

MORPHOMETRIC STUDY OF THE FRONTAL HORN OF LATERAL VENTRICLES OF BRAIN BY IMAGING USING COMPUTERIZED TOMOGRAPHY

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ABSTRACT

Introduction The cerebral ventricular system consists of a series of interconnecting spaces and channels which originate from the central lumen of the embryonic neural tube. The ventricular system filled with cerebrospinal fluid, is an essential part of the brain. Understanding the normal anatomy and the variations of the ventricular system of brain is helpful for clinicians, neurosurgeons and radiologists in day-to-day clinical practice¹. **Aims And Objectives** To determine the average dimensions and variations of the frontal horn of the normal lateral ventricles of brain by CT scan. **Materials And Methods** The study was conducted in individuals who attended the Department of Radiodiagnosis in Government Medical College, Thiruvananthapuram. Those patients whose brain CT scans were read as normal by the radiologist were taken up for the study. A total of 200 CT brain of individuals above 10 years of age were taken during the period from January 2017 to June 2018. 100 males and 100 females were included in the study group. **Results** The length of the frontal horn of lateral ventricle of brain was found to be more on the left side and in male gender. It was also observed to be increasing with age. **Conclusion** The present study outlines the normal values of the length of frontal horn of the lateral ventricles of brain using Computerized tomography which would aid in the diagnosis and management of neurological disorders.

KEYWORDS : Frontal horn, Computerized tomography, Lateral ventricles

INTRODUCTION

The cerebral ventricular system is a marker of brain development and a predictor of neurodevelopmental outcome in foetus². Morphometric analysis of cerebral ventricular system is important for evaluating changes due to growth, ageing or intrinsic and extrinsic pathologies³. Neuroradiologists are frequently faced with the problem of deciding whether the ventricles are within the normal limits or enlarged for the age of the patient. Therefore, it is necessary to define the normal ranges of measuring ventricular size with a uniform, comparable and exact method⁴. Morphometric analysis of the ventricular system such as its volume, shape and size, especially those of the lateral ventricles, has recently become a main focus of interest in studies of some neuropsychiatric diseases like Schizophrenia, Parkinson's disease and Alzheimer's disease⁵.

Knowledge of the anatomy of the ventricular system helps neurosurgeons for localization and total removal of space occupying lesions around the ventricular system like craniopharyngiomas and gliomas⁶. It is of much importance in endoscopic neurosurgery as well as in the assessment and follow-up of the enlargement of ventricular system during therapy (ventricular shunts)⁷. This will be helpful in the diagnosis and classification of hydrocephalus too.

Computerized Axial Tomography is a safe and non-invasive investigative technique by which morphometric evaluation of the ventricles of brain can be done, which was developed by Hounsfield GN.

The present study was done to analyse the morphometric measurements of frontal horn of the lateral ventricles of brain by imaging using CT scan method.

MATERIALS AND METHODS

The present study was a descriptive cross-sectional study conducted in Department of Radiodiagnosis, Government Medical College, Thiruvananthapuram during the period from January 2017 to June 2018. 200 CT brain of individuals

from 10 years to 90 years of age, with normal radiological findings, were taken. The study group included 100 males and 100 females. CT scans of patients, with history of head injuries, previous intracranial surgeries or showing local mass lesion or cerebral infarctions, were excluded from the study.

The CT scan films were taken and length of frontal horn of the lateral ventricles were measured in millimetres from the interventricular foramen of Munro to the tip of frontal horn on both sides.

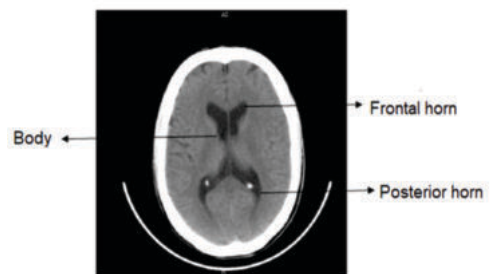


Figure 1: Ct Scan At The Level Of Interventricular Foramen Showing Parts Of Lateral Ventricles Of Brain

Inclusion Criteria

CT brain of those patients who were referred to the Department of Radiodiagnosis during the study period, which were read as normal by the radiologist, were included in the study.

Exclusion Criteria

CT scans of patients with head injuries, previous intracranial surgeries or showing local mass lesion or cerebral infarctions, were excluded from the study.

Statistical Analysis

The statistical analysis of the study was performed using SPSS Software. All the data collected were entered as mean and standard deviation, and expressed in tables and graphs.

p value less than 0.05 was considered as statistically significant.

OBSERVATION AND RESULTS

In the present study, 200 normal CT scans from 10 to 90 years were taken and analysed. Of these, 100 were CT scans of males and 100 were CT scans of females.

