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PAEDIATRIC STROKE; CLINICO- ETIOLOGICAL PROFILE AND OUTCOME

Paediatrics

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ABSTRACT

Background: Stroke in the paediatric age group is an increasingly conceded cause of significant long-term morbidity that creates a substantial burden of illness on the affected individual as well society at large.

Objectives Of The Study:

1. To study the etiological profile of stroke or cerebrovascular accident.
2. To study the various clinical presentation of stroke in children.
3. To study the outcome of stroke.

Study Design: Prospective observational study. **Study Participants:** After obtaining ethical committee clearance and informed consent from the parents and patients, 32 children between age group of 1 month to 15 years admitted to teaching hospitals attached to MR medical college kalaburagi. **Results:** According to the present study it was found that occurrence of stroke was more common among children between 3-10yrs of age. Stroke was more common in male compared to female with a ratio of 1.2:1. The most common clinical presentation being hemiparesis 71.8% followed by fever and convulsions 43.8%. Arterial ischemic stroke was more common compared to haemorrhagic stroke accounting to 84.4% of the cases. Among vascular territories MCA was more commonly involved accounting to 43.8% of cases. Mortality of stroke cases in present was 6.25% and complete recovery on follow up was seen in 80% of cases and residual paralysis seen in 20% of cases. **Conclusion:** The most common presentation of childhood stroke being weakness/ hemiparesis followed by fever and convulsions. Hence any case presenting with above symptoms must be evaluated for stroke since its treatable and prevent residual paralysis with timely intervention.

KEYWORDS

Stroke, Paralysis, Convulsions

INTRODUCTION:

Stroke in paediatric age group is not as common as in adults. Common etiologies of stroke are also different in this age group. Paediatric stroke is now recognized as an important cause of morbidity and mortality in children[1]. In children, the presentation of stoke is often subtle and nonspecific that can also be attributed to other neurological disorders. The rarity of the condition and paucity of signs and symptoms can cause a delay in diagnosis and initiation of treatment[2].

Acute onset of focal neurological deficit is stroke until proven otherwise[3]. Pediatric ischemic stroke affects an estimated 1.0 to 2.0 in 100 000 children (non-neonates) annually in Western countries. Hemorrhagic stroke makes up about half of pediatric stroke, with an incidence of approximately 1 to 1.7 in 100000 per year[4]. Ischemic stroke is more frequently caused by arterial occlusion, but it may also be caused by venous occlusion of cerebral veins or sinuses. Haemorrhagic stroke is the result of bleeding from a ruptured cerebral artery or from bleeding into the site of an acute ischemic stroke.

Table 1: Risk Factors For Arterial Ischemic Stroke[3]

Category	Common	Uncommon
Arteriopathy	1.Inflammatory / Para infectious • Childhood primary angiitis of CNS • Transient cerebral arteriopathy •Focal cerebral arteriopathy 2.infectious • Bacterial and tubercular meningitis • HIV 3.dissection • Internal carotid arteries • Vertebral artery • Intracranial arteries 4.MOYA-MOYA disease • Moya Moya syndrome, NF – I, trisomy 21	• Secondary CNS vasculitis • SLE, PAN, IBD • Post radiation vasculopathy • Genetic • Congenital (e.g.: PHACES, Progeria, fibromuscular dysplasia)
Cardiac	1.complex CHD • Cardiac surgery (Fontan) • Cardiac catheterization(BAS) 2.other cardiac conditions • Bacterial endocarditis • Atrial septal aneurysms • Atrial septal defect • Patent foramen ovale • Venous thrombosis + R TO L shunt	Cardiomyopathy, myocarditis • Aortic coarctation • Valvular disease (rheumatic fever) • Arrhythmias (atrial fibrillation) • ECMO • Embolism (air, fat, amniotic fluid)
Prothrombotic	1.factor v laden 2.protein C deficiency 3. lupus anticoagulant 4. anticardiolipin antibodies	• Hyper homocystenemia • Protein s deficiency • Antithrombin III •Dysfibrinogenemia • Pregnancy, puerperium
Haematological	1.sickle cell disease 2.iron deficiency anaemia	•Thalassemia •Polycythaemia • Leukaemia • HUS, ITP,TTP
Medications/ drugs	1.oral contraceptives Chemotherapy/ L-asparaginase	• Cocaine ergots, triptans
Other	Migraine ,inborn errors of metabolism Acute systemic illness(Dehydration, sepsis, diabetic ketoacidosis)	• Metabolic syndromes • Cigarette smoking

DEFINITION OF STROKE ACCORDING TO WHO:

- Stroke is defined by World Health Organization as 'a clinical syndrome consisting of rapidly developing clinical signs of focal (global in case of coma) disturbance of cerebral function lasting more than 24 hours or leading to death with no apparent cause other than a vascular origin.[5]
- CHILDHOOD STROKE: Stroke occurring after 28 postnatal days of life to 18 years of age.[6]

The duration cut-off of 24 hours is in the context of defining another vascular event.

Transient ischemic attack (TIA):
A sudden focal neurologic deficit that lasts for less than 24 hours, of presumed vascular origin, confined to an area of the brain or eye perfused by a specific artery.

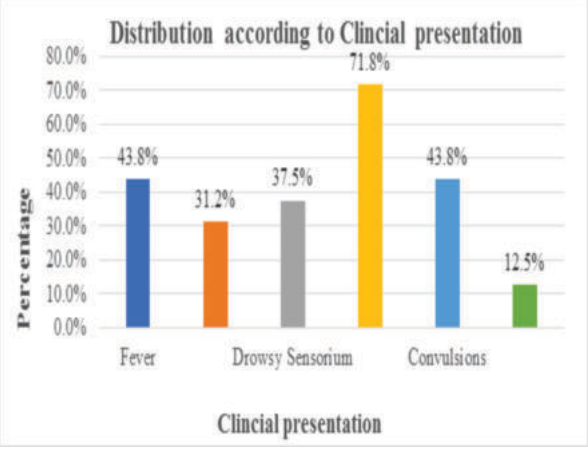
Table 2: Presentation According To Vascular Territory Involved[7]

Vascular territory	Presentation
1. ANTERIOR CEREBRAL ARTERY	Primarily lower extremity weakness Loss of voluntary control of micturition Behavior and memory disturbances
2. MIDDLE CEREBRAL ARTERY	Contralateral Hemiplegia with upper limb predominance Contralateral homonymous Hemianopia Aphasia Apraxia
3. POSTERIOR CEREBRAL ARTERY	Vertigo, ataxia, nystagmus Sensory loss, pain, movement disorders due to thalamic involvement Cortical blindness

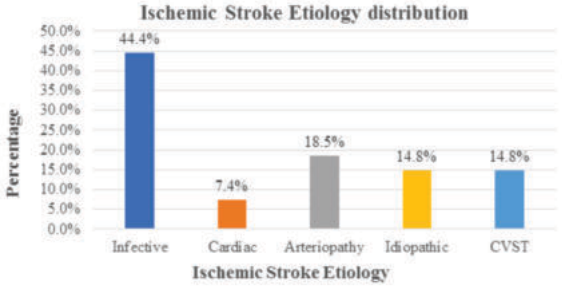
METHODS:
This prospective observational study was conducted in department of pediatrics at basaveshwara and sangameshwara tertiary care teaching hospitals attached to MR medical college from March 2021 to August 2022 after obtaining ethical clearance from institutional ethical committee for human research. Written informed consent was taken from parents for participation in the study.

All children between 1 month to 15 years who presented with acute onset of symptoms were included in the study and those children with presentation lasting for more than 24 hrs were excluded from the study.

RESULTS:
A total of 32 cases who fulfilled the inclusion criteria were included in the study. Among which, the most common age group of presentation i.e. 40.6% cases in 3-10 yrs. age group followed by 28% , 25%, 6.2% in 1-3 yrs. , >10yrs, <1yr respectively. M: F ratio 1.2:1. Ischemic stroke was more common (84.4%). Most common clinical presentation was weakness /hemiparesis followed by fever, convulsions and altered sensorium. Most common etiology of stroke in the present study was infective (44.4%) followed by arteriopathy. Among the infectious causes pyogenic meningitis was found to be more common (41.7%). Cranial nerve 7 was more commonly involved (81.2%).weakness was a common clinical presentation in all age groups . Convulsion was more common presentation of stroke among infants and toddlers. (P=0.012). Out of 4 cases of speech disturbance, all were in age groups in between 3 – 10 years. Headache was more common presentation among older children (P=0.041). 60.9% cases had single artery involvement, whereas 39.1% cases had multiple artery involvement. 43.8% cases presented with MCA territory involvement followed by vertebro-basilar arteries. There was a no statistically significant association between age and fever, sensorium, speech. Around 93.7% of cases showed improvement, among these 20% cases show complete recovery and residual paralysis was seen in 80% of the cases, death was seen in 6.25% of cases.



Graph 1: Distribution according to clinical presentation.



Graph 2: Etiology of Arterial ischemic stroke distribution

Table 3: Outcome Of Stroke

OUTCOME	No. of cases	Percentage
Improved	30	93.75%
Death	2	6.25%

DISCUSSION:
Most common age of presentation of stroke in the presence study was 3-10years which was similar to Dubey S et al, Patil S et al and Patra et al. mean age of presentation in the present study was 4.14% (4.75%). Cases of stroke were more common in male children (56.25%) which was similar to Dubey S et al (65.5%) Patra et al (70.6%) whereas it was found to be more common in female children according to Patil et al. the most common presentation of stroke in the present study was weakness or hemiparesis (71.8%) followed by convulsions and fever which was similar to Dubey S et al, Patil et al and Patra et al. according to present study, most common type of stroke was arterial ischemic stroke (71.8%), followed by 15.6% of haemorrhagic and 12.5% CVST which was similar to Dubey s et al, Patil s et al and Patra et al . according to the present study 37.5% cases had infective etiology which was similar to Patil et al with 38.7% cases and 41.2% of cases according to Patra et al, but according to Dubey S et al most common etiology was Arteriopathy i.e. 30%. MCA 43.7% was most commonly involved in the present which was similar to Patil et al 61.4% . Mortality due to stroke was seen in 6.25% cases, however in Taiwan university and Hong kong university studies mortality was 21% and 18% respectively.

Table 4: Comparison Of Etiology Of Stroke In Study Subjects In Present And Other Studies

Etiology	Dubey S et al[8] (n=70)	Patil S et al[9] (n=33)	Patra et al[10] (n=34)	Present study (n=32)
INFECTIVE	10 (14.28%)	12(38.70%)	14 (41.2%)	12(37.5%)
ARTERIOPATHY	21 (30%)	6(19.53%)	7 (21.21%)	5(15.6%)
CARDIAC	07 (10%)	2(6.45%)	2(5.9%)	2(6.25%)
HEMATOLOGICAL	04 (5.7%)	4(12.9%)	4(11.8%)	4(12.5%)
IDIOPATHIC	04 (5.7%)	7(22.58%)	5 (15.15%)	7(21.87%)
PROTHROMBOTIC STATE	9 (12.85%)	0	0	2(6.25%)
VASCULITIS	5 (7.24%)	0	2(5.9%)	0
TRAUMA	10 (14.88)	2(6.45%)	0	0

CONCLUSION:
Within the constraints of the present study it was found that mean age of occurrence of pediatric stroke was 4.14 (4.75) years. Incidence of stroke was more common in male children. The most common presentation of childhood stroke was weakness/ hemiparesis followed by fever and convulsions. Ischemic stroke was more common in paediatric age group than haemorrhagic stroke. Mortality of stroke cases in present study was 6.25% and complete recovery on follow up was seen in 80% of cases and residual paralysis seen in 20% of cases. . Hence any case presenting with above symptoms must to be evaluated for stroke since it's a treatable and prevent residual paralysis with timely intervention.

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