70-75)

### **Introduction**

Definition of computed tomography (CT) originally known as computed axial tomography (CAT or CT scan ) and body section roentgenography, is a medical imaging Methods employing tomography where digital geometry processing is used to generate a three dimensional image of the internals of an object from a large series of two dimensional X- rays images taken around a single axis of rotation. The word "tomography" is derived from the Greek tomos (slice) and graphia (describing)(1,2).

CT produces a series of axial images which can be manipulated, through a process known as windowing, in order to recreate the image in a different plane(3,4,). Intra cerebral Hemorrhage (ICH) is the bleeding that occurs directly into the brain parenchyma the symptoms and prognosis of an intra cerebral bleed vary depending on the size and location of the bleed: which divided into two types spontaneous and traumatic(5,6)

The symptoms of ICH include partial or total loss of consciousness, vomiting or severe nausea, weakness, numbness or paralysis especially on one side of the body, sudden severe headache(7)

The causes of ICH include primary and secondary causes:

Primary causes : approximately half result from long standing hypertension most occur in over 50's. Both systolic and diastolic, is the most consistently powerful predictor of stroke(8,9). Secondary causes: neoplasm, Vasculitis, bleeding disorder, prior embolic infarction, aneurysm, vascular malformation, trauma other common areas are the cerebellum and pons(10,11,12).

### **Subjects and Methods**

This study enrolled forty four patients with intra cerebral hemorrhage (22 males and 22 females) were involved in the present study (24 without any other problem subject and 20 hypertension subject). All studied cases contains the subjects who were suffering from intra cerebral hemorrhage The physical parameters measurements have been taken by using CT scanner for the two groups and these measurements are include : (Age, head circumference, lateral ventricles diameters for both left and right ventricles, Cerebral radius for both left and right hemisphere, lateral ventricle length for both left and right, lateral ventricle area, Lateral ventricle volume, left and right dilatation ratio).

CT scanner uses a computer and a rotating x- ray device to create detailed, cross-sectional images, or slices, of organs and body parts. CT machine resembles a large, square doughnut. A flat “patient couch” is situated in the circular opening, which is about 24 to 28 inches in diameter. The patient lies on the couch, which can be moved up, down, forward, and backward to position the patient for imaging.

**Statistical Analysis**

All statistical tests were achieved by using Microsoft “Excel statistical package which runs under “Windows” system. Erasing Data were expressed as mean ± SD and the correlation coefficient was calculated and used to look for correlations between variables. Differences in group means were analyzed using the 2- tailed unpaired -test. A P- value < 0.05 was considered significant.

**Results**

The mean age of the two groups was shown in table (1). The ages are between (40 and 75 years), the average and standard deviation (SD) are between (61.25 ± 6.4285& 59.45 ± 10.44 respectively in the two groups. No significant difference was found between the two groups. The frequency distribution of gender of the two groups was shown in table (2).

**Table- 1 : The range and mean age in two study groups.**

	Subjects without any problems (n=24)	Subjects with hypertension (n =20)
Age range (years)	(41-72)	(40-75)
Mean ± SD	61.25 ± 6.4285	59.45 ± 10.44

**Table -2 : Frequency distribution by gender in two study groups.**

	Subjects without any problems	Subjects with hypertension
Female		
n	13	9
%	54.2	45
Male		
n	11	11
%	45.8	55
Total		
n	24	20
%	100	100

**Table -3: The differences in mean of physical parameters between different study groups.**

Mean ± SD	Subjects without any problems (n=24)	Subjects with hypertension (n =20)
Head cir. (cm)	55.38±2.221	55.18±2.339
L. Lat. v. d. (cm)	0.542±0.2	0.87±0.454
Rt. Lat. v. d.(cm)	0.446±0.23	0.665±0.356
L.c.r. (cm)	5.988±0.878	6.12±0.68
Rt.c.r. (cm)	5.732±1.268	5.946±0.702
L. Lat.v.l. (cm)	8.096±1.125	8.22±2.004
Rt. Lat.v.l. (cm)	7.473± 1.362	7.69±1.859
L. Lat.v.v. (cm)	4.622± 1.616	4.25±1.7
Rt. Lat.v.v. (cm)	5.258±1.266	4.243±1.575
L. Lat.v.a. (cm)	8.17±2.77	7.17±2.98
Rt. Lat.v.a. (cm)	6.429±3.164	8.52±3.0218

**P (paired t- test) for all of the above mean was < 0.001.**

**Head circumferences:**The mean to the subjects with hypertension (55.18±2.339) is lower than subjects with any problems (55.38±2.221).