Table 1: Agewise Frequency Of Ct Scans

Age in years	Frequency	Percent
10-19	32	16.0
20 – 29	47	23.5
30 – 39	30	15.0
40 – 49	30	15.0
50 – 59	35	17.5
60 – 69	17	8.5
70 – 79	6	3.0
80-89	3	1.5
Total	200	100.0

Table 2: Length Of Right Frontal Horn Of Lateral Ventricle In Various Age Groups

Age (years)	Number	LENGTH OF RIGHT FRONTAL HORN OF LATERAL VENTRICLE				ANOVA	
		Mean (mm)	SD	Minimum (mm)	Maximum (mm)	F	P value
10-19	32	29.09	2.59	23	33	1.429	0.195
20 – 29	47	29.26	2.74	23	35		
30 – 39	30	29.53	2.08	25	33		
40 – 49	30	29.33	2.52	24	33		
50 – 59	35	29.91	2.56	25	36		
60 – 69	17	30.76	1.52	28	34		
70 – 79	6	30.67	3.01	27	34		
80 – 89	3	31.67	3.51	28	35		
TOTAL	200	29.61	2.51	23	36		

Table 3: Length Of Left Frontal Horn Of Lateral Ventricle In Various Age Groups

Age (years)	Number	LENGTH OF LEFT FRONTAL HORN OF LATERAL VENTRICLE				F	P value
		Mean (mm)	SD	Minimum (mm)	Maximum (mm)		
10- 19	32	30.84	2.99	23	39	1.072	0.383
20 – 29	47	30.15	2.89	23	37		
30 – 39	30	30.47	2.21	25	34		
40 – 49	30	30.97	2.37	26	37		
50 – 59	35	31.11	2.74	26	35		
60 – 69	17	31.76	1.48	30	35		
70 – 79	6	31.83	2.14	29	34		
80 - -89	3	31.33	3.06	28	34		
TOTAL	200	30.81	2.60	23	39		

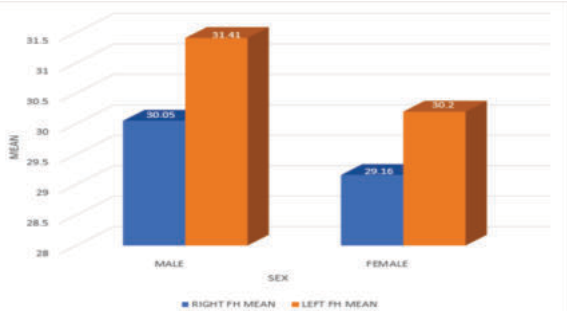


Figure 2: - Genderwise And Sidewise Changes In Length Of Frontal Horn Of Lateral Ventricles

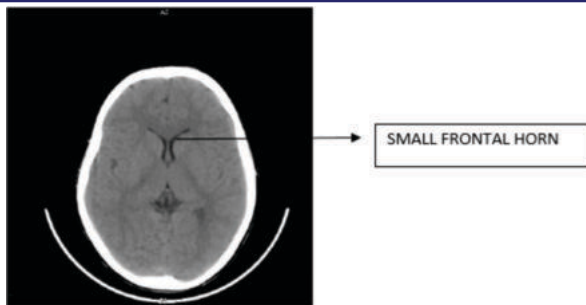


Figure 3: Ct Scan Of A 10-year-old Male Showing Small Frontal Horns Of Lateral Ventricles

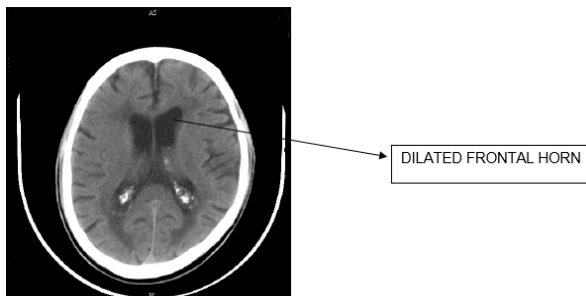


Figure 4: Ct Scan Of A 70-year-old Male Showing Dilated Frontal Horns And Body Of Lateral Ventricles

DISCUSSION

In the present study, the mean length of frontal horn in females is 29.16 mm on right side and 30.20 mm on left side. The mean length of frontal horn in males is 30.05 mm on right side and 31.41 mm on left side. There is a difference of measurements seen in both right and left sides, as well as, when both males and females are compared. That is, the length of the frontal horn is more in males and is also found to be more on the left side in all age groups.

Table 4: Comparison Of The Length Of Frontal Horn Of Lateral Ventricles By Ct Scan In Various Studies

	MEAN LENGTH OF FRONTAL HORN			
	MALES		FEMALES	
	RIGHT (mm)	LEFT (mm)	RIGHT (mm)	LEFT (mm)
D'Souza et al ⁸	27.4±3.6	27.8±3.7	25.5±3.3	25.8±3.5
Brij et al ⁹	25±3.18	26.2±2.94	25.3±3.5	26.5±3.3
Gameraddin et al ¹⁰	28.53±3.88	28.53±3.88	26.16±4.21	26.17±4.23
Present study	30.05±2.51	31.41±2.63	29.16±2.44	30.20±2.43

The mean length of the frontal horn of lateral ventricles of brain was 2-4 mm more in the present study when compared to that of D'Souza et al study (2007)⁸. It is 4-5mm more when compared to Brij et al study (2014)⁹ and 2-4mm when compared to Gameraddin et al study (2015)¹⁰.

In the present study, the length of the frontal horn is more in males than in females which is in accordance with D'Souza et al, Brij et al and Gameraddin et al studies. Also, it is more on the left side when compared to right side.

CONCLUSION

The mean length of the frontal horn of lateral ventricles of brain showed a difference in values on the right and left sides, as well as, between males and females. The length was observed to be more in males and on the left side. Age wise distribution showed that the mean length of frontal horn increased gradually from the age group of 40 – 49 years

onwards, on both right and left sides, in males as well as females.

The present study has defined the length of the frontal horn of lateral ventricles of the brain by Computerized Tomography, which could have clinical significance in the diagnosis and management of various neurological conditions.

Abbreviations

CT: Computerized Tomography

FH: Frontal Horn

SD: Standard Deviation

Conflicts of Interest – None

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