Original Research Paper

Volume - 11 | Issue - 10 | October - 2021 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Anatomy

A STUDY ON MORPHOMETRY OF WIDTH OF FOURTH VENTRICLE OF BRAIN BY MRI - A CROSS SECTIONAL COHORT STUDY IN QUATERNARY CARE CENTRE OF DIFFERENT DISTRICT OF GUJARAT, INDIA.

Dr Vidya Kantilal Satapara* Assistant Professor, Department Of Anatomy, Nootan Medical College & Research Centre, Visnagar, Gujarat, India. *Corresponding Author

Dr Killol Nathubhai Desai Associate Professor, Department Of Pathology, Nootan Medical College & Research Centre, Visnagar, Gujarat, India.

ABSTRACT The ventricular system of brain is cavity of brain. The ventricular system of brain consists of two lateral ventricle, third ventricle and fourth ventricle. The fourth ventricle is the cavity of hind brain located in between pons and medulla anteriorly and cerebellum posteriorly. Here, an attempt has been made to establish the ranges of normal values for the width of normal fourth ventricle of brain by radiological method (MRI).

MATERIAL AND METHOD In this study total of 63 brains were studied by MRI scans obtained from records of department of Radiodiagnosis.

OBSERVATIONS The mean width of fourth ventricle was 1.74 cm in 63 subjects (males and females). The mean width of fourth ventricle was higher in age groups 10-19 and 80-89 years. The mean width of fourth ventricle in males and females was 1.78 cm and 1.71 cm respectively.

CONCUSSION The **mean width of fourth ventricle** is slightly more in males than that in females in MRI study.

KEYWORDS : Fourth ventricle, MRI, Morphometry

INTRODUCTION

The ventricular system of brain is cavity of brain. The ventricular system of brain consists of two lateral ventricle, third ventricle and fourth ventricle. The fourth ventricle is the cavity of hind brain located in between pons and medulla anteriorly and cerebellum posteriorly.[1]

Described by **Standring S et al**, The fourth ventricle lies between the brain stem and the cerebellum. Rostrally it is continuous with the cerebral aqueduct, and caudally with the central canal of the spinal cord. In sagittal section, the fourth ventricle has a characteristic triangular outline, and the apex of its tented roof protrudes into the inferior aspect of the cerebellum.

The ventricle is at its widest at the level of the pontomedullary junction, where a lateral recess on both sides extends to the lateral border of the brain stem. At this point the lateral aperture of the fourth ventricle (foramen of Luschka) provides access to the subarachnoid space at the cerebellopontine angle; CSF flows through it into the lateral extension of the pontine cistern. [2]

Described by **Corliss CE,** The original rhombocoele remains as a continuous cavity in spite of the specialization of its wall to form separately differentiated metencephalic and myelencephalic structures. Caudally the rhombocoele is narrow and directly continuous with the central canal of the spinal cord. Its rostral three-fourths widen out to constitute fourth ventricle. [3]

Here, an attempt has been made to establish the ranges of normal values for the width of normal fourth ventricle of brain by radiological method (MRI), as identical studies are scarcely found in Gujarat. Very few studies has been done on difference in the width of fourth ventricle of brain between males and females, so this study was done to observe for any differences in the width of fourth ventricle of brain between males and females.

MATERIALS AND METHODS

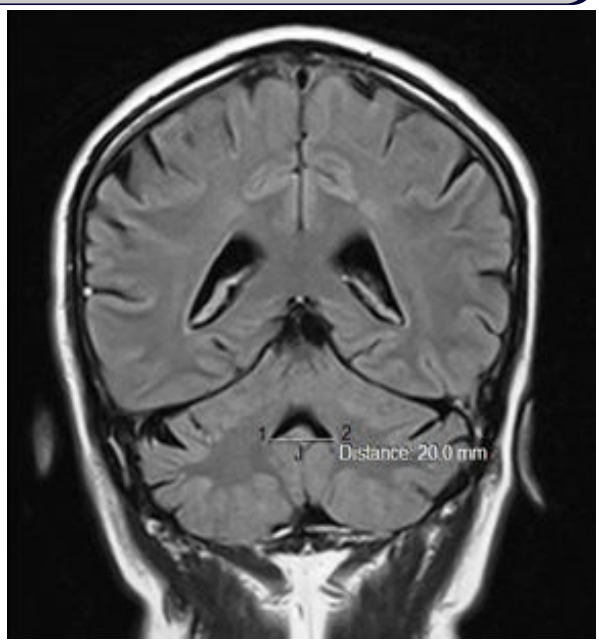
In this study total of 63 brains were studied by MRI scans obtained from records of department of Radiodiagnosis at our institute. The study was conducted after taking approval from institutional ethics committee.

Materials:

MRI scans obtained from records of Department of Radiodiagnosis, at our institute.

METHODS:

The Morphometry of width of fourth ventricle of brain was studied by Radiological method (MRI)- 63 subjects Width of fourth ventricle in coronal section of MRI (Photograph 1)



Photograph 1 Showing coronal section of MRI 1-2J- Width of fourth ventricle

Width of fourth ventricle was analyzed statistically. Width of fourth ventricle obtained was analyzed statistically to find range, mean, standard deviation (SD). Analysis of variance (ANOVA) test was done to compare more than 2 groups at a time. The P-values was found for each parameter. If the P-value was > 0.05, it means that the difference was not significant. If the P-value was between 0.05 & 0.01, it means that the difference was significant.