There is no statistically significant difference found with the age in two study groups ( fig. 1).

**Left and right lateral ventricles diameters:** The mean to the subjects with hypertension (0.87±0.454), (0.665±0.356) is higher than subjects with any problems (0.542±0.2), (0.446±0.23).

As shown in figure (2,3), the (L & Rt .L.v.d.) significantly decreased with the age to the hypertension subjects.

**Left and right Cerebral hemispheres radiuses :** The mean to the subjects with hypertension (6.12±0.68), (5.946±0.702) is higher than subjects with any problems (5.988±0.878) (5.732±1.268).There is no significant difference found with the age as shown in figure (4,5).

**Left and right lateral ventricles length:** The mean to the subjects with hypertension (8.22±2.004), (7.69±1.859) is higher than subjects with any problems (8.096±1.125), (7.473± 1.362). (L.lat.v.l) of hypertension subjects was statistically significant with age (fig. 6,7).

**Left and right lateral ventricles volumes:** The mean to the subjects with hypertension (4.25±1.7), (4.243±1.575) is lower than subjects with any problems (4.622± 1.616), (5.258±1.266).Statistically there is no significant differences was found with age in two study groups (fig.8,9)

**Left lateral ventricles areas:** The mean to the subjects with hypertension (7.17±2.98), (8.17±2.77) is lower than subjects with any problems (8.52±3.0218), (6.429±3.164), but the right is higher.

**Left and right dilation ratios:** The mean to the subjects with hypertension (4.25±1.7), (4.243±1.575) is higher than subjects with any problems (4.622± 1.616), (5.258±1.266) Statistically there is no significant differences was found with age in two study groups (fig.10,11)

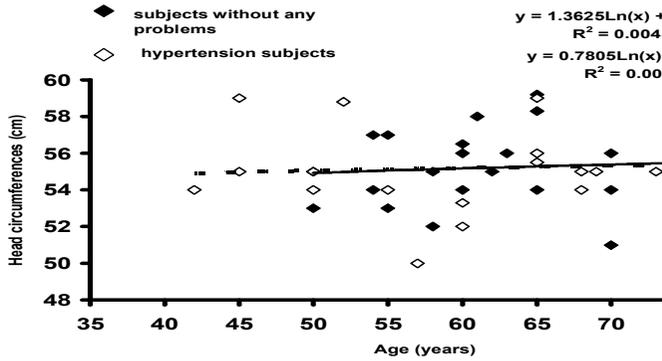


Fig (1) : Correlation between the age of the subjects without any prob hypertension subjects with head circumferences

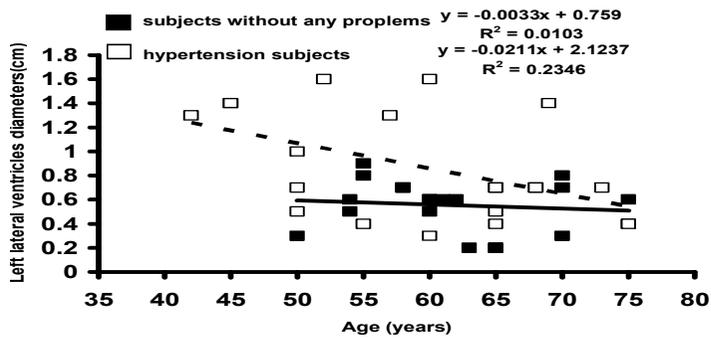


Fig ( 2): Correlation between the age of the subjects without any proplems and hypertension subjects with the left lateral ventricles diameters

