

ETIOLOGY AND CLINICAL PATTERNS OF STROKE AND HEMIPLEGIA IN A
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ABSTRACT

Introduction: Hemiplegia & stroke are not as common in children as in adults. However, diagnosing the cause of stroke will help in providing preventive & curative treatment. **Methods:** This retrospective study was carried out on 51 cases of hemiplegia admitted during a period of three years (1st January 2015 - 1st January 2018) admitted to Children Welfare Teaching Hospital / Medical City Complex / Baghdad. The age range was 9 months to 14 years. The data were obtained from patients' record history & examination as age, sex, clinical features & investigations. **Results:** Males constituted 54.9% while females constituted 45.1%. The main etiology of stroke was intracranial infections causing stroke in 31(60.78%) patients & the majority of them (61.29%) in this group were below 5 years, unknown etiology in 5 patients (9.8%), after necessary available investigations, 21 cases (68%) were right sided hemiplegia, 10 (32%) cases were left sided hemiplegia.

KEYWORDS: Stroke; hemiplegia; intracranial infection; brain tumor.**INTRODUCTION**

Hemiplegia means paralysis on one side of the body, while hemi paresis means weakness on one side of the body. The paralysis in the body occurs on side opposite the affected brain.^[1] Hemiplegia accounts for one third of cases of cerebral palsy & it is of two types: congenital & acquired. Congenital hemiplegia is defined as hemiplegia whose causal lesion is presented before the end of neonatal period. It is thought to be prenatal in about 75% of cases. Boys affected more than girls, right sided was involved in 53%-58% of cases. It is due to damage of brain tissue, most commonly at the level of cerebral cortex or internal capsule.^[2] Unilateral paresis & spasticity are characteristic features of hemiplegia, weakness usually predominant in the distal part of limbs, hemiplegia is rarely diagnosed at birth, silent interval is present in more than 90% of cases & last until age 4-5 months.^[3] Acquired hemiplegia is the commonest type of cerebral palsy (CP) during infancy and early childhood. The stroke is the most common cause of acquired hemiplegia, as vascular disease, inflammatory disorder, & migraine.^[4] Stroke is an important cause of mortality & chronic morbidity in children. Cerebrovascular disorders are commonly the top ten causes of death in children, one of hundreds of children who suffer a stroke each year, will have permanent motor or cognitive disability. Recent improvements in imaging techniques have led to increase detection & characterization of stroke in children & have contributed to increase in the reported incidence & prevalence of the disorder.^[5] Stroke

may be caused by arterial thrombosis/embolism, intracranial hemorrhage, venous thrombosis, and various miscellaneous conditions. Arterial thrombosis/embolism (AT/AE) is defined as an acute focal neurologic deficit lasting more than 24 hours with neuroimaging evidence of cerebral infarction. The incidence of childhood arterial ischemic stroke (AIS), as reported by population-based studies and hospital discharge surveys, ranges from 0.6 to 7.9 per 100,000 children. This may involve major cerebral arteries (internal carotid, anterior, middle & posterior cerebral artery) or small cerebral arteries.^[2] Risk factors of (AT/AE) include cardiac causes (congenital and acquired heart disease)^[5], hematological causes, hyperviscosity syndromes^[6], and sickle cell disease (SCD)^[7,8], coagulation disorder (anti thrombin III deficiency), metabolic disorders (homocystinuria)^[9,10], vascular disorders (Moyamoya & arterial dissection^[11,12]), infectious disorders (meningitis, encephalitis, brain abscess, and sepsis), autoimmune disorders (polyarteritis nodosa, Wegener's granulomatosis, and Henoch-Schonlein purpura).^[13] The clinical presentation is different