RESULTS

The mean width of fourth ventricle was 1.74 cm in 63 subjects (males and females). The mean width of fourth ventricle was higher in age groups 10-19 and 80-89 years. (Table 1) The mean width of fourth ventricle in males and females was 1.78 cm and 1.71 cm respectively. (Table 2).

DISCUSSION

The width of fourth ventricle was measured by method of radiology and cast by various workers like D'souza E DMC & Natekar PE [4], Akbari VJ et al [5] and Duffner F et al [6] . The finding of these workers were tabulated, compared and discussed with the finding of present study below.

As shown in table 2, the mean width of fourth ventricle **as per our study by MRI** was 1.78 cm and 1.71 cm in males and females respectively. The mean width of fourth ventricle was 1.74 cm in 63 subjects (males & females).

The mean width of fourth ventricle **in present study by MRI** (1.74 cm) was more than that **in Duffner F et al**[6] **study by MRI** (1.25 cm), because they measured distance between roof and floor.

The mean width of fourth ventricle **in present study by MRI** (M- 1.78 cm, F-1.71 cm) was more than that in **D'souza e DMC & Natekar PE**[4] **study by CT** (M- 1.31 cm, F- 1.21 cm). The finding in our study was more in males than females which correlate with finding of **D'souza e DMC & Natekar PE**[4]**study**.

The mean width of fourth ventricle **in present study by MRI** (1.74 cm) was less than that **in Akbari VJ et al**[5] **study by cast** (at the level of lateral recess) (2.38 cm), because of difference in method used.

Table 1: Width of fourth ventricle in various age groups

Age (years)	No	Mean (cm)	SD (cm)	Minimum	Maximum	P value
10-19	9	1.95	0.35	1.55	2.55	0.37
20-29	12	1.70	0.18	1.4	1.94	
30-39	8	1.63	0.44	1.21	2.18	
40-49	16	1.72	0.29	1.02	2.23	
50-59	4	1.64	0.32	1.16	1.86	
60-69	6	1.68	0.13	1.52	1.9	
70-79	5	1.78	0.14	1.69	2.02	
80-89	3	1.95	0.56	1.31	2.33	
Total	63	1.74	0.31	1.02	2.55	

Table 2: Comparison of width of fourth ventricle (by MRI)

Workers	Study done in	Method	No of subject	Sex	Mean (cm)	SD (cm)	Range (cm)
D'souza e DMC & Natekar PE[4] **(2007)**	Goa	CT	1000	Male	1.31	0.23	0.85-1.77
				Female	1.21	0.22	0.79-1.64
Akbari VJ et al[5] **(2010)**	Gujarat	Cast	20	M+F	2.38	0.44	1.75-3
Duffner F et al[6] **(2003)**	Germany	MRI	30	M+F	1.25	0.17	1.02-1.64
Present study (2021)	Gujarat	MRI	63	Male	1.78	0.32	1.21-2.55
				Female	1.71	0.29	1.02-2.23
				Total	1.74	0.31	1.02-2.55

The mean width of fourth ventricle in Gujarat was more than that study done by Duffner F et al[6] in Germany and by D'souza e DMC & Natekar PE[4] in Goa.

The mean width of fourth ventricle in present study was less than that Akbari VJ et al[5] study, because of difference in method used.

CONCLUSION

The knowledge of the measurement of ventricular system of brain by MRI is of use in diagnosis of some disease and surgical intervention like endoscopic neurosurgery.

The **mean width of fourth ventricle** is slightly more in males than that in females in MRI study. The mean width of fourth ventricle in Gujarat is more than that study done by Duffner F et al in Germany and by D'souza E DMC & Natekar PE in Goa. The mean width of fourth ventricle in present study is less than that Akbari VJ et al study, because of difference in method used.

REFERENCES

1. Singh V. Textbook of clinical neuroanatomy; chapter-10 cerebellum and fourth ventricle, chapter-11 diencephalon and third ventricle, chapter- 14 white matter of the cerebrum and lateral ventricles. 2nd edition; India; Elsevier; 2010;120-123, 137, 168-171.
2. Standring S, Borley NR, Coliins P, Crossman AR, Gatzoulis MA, Healy JC et al; Gray's anatomy, the anatomical basis of clinical practice; chapter-16 ventricular system and subarachnoid space, chapter-24 development of nervous system; 40th edition; Spain; Elsevier; 2008;237-240.
3. Corliss CE; Patten's human embryology, elements of clinical development; Chapter 13-the nervous system; USA; McGraw-Hill book company;1976;216-218.
4. D' Souza DMC, Natekar PE. Morphometric study of the ventricular system of Brain by Computerised Tomography. J Anat Soc India. 2007;56:19-24.
5. Akbari VJ, Saiyad SS, Pandya AM, Solanki SV, Dangar KP. A Morphometric Analysis Of Fourth Ventricle Of Human Cadaveric Brain By Plastination; National Journal Of Medical Research. 2011;1(2): 2249 4995,48-50.
6. Duffner F, Schiffbauer H, Glemser D, Skalej M, Freudenstein D. Anatomy of the cerebral ventricular system for endoscopic neurosurgery: A magnetic resonance study. Acta Neurochir. 2003;145:359–368.