

# Study on CT and MRI Correlation of Pediatric Brain Tumors: In A Tertiary Care Hospital

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## ABSTRACT

**Introduction:** In the pediatric population the central nervous system (CNS) is common site for the development of solid neoplasms exceeded only by leukaemia. Of all primary brain tumors, 15-20% arise in childhood. Computed Tomography (CT) and Magnetic Resonance Imaging (MRI) represent the two most important and commonly used imaging modalities. With the advent of CT in neuro radiology, direct images of the brain started. Magnetic resonance imaging is the modality of choice for evaluating patients who have symptoms and signs suggestive of brain tumor. Aims and objective: Correlation of pediatric brain tumors by CT scan and MRI imaging for accurate diagnosis in relation to age and sex. To find out most common brain tumors in pediatric age group.

**Material and methods:** The present study was carried out in the department of Radiology, Patna Medical college hospital during year June 2015 to Dec 2015. 50 cases with clinical symptoms of intracranial space occupying mass were referred for CT scan and MRI.

**Results and Discussion:** Out of 50 cases, 46 cases had been accurately diagnosed as brain tumors by CT scan and MRI. Male occupied 58% of the case and female occupied 42%. Peak age group for pediatric brain tumors was 5-10 years of age group (46%) and least common affected age group was 0-2 years (4%). Pilocystic astrocytoma constituted the maximum number of patients in our study.

**Conclusion:** MRI remains superior sensitivity in tumor localization in diagnosis over CT scan.

**Keywords:** CT, MRI, Pediatric Brain Tumors

## INTRODUCTION

The third National Cancer Survey of the United States, in 1975, placed the incidence of central nervous system (CNS) neoplasm for children younger than 15 years of age at approximately 2.4 per 100,000 which increased to a corresponding value of 3.45 in 1994.<sup>1</sup> This rise in brain tumor incidence among children is attributed to improved diagnostic methods and more awareness of brain tumors among physicians.<sup>1,2</sup> Developed in the mid 70's the computed tomography (CT) scan revolutionized the diagnosis of brain tumors. CT images show skull, blood clots, and the calcified mass, appears white, while the brain is gray, and the CSF, fat and air appear black.<sup>3,4</sup>

Magnetic resonance imaging (MRI), which involves a high-powered magnet, became available in mid 1980's. MRI images are quite distinct, allowing a more detailed examination than is possible with CT. Because MRI gives not only an axial view but also coronal and sagittal views, three-dimensional examination is possible.<sup>5,6</sup>

The incidences of brain tumors in the children are approximately 2-5 per 100,000 per year. Most pediatric brain tumors are primary neoplasm; CNS metastases are rare in children.<sup>7,8</sup> Primary tumors of the central nervous system (CNS) are the

most common neoplasm in children and the leading cause of death in this patient population.<sup>9</sup> Hence the study was carried out to correlate pediatric brain tumors by CT scan and MRI in relation to age and sex further to find out most common pediatric brain tumour.

## MATERIAL AND METHODS

Patients having clinical symptoms of intracranial space occupying mass presented in department of Radiology at Patna Medical College Hospital, Patna are included in the present study. On the random basis, 50 cases are included with clinical symptoms of intracranial space occupying. All patients underwent as routine and contrast enhanced CT scan and MRI. Patients up to 15 years were included. Patient with no clinical symptoms of intracranial space occupying mass were excluded in the study. Ethical clearance and informed consent was taken prior to the commencement of study. The study was done.

1. To correlate pediatric brain tumors by CT scan and MRI imaging for accurate diagnosis in relation to age and sex.
2. To find out most common pediatric brain tumors.

## STATISTICAL ANALYSIS

Microsoft office 2007 was used for the statistical analysis. Mean and percentages were used to interpret the data.

## RESULTS

In our study of 50 patients, the initial diagnosis of brain tumours was done by Computed Tomography and on MRI.