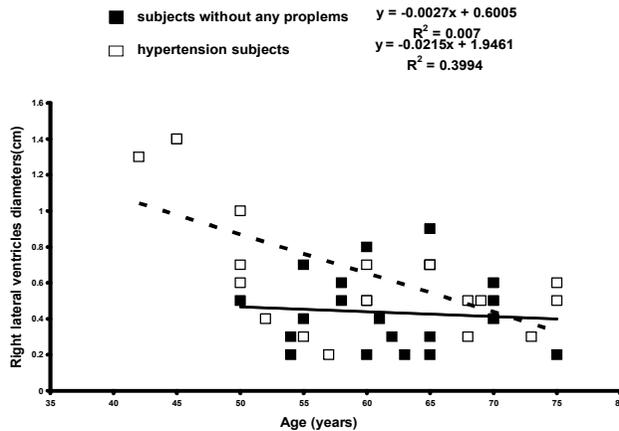


Fig (3): Correlation between the age of the subjects without any proplems and hypertension subjects with the right lateral ventricles diameters

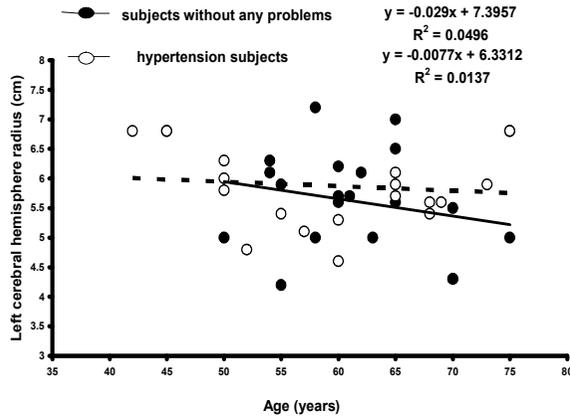


Fig (4) : Correlation between the age of the subjects without any problems and hypertension subjects with Left cerebral hemisphere radius

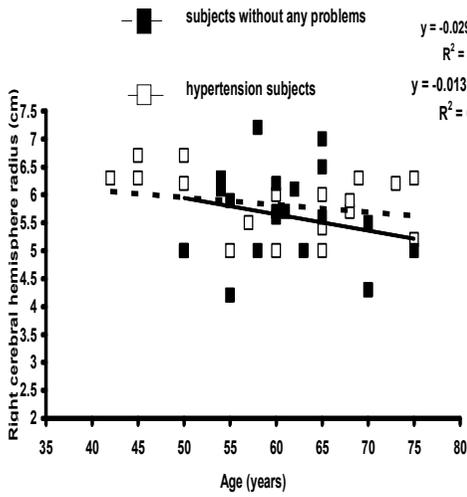


Fig (5): Correlation between the age of the subjects without any problems and hypertension subjects with right cerebral hemisphere radius

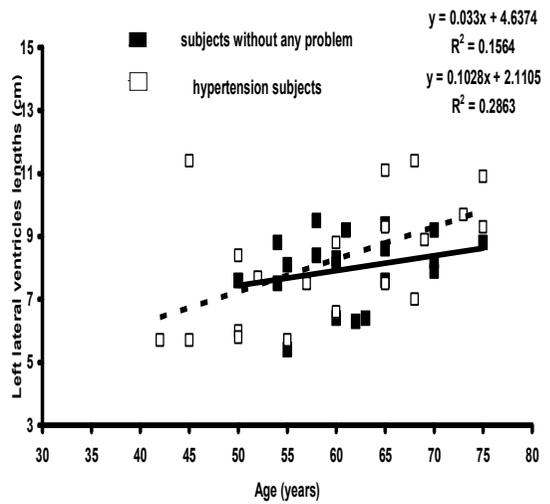


Fig.(6): Correlation between the age of the subjects without any problem and hypertension subjects with the left lateral ventricles lengths

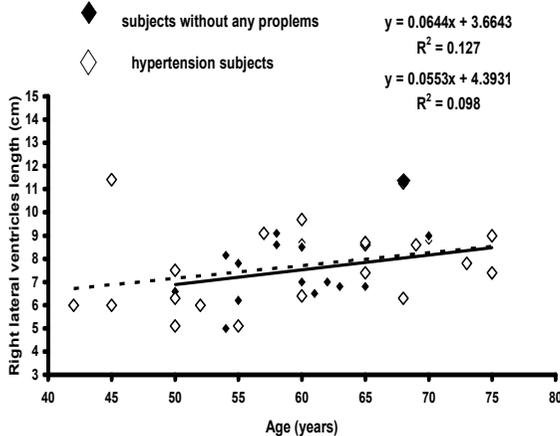


Fig.(7) : Correlation between the age of the subjects without any problems and hypertension subjects with the right lateral ventricles length

