

**Original article:**

## Childhood brain malignancies: Imaging characteristics on MRI

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### Abstract:

**Introduction:** Besides the initial diagnosis, other goals of brain MRI for pediatric brain tumor should include differentiation of specific tumor types, grading tumors, distinguishing viable tumor from necrotic tissue, guiding stereotactic biopsy and determining treatment responses.

**Material and methods:** This was a non-interventional, cross sectional observational study of paediatric patients (age < 12 years) suspected to have brain tumour A total of 50 such patients referred to the radiology department of medical college where the study was conducted, were studied.

**Aims and objective :** to assess grade of tumor preoperatively and evaluate role of contrast enhanced MRI.

**Results:** According to MRI sensitivity, specificity and accuracy was 60% each, which increased to 97.5%, 80% and 90% on inclusion of post Contrast sequences. Free diffusion was mostly low grade on MRI. Significant association was seen between diffusion and grade on MRI.

**Conclusion:** Low grade pathologies often show free diffusion ( no restriction ), thus highlighting the role of DWI sequences in tumor evaluation. According to MRI sensitivity, Specificity, and accuracy was 60% each. Contrast Enhanced MRI showed sensitivity 97.5% Specificity 80% and Diagnostic accuracy 94% ; thus underlining the importance of post contrast evaluation on MRI.

**Keywords:** MRI , Brain malignancies

### Introduction:

Besides the initial diagnosis, other goals of brain MRI for pediatric brain tumor should include differentiation of specific tumor types, grading tumors, distinguishing viable tumor from necrotic tissue, guiding stereotactic biopsy and determining treatment responses. To narrow the differential diagnosis of pediatric brain tumors by using these advanced techniques, identification of findings that are inclusive, exclusive, or highly suggestive is required. In order to monitor treatment response in high-grade tumors accurately, we should be aware of imaging characteristics useful for that purpose.

**Aims and objective :** to assess grade of tumor preoperatively and evaluate role of contrast enhanced MRI.

### Material and methods:

This was a non-interventional, cross sectional observational study of patients suspected to have brain tumour. All paediatric patients (age < 12 years), with clinically suspected brain tumour referred to the radiology department of medical college where the study was conducted. A total of 50 such patients were

studied. MR imaging protocol employed included T1, T2, FLAIR axial and T1 sagittal DWI- ADC and Post Gadolinium contrast 3D sequences. Histopathological result was compared with DWI characters retrospectively. Post gadolinium contrast 3D sequences were taken for each patient.

**INCLUSION CRITERIA**

All patients with suspected brain tumors and age less than 12 years.

**EXCLUSION CRITERIA:**

Patients having contraindication for contrast such as contrast hypersensitivity / renal failure/ other contraindications related to MR imaging ( ex. metal prosthesis) and Highly irritable patient.

**Results:**

- Free diffusion was mostly low grade on MRI. Significant association was seen between diffusion and grade on MRI.
- According to MRI sensitivity was 60% while specificity was also 60%. Therefore diagnostic accuracy was 60%
- Sensitivity according to Contrast Enhanced MRI Sensitivity= 97.5% Specificity= 80% Diagnostic accuracy= 94% According to contrast enhanced MRI sensitivity was 97.5% while specificity was also 80%. Therefore diagnostic accuracy was 94% according to contrast enhanced MRI

**Table 1- Sensitivity according to MRI**

	Positive by diagnosis	Negative by diagnosis	Total
Positive by MRI	24	4	28
Negative by MRI	16	6	22
Total	40	10	50

**Table 2 : Sensitivity according to Contrast enhanced MRI**

	Positive by diagnosis	Negative by diagnosis	Total
Positive by MRI	39	2	41
Negative by MRI	1	8	9
Total	40	10	50

**Association of diffusion with grade of disease on MRI**

Free diffusion was mostly low grade on MRI. Significant association was seen between diffusion and grade on MRI

**Table 2 -Association of diffusion with grade of disease on MRI**

Diffusion	High grade (N)	High grade (%)	Low grade (N)	Low grade (%)
Free	8	40.00%	20	66.70%
Restricted	12	60.00%	10	33.30%
Chi-square	3.463	P value	0.0063 S	

### Discussion:

Brain and other central nervous system (CNS) tumors constitute the most common solid tumors in the pediatric population (ie, individuals aged 0–19 years), with an overall incidence of 5.81 cases per 100 000 individuals and is also the most common cause of cancer-related mortality in this age group. The rise in brain tumor incidence among children is also attributed to improved diagnostic methods and more awareness of brain tumors among physicians . MRI remains the most common imaging modality used to evaluate CNS tumors. Having a basic understanding of both the principles of tumor genomics and the recent updates in tumor genomics is crucial to radiologists who interpret neuro-oncology imaging studies.

- In the present study, sensitivity according to MRI and Contrast Enhanced MRI are as follows: Sensitivity according to MRI Sensitivity= 60% Specificity= 60% Diagnostic accuracy= 60% According to MRI sensitivity was 60% while specificity was also 60%. Therefore diagnostic accuracy was 60% according to MRI Sensitivity according to Contrast Enhanced MRI Sensitivity= 97.5% Specificity= 80% Diagnostic accuracy= 94% According to contrast enhanced MRI sensitivity was 97.5% while specificity was also 80%. Therefore diagnostic accuracy was 94% according to contrast enhanced MRI. Different observations were noted in the study of Bouzidi Y et al, that demonstrated no significantly increased sensitivity of contrast enhanced MRI from the usual MRI. (13)
- It was observed in the present study that free diffusion was mostly low grade on MRI. Significant association was seen between diffusion and grade on MRI, as shown in table 2. This is in concordance to the study of Sui Y et al. (14)
- **Conclusion:**  
Low grade pathologies often show free diffusion ( no restriction ), thus highlighting the role of DWI sequences in tumor evaluation. According to MRI sensitivity, Specificity, and accuracy was 60% each. Contrast Enhanced MRI showed sensitivity 97.5% Specificity 80% and Diagnostic accuracy 94% ; thus underlining the importance of post contrast evaluation on MRI.

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