The present study shows that out of 50 cases, maximum number of patients belongs to the age group of 5.1 to 10 years (46%) and minimum of 4% belongs to 0 to 2 years. Only 2 cases were reported between 0-2 years. 7 (14%) cases belongs to 2.1-5 age groups and 18 (36%) cases belongs to 10-15 age group. Out of

Age Group years	No of cases	Percentage
0-2	2	4%
2.1-5	7	14%
5.1-10	23	46%
10-15	18	36%

**Table-1:** Distribution of patients suspected of brain tumors as per age.

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Serial No.	Tumors	Presumptive diagnosis of CT Scan	Percentage	Diagnosis by MRI	Percentage
1	Astrocytoma	15	30	13	26
	Supratentorial	9	18	8	16
	Infratentorial	6	12	6	12
2	Malignant glioma	2	4	1	2
3	Brain stem glioma	4	8	4	8
4	Ganglioglioma	1	2	1	2
5	Medulloblastoma	4	8	4	8
6	Ependymoma	1	2	1	2
7	Tumor of suprasellar regions.	3	6	3	6
	Craniopharyngioma	3	6	3	6
8	Pineal region and germ cell tumours	1	2	1	2
9	Choroid plexus tumors	1	2	1	2
10	Others (Infarct, inflammatory granuloma, abscess)	0	0	4	8
	Total	50	100	50	100

**Table-2:** Comparative date of studied cases.

total number cases suspected of brain tumors 58% were male and 42% were female (table-1).

In our study of 50 cases of intracranial tumors 18% were located in supratentorial, 12% infratentorial. But by MRI 16% were located in supratentorial region. Malignant Glioma accounted 4% according to CT but by MRI it was 2%, Brain stem glioma 8%, Ganglioglioma 2%, Medulloblastoma 8%, Ependymoma 2%, Suprasellar tumor 6%, Craniopharyngioma 6%, Germ cell tumor 2% was diagnosed same by CT and MRI. 8% were diagnosed as infarct by MRI (table-2).

## DISCUSSION

In our study of 50 patients, the initial diagnosis of brain tumors was done by Computed Tomography and on subsequent MRI, 4 cases were misdiagnosed as brain tumors by CT. 92% of cases (46 out of 50) had positive MRI findings of brain tumors. These data clearly shows the increased sensitivity of MRI over CT scan in diagnosis of brain tumors. Coates T et al and Yuh EL documented that MRI appears to be more sensitive for brain tumors than CT scan in tumor detection.<sup>10,11</sup>

In our study of 50 cases of intracranial 9 (18%) were located in supratentorial and 6 (12%) in the infratentorial region by CT scan. Osborn 2008<sup>12</sup> also found similar incidence of 52% of supratentorial tumors and 48% of infratentorial tumors. The majority of infratentorial tumors were cerebellar astrocytic tumors (30%), Medulloblastoma (8%) Brain stem glioma (8%) Ependymoma tumors (2%), Craniopharyngioma (1%) diagnosed by CT. But by MRI Astrocytoma (26%), Medulloblastoma (8%), Brain stem glioma (8%), ependymoma tumors (2%), Craniopharyngioma (6%) and Pineal region germinoma (2%) was diagnosed.

In present study cerebellar astrocytoma was present in 15 (30%) patient diagnosed by CT and 13 (26%) patient diagnosed by MRI proved to be commonest tumor.<sup>8,9</sup> In our present study of 50 cases, who underwent CT scan and MRI it was found that 3 patient were detected Craniopharyngioma and 5 patient had suprasellar mass.<sup>13,14</sup>

Maximum number of patient (46%) belongs to 5.1 -10 years age group. This was reported by others.<sup>15,16</sup> out of total suspected cases of brain tumors 58% were males.<sup>17,18</sup>

In our present study of 50 patient, who underwent CT and

MRI imaging, it was found that 3 patients that were presented with visual disturbances and headache were diagnosed as a Craniopharyngioma by both CT and MRI.<sup>18</sup> Choroid plexus papilloma found in 1 patient accounted for 2% of pediatric brain tumor. Medulloblastoma was seen in 8% of cases.<sup>9</sup>

## CONCLUSION

Both CT scan and MRI play a complementary role in diagnosis of pediatric brain tumor. MRI because of superior sensitivity in tumor localization and revealing their secondary effects is the modality of choice for diagnosis of pediatric brain tumors if cost and availability is not a factor so that early accurate preoperative diagnosis and early intervention and rehabilitation could be done to cure the patients.

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