

Original Article

MORPHOMETRIC STUDY OF FRONTAL HORN OF LATERAL VENTRICLES OF THE BRAIN BY COMPUTED TOMOGRAPHY IN WESTERN UP POPULATION

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ABSTRACT

Morphometric analysis of lateral ventricles of brain is important for evaluating changes due to growth, ageing, intrinsic and extrinsic pathologies. The present study was done to provide more information regarding size of frontal horn of lateral ventricles of the brain in normal western UP population. The objectives of the present study were, (1) Measurement of the dimensions of frontal horns of lateral ventricles. (2) To compare the data with reference to side, gender and different age groups.

The present study was carried on 200 patients [100 males and 100 females] in the age group of 10-80 years. GE OPTIMA CT 660 was used for obtaining the scans.

With regard to side and gender, the length of frontal horn of right side was 29.8 mm, 28.9mm in males and females respectively and on the left side 31.1mm, 29.9mm in males and females respectively.

Key words: Frontal horns, lateral ventricles, computed tomography.

INTRODUCTION : Lateral ventricle is roughly 'C' shaped cavity present in the cerebral hemisphere which is customarily divided into anterior (frontal) horn, body which occupies the parietal lobe, posterior (occipital) horn and inferior (temporal) horns[1].

The ventricular system consists of two lateral ventricles, the third ventricle and the fourth ventricle. The two lateral ventricles communicate through the inter-ventricular foramina of Monro with the third ventricle[2].

Morphometric analysis of cerebral ventricular system is important for evaluating changes due to growth, ageing, intrinsic and extrinsic pathologies[3].

Computerised Axial tomography is a safe non-invasive technique which utilises X-ray in the

diagnosis. It is developed by Hounsfield GN, which provides images of transverse slices of brain with or without the use of contrast media. It can be used as a screening procedure for many diseases. The cerebral ventricular system of brain have been studied in detail routinely using MRI and CT scan. Gross anatomy of cerebral ventricles can be studied either by casts or dissection of human brain[4].

The present work is undertaken to study morphometric analysis of frontal horns of the lateral ventricles of brain by CT scan.

MATERIAL AND METHODS

Data for the present study was collected from the CT scans done at the O.P GUPTA IMAGING CENTRE, MEERUT & MIMHANS NEUROSCIENCES HOSPITAL, MEERUT. The CT scans were randomly selected,

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which were reported by radiologists as normal. Two hundred (200) CT scans in the age group of 10-80 years were taken. The study group includes 100 males and 100 females. CT scans with history of head injuries, cerebral infarctions, local mass lesions and previous intracranial surgeries were excluded from the study.

The details of the case such as name, age, sex, address, inpatient or outpatient number and indications for CT were collected.

The CT scan machine used for this study at the O.P GUPTA IMAGING CENTRE, MEERUT was GE OPTIMA 660 Version 2.0, having a fan beam scanner with a scan time of 1 to 10 seconds.

Parameters used in CT Scans

In CT study, the computerised tomography films were taken in 3-4 slices and measurements were taken at following level:

- At the level of interventricular foramen of Monro

(a) Length of frontal horn of right lateral ventricle in millimeters.

(b) Length of frontal horn of left lateral ventricle in millimeters.

(from interventricular foramen to the tip of frontal horn)

OBSERVATION

Two-hundred normal CT scans in the age group of 10-80 years were taken for the study in which 100 were CT scans of males and 100 were CT scans of females.

TABLE I : LENGTH OF FRONTAL HORNS OF LATERAL VENTRICLE IN VARIOUS AGE GROUPS

FIGURE I : LENGTH OF FRONTAL HORNS OF LATERAL VENTRICLE IN VARIOUS AGE GROUPS

Figure II : Genderwise and sidewise changes in the length of frontal horn

Fig-III: CT Scan of a 48 year old female showing (A) frontal horn of lateral ventricle.

Age (Yrs)	No.	Right frontal horn					Left frontal horn				
		Mean	SD	Min	Max	P value	Mean	SD	Min	Max	P value
10-19	32	28.8	2.5	23	32	>0.05	30.1	2.4	23	34	>0.05
20-29	47	29.0	2.6	23	34		30.1	2.9	23	36	
30-39	30	29.1	2.1	25	31		30.3	2.0	25	33	
40-49	30	29.2	2.7	24	33		30.6	2.5	25	36	
50-59	35	29.9	2.7	25	35		30.7	2.5	26	35	
60-69	17	30.6	1.5	28	34		31.6	1.7	29	35	
70-79	09	30.3	2.5	27	33		31.4	2.4	28	34	
TOTAL	200	29.34	2.5	23	35		30.5	2.5	23	36	

TABLE II: GENDERWISE AND SIDEWISE CHANGES IN THE LENGTH OF FRONTAL HORN

	MALE				FEMALE				TOTAL	
	No.	Mean [mm]	SD	p-value	No.	Mean [mm]	SD	p-value	No.	Mean [mm]
RIGHT	100	29.8	2.6	<0.0001	100	28.9	2.3	<0.002	200	29.3
LEFT	100	31.1	2.5		100	29.9	2.3		200	30.5

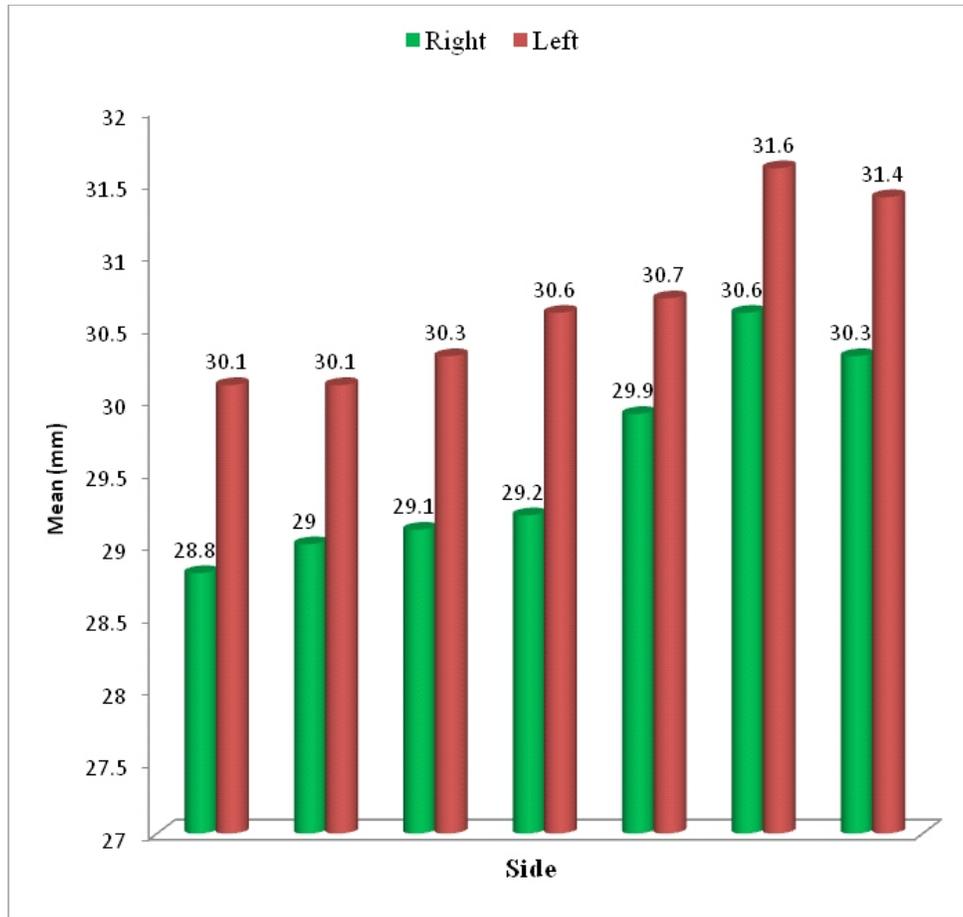
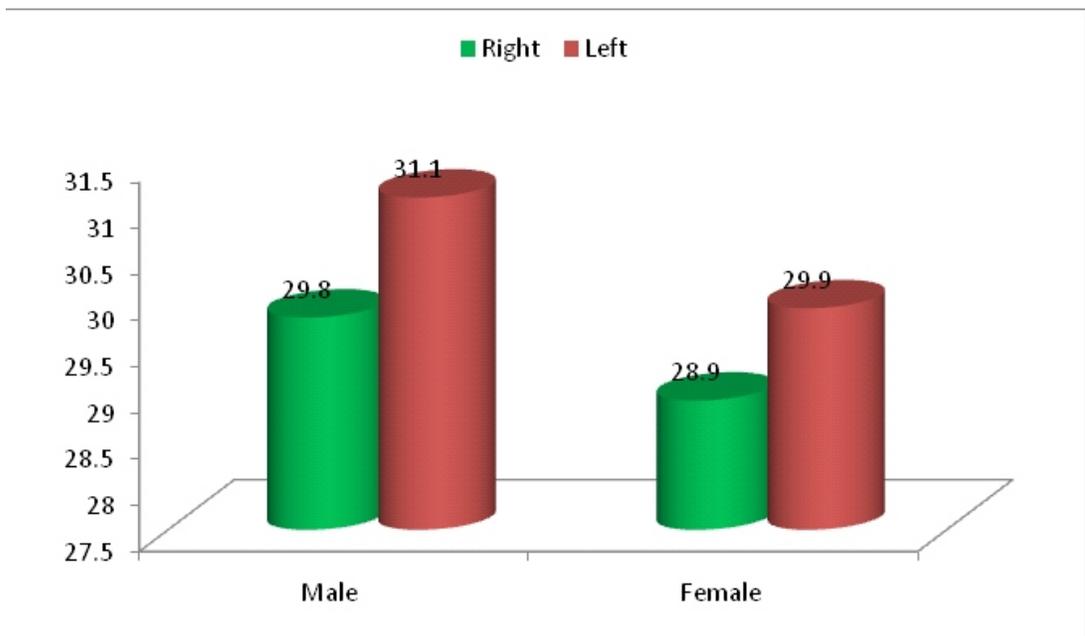
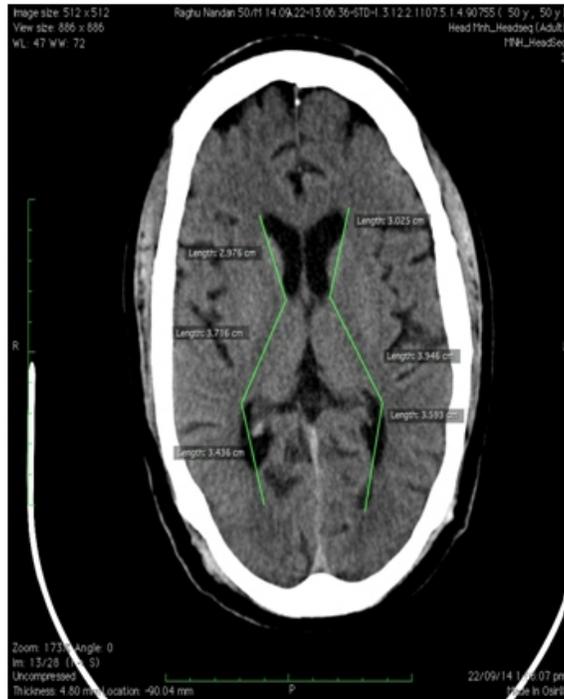


Fig-IV: CT Scan of a 50 year old male showing frontal horn of lateral ventricle.





DISCUSSION

In the present study, computerized Tomographic Scans (CT Scans) of 200 patients (Males-100 and Females-100) were examined for the various morphometric measurements of the lateral ventricles of the brain and it was observed that the length of the frontal horns on the right side was 29.8 ± 2.5 mm and 28.9 ± 2.3 mm in the males and females and on the left side was 31.1 ± 2.5 mm and 29.9 ± 2.3 mm in the males and females respectively.

In D'Souza study[5], computerized Tomographic Scans (CT Scans) of 1000 patients were examined for the various morphometric measurements of the ventricles of the brain and it was observed that the anteroposterior extent of the frontal horns on the right side was 27.4 ± 3.6 mm and 25.5 ± 3.3 mm in males and females and 27.8 ± 3.7 mm and on the left side was 25.8 ± 3.5 mm in males and females.

In Gameraddin study[6], computerized Tomographic Scans (CT Scans) of 152 patients (Males-89 and Females-63) were examined for the various morphometric measurements of the ventricles of the brain and it was observed that the length of the frontal horns on the right side was 28.53 ± 3.88 mm and 26.16 ± 4.21 mm in the males and females and on the left side was 28.53 ± 3.88 mm and 26.17 ± 4.237 mm in the males and females respectively.

In Bijaylakshmi Parija study[7], the mean antero posterior length of frontal horn in males ranged from 29.5 ± 2.1 mm to 33.3 ± 1.8 mm on the right side and in females antero posterior length ranged from 28.1 ± 1.9 mm in the youngest age group, to 30.8 ± 2.0 mm in the eldest age group. The mean antero posterior length of frontal horn in males ranged from 28.05 ± 2.1 mm to 32.5 ± 2.3 mm on the left side and in females antero posterior length ranged from 27.6 ± 1.7 mm in the youngest age group, to 30.05 ± 2.0 mm in the eldest age group.

The total length of frontal horn is more in the present study may be due to geographical and racial distribution of population.

The size of frontal horn of lateral ventricles of the brain is more in males as compared to females and more on the left side as compared to the right side.

Age related changes-

As ageing advances, the human brain undergoes many gross and histopathological changes with regression of the brain tissue leading to the enlargement of the ventricles[6].

Comparison of size according to the gender and side :

According to Gystensted[8], the left lateral ventricle was larger than right one. This reflects general experience that the ventricular system is usually larger in dominant hemisphere. Both left and right lateral ventricles were large in males compared to females. This is because males have heavier and bigger skull, the capacity of skull is 10% more compared to female skull and also because the brain size is more in males compared to females[1].

CONCLUSION

In CT study, it was observed that length of frontal horn on the right side was 29.8 mm, 28.9 mm in males and females respectively and on the left side 31.1 mm, 29.9 mm in males and females respectively.

The present study has defined the morphometric measurements of frontal horns of lateral ventricles of the brain by CT, which has clinical correlations in diagnosis, treatment and surgical intervention.

The frontal horn of left lateral ventricle was shown to be larger than right in either sex while frontal horns of both lateral ventricles were larger in males. The size of the ventricular system varies with age (increased steadily with age).

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