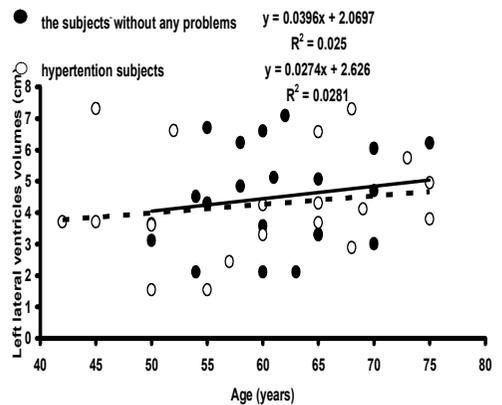


Fig. ( 8 ) : Correlation between the age of the subjects without any problems and hypertension subjects with left lateral ventricles volumes

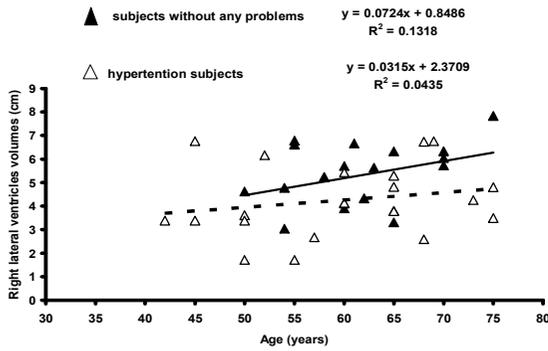


Fig.( 9 ) : Correlation between the age of the subjects without any problems and hypertension subjects with the right lateral ventricles volumes

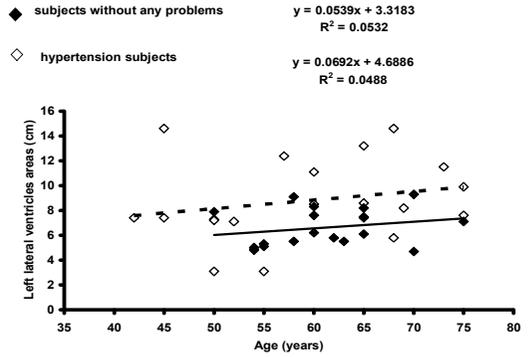


Fig.(10 ) : Correlation between the age of the subjects without any problems and hypertension subjects with the left lateral ventricles areas

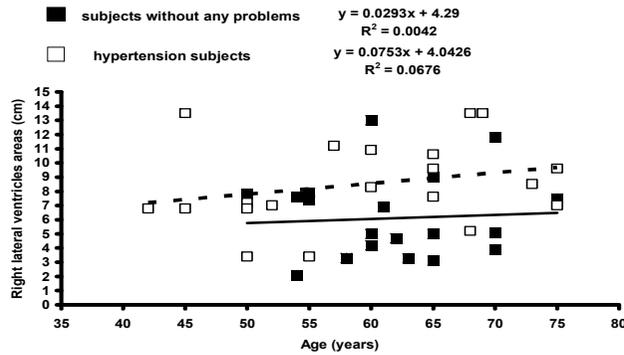


Fig. (11): Correlation between the age of the subjects without any problems and hypertension subjects with right lateral ventricles areas

## Discussion

This subject deals with one of the pathological conditions, which known as intra cerebral hemorrhage and effects on the cerebral components (lateral ventricles and cerebral hemispheres). To study the effect of hypertension to the physical parameters so the data are divided into two groups subject without any other problems and hypertension subjects. The relation between the subject's age and all these physical parameters measurements is directly proportional except the radius and diameters which is inversely proportional with subject ' s age.this is the same result as (13,14)

From the large values the left side measurement ( lateral ventrical, , length, diameters) is larger than the right side, this result may refers to human brain's position.

While in the lateral ventrical volum and area the right side is larger than the left side.

This study according to the fitting equation and correlation coef. Show strong relation between the right ventrical diameters and age in hypertension group.

Experimental studies have shown that the clear physical parameters changes to the hypertension group are with age period (70-75) years.

From studying the effect of the gender on these physical parameters measurements reaching that all these relation were weakly directly or inversely proportional.

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