Posterior Reversible Encephalopathy Syndrome in Pediatric Oncology: A Decade Long Retrospective Review

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Background:

Posterior Reversible Encephalopathy Syndrome (PRES) is a serious, potentially reversible neurological complication associated with chemotherapy or immunosuppressive therapy in children with hematologic and oncologic disorders.

Objective:

- Characterize clinical presentation and neuroimaging findings
- Describe treatment exposures, management and outcomes
- Identify predictors of adverse outcomes

Methodology:

- Retrospective cohort study conducted in the Pediatric Oncology Unit, Aga Khan University Hospital, Karachi; patients <18 years with PRES, Jan 2015–Dec 2024.

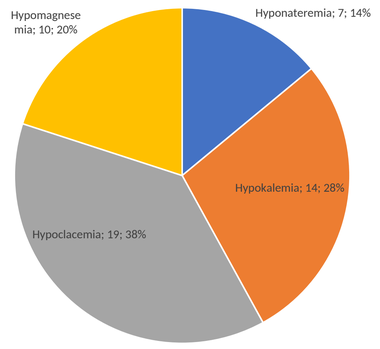
Inclusion Criteria: Children of both sexes, under the age of 18, who developed PRES while undergoing chemotherapy, immunotherapy, or targeted therapy.

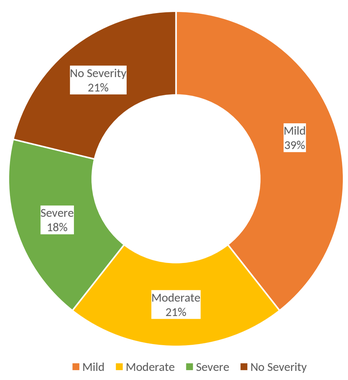
Exclusion Criteria

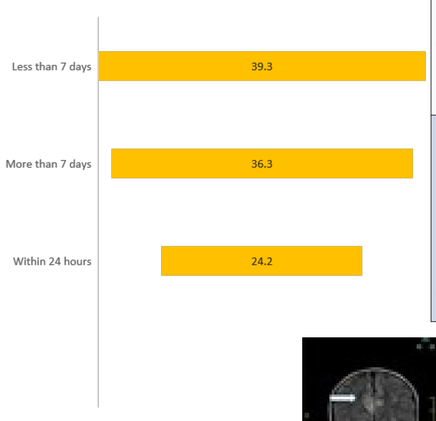
- Insufficient neuroimaging confirmation.
- Alternative neurological diagnoses such as primary seizure disorders, stroke, metabolic encephalopathy, and central nervous system infections.
- Pre-existing chronic neurological conditions like neurodevelopmental disorders or long-term epilepsy.

Results:

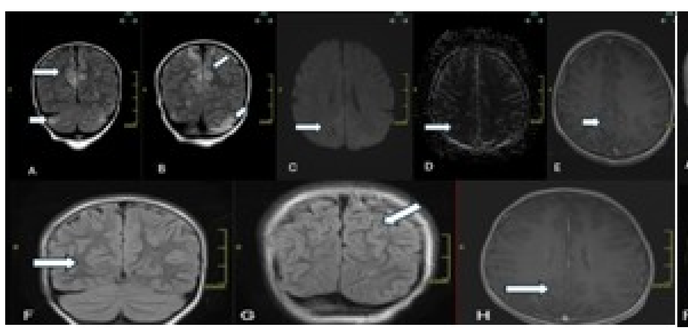
- n=33: 69% male; 57% ALL.
- PRES most commonly occurred within 7 days of treatment; 2-drug chemotherapy was the most frequent exposure.
- Seizures: 78% | Hypertension: 60%
- MRI: Parietal 75% | Occipital 54%
- Hypocalcemia: 38%
- PICU admission: 39% | Mechanical ventilation: 21%
- Complete neurological recovery: 87% | Mortality: 30%
- Independent Predictors of adverse outcome: cerebellar involvement: aOR 15.34, p=0.009
- Increasing number of chemotherapy drugs: aOR 1.53, p=0.038
- Prior blood transfusion: aOR 0.022, p=0.001



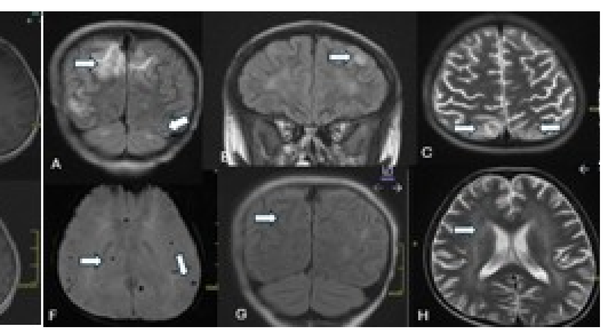




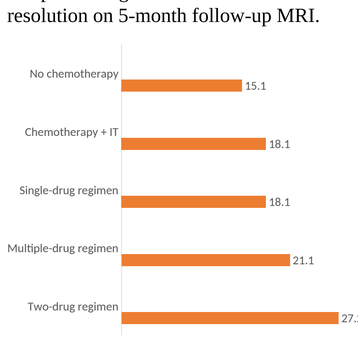
Regimen Group	N (%)	Common Diagnoses	Onset (<24h / <7d / >7d)	Severity Profile	Transfusion
Single Drug	6 (18.1%)	ALL, Thalassemia, Aplastic Anemia, Osteosarcoma	0 / 2 / 4	Mild:2, Mod:1, Sev:1, LE:2	Yes (4), No (2)
Two Drug	9 (27.2%)	ALL (6), AML (1), HL (1), Thalassemia (1)	3 / 3 / 3	Mild:3, Mod:2, Sev:3, LE:1	Yes (4), No (5)
Multi-Drug	7 (21.1%)	ALL (5), NHL (1), Nasopharyngeal Carcinoma (1)	1 / 4 / 2	Mild:5, Mod:1, Sev:1, LE:0	Yes (2), No (5)
Chemotherapy + IT	6 (18.1%)	ALL (6)	0 / 3 / 3	Mild:2, Mod:1, Sev:0, LE:3	Yes (0), No (6)
Supportive / No Chemotherapy	5 (15.1%)	ALL (2), HL (1), Thalassemia (1), Aplastic Anemia (1)	4 / 1 / 0	Mild:1, Mod:2, Sev:1, LE:0	Yes (2), No (3)

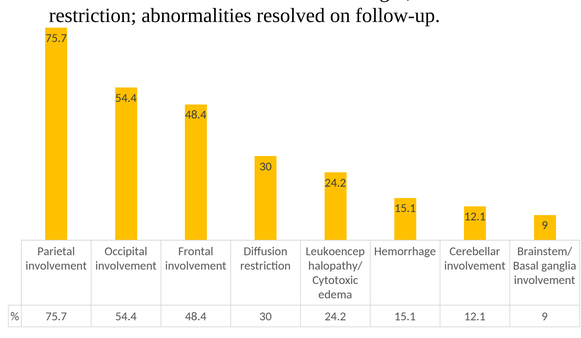


Typical PRES: 8-year-old boy with ALL and seizures: Bilateral parieto-occipital vasogenic edema without diffusion restriction, with complete resolution on 5-month follow-up MRI.



Atypical PRES: 13-year-old with ALL: Cerebellar, occipital and frontal involvement with microhemorrhages, without diffusion restriction; abnormalities resolved on follow-up.





Conclusions:

- Pediatric PRES is clinically and radiologically heterogeneous and can cause significant morbidity and mortality.
- Cerebellar involvement may be an important marker of adverse neurological outcome.
- Greater chemotherapy exposure was associated with poorer outcomes, highlighting the importance of treatment-related risk assessment.
- Early recognition of neurological symptoms is essential for timely intervention.
- Prompt MRI evaluation can identify both typical and atypical PRES patterns.
- Correction of reversible triggers, particularly hypertension and electrolyte abnormalities, should be prioritized.
- Multidisciplinary management involving oncology, neurology, radiology, and critical care is important.
- Findings support the need for larger multicenter prospective studies to validate prognostic factors and develop standardized management strategies.

