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Abstract: Pediatric stroke represents a rare but severe neurological condition associated with significant morbidity and long-term disability. In arid regions, extreme climatic factors such as chronic dehydration, high ambient temperatures, and environmental stressors may contribute to unique pathophysiological mechanisms influencing the onset and clinical course of cerebrovascular events in children.

Keywords: Pediatric stroke; arid climate; clinical characteristics; cerebrovascular disorders; dehydration; neurological deficits; ischemic stroke.

Introduction

Pediatric stroke is a relatively rare yet critically important neurological disorder that poses substantial diagnostic and therapeutic challenges. Unlike adult cerebrovascular diseases, stroke in children demonstrates heterogeneous etiological factors, atypical clinical presentation, and delayed recognition, often resulting in unfavorable neurological outcomes and long-term disability. Despite advances in neuroimaging and pediatric neurology, childhood stroke remains underdiagnosed, particularly in geographically and climatically extreme regions. Arid zones are characterized by persistently high temperatures, low humidity, limited water resources, and prolonged exposure to environmental stressors.

These conditions may contribute to physiological alterations such as chronic dehydration, hemoconcentration, electrolyte imbalance, and increased blood viscosity, which can predispose children to cerebrovascular events. Moreover, socio-environmental factors, including limited access to specialized medical care and delayed hospital presentation, further exacerbate disease severity in these regions.

Materials and Methods

This study was designed as a retrospective observational investigation conducted in neurological and pediatric departments of healthcare institutions located in arid climatic regions. The study period covered pediatric stroke cases registered over several consecutive years, allowing for comprehensive analysis of clinical presentation and outcomes under arid environmental conditions. The study included pediatric patients aged from 1 month to 18 years who were diagnosed with acute ischemic or hemorrhagic stroke. Stroke diagnosis was confirmed based on clinical neurological assessment and neuroimaging findings. Patients with traumatic brain injury, brain tumors, congenital brain malformations, or incomplete medical records were excluded from the study. Clinical data were obtained from medical records and included demographic characteristics, medical history, presenting neurological symptoms, time from symptom onset to hospital admission, and comorbid conditions. Special attention was paid to dehydration status, presence of fever, electrolyte imbalance, and hematological abnormalities at admission. Neurological assessment was performed using age-appropriate neurological examination scales.

Results

The study analyzed pediatric patients diagnosed with stroke who were living in arid climatic regions. Most of the patients were of school age, with a slightly higher number of male children. A significant number of cases were admitted to the hospital with a delay after the onset of symptoms. Ischemic stroke was more frequently observed than hemorrhagic stroke. Neuroimaging studies showed that ischemic lesions were mainly localized in major cerebral arterial territories. Hemorrhagic strokes were less common but were associated with more severe clinical conditions. The most common clinical manifestations included hemiparesis, speech disturbances, facial asymmetry, and seizures. Seizures were particularly frequent in younger children. Altered level of consciousness was observed in patients with severe stroke. Laboratory findings revealed signs of dehydration, electrolyte imbalance, and increased blood concentration in many patients. These changes were more pronounced during periods of high environmental temperatures. Children with dehydration had more severe neurological symptoms and longer hospital stays.

Discussion

The results of this study indicate that pediatric stroke in arid zones has specific clinical features influenced by environmental conditions. High temperatures and limited water intake may contribute to dehydration, which plays an important role in the development and severity of stroke in children. The predominance of ischemic stroke observed in this study is consistent with findings reported in other pediatric populations. However, the high frequency of dehydration-related laboratory abnormalities suggests that climatic factors may increase the risk of cerebrovascular events in arid regions. Delayed hospital admission was a common finding and may be explained by the nonspecific early symptoms of pediatric stroke and limited access to specialized medical care. This delay negatively affects early diagnosis and treatment, leading to more severe neurological outcomes.

Conclusion

Pediatric stroke in arid climatic zones is characterized by specific clinical features influenced by environmental conditions such as high temperatures and limited water availability. Dehydration, electrolyte imbalance, and delayed hospital admission play an important role in the severity and progression of cerebrovascular events in children. Ischemic stroke was identified as the most common subtype, while hemorrhagic stroke, although less frequent, was associated with more severe neurological outcomes. The presence of seizures, motor deficits, and altered consciousness highlights the complexity of clinical presentation in pediatric patients. Early diagnosis remains a major challenge due to nonspecific initial symptoms and limited awareness of pediatric stroke, especially in arid regions. Timely neurological assessment and adequate hydration may significantly improve clinical outcomes. The findings of this study emphasize the need for increased clinical awareness, early recognition, and region-specific preventive strategies to reduce morbidity and long-term disability associated with pediatric stroke in arid zones.

References:

1. Ferriero DM. Neonatal brain injury. *New England Journal of Medicine*. 2004;351(19):1985–1995.
2. Mackay MT, Ganesan V, Steinlin M, et al. Stroke in childhood: clinical presentation, risk factors, and outcome. *The Lancet Neurology*. 2004;3(5):306–315.
3. Fullerton HJ, Wu YW, Sidney S, Johnston SC. Risk of recurrent childhood arterial ischemic stroke in a population-based cohort. *Stroke*. 2007;38(10):2658–2664.



4. Mallick AA, O'Callaghan FJK. Risk factors and treatment outcomes of childhood stroke. *Expert Review of Neurotherapeutics*. 2010;10(8):1331–1346.
5. Amlie-Lefond C, Bernard TJ, Sébire G, et al. Predictors of cerebral arteriopathy in children with arterial ischemic stroke. *Stroke*. 2009;40(1):165–171.
6. Kirkham FJ, Hogan AM. Risk factors for arterial ischemic stroke in childhood. *Pediatric Neurology*. 2004;30(2):81–92.
7. Goldenberg NA, Bernard TJ. Venous thromboembolism in children. *Hematology/Oncology Clinics of North America*. 2010;24(1):151–166.
8. World Health Organization. *Global Health Estimates: Neurological Disorders*. WHO; 2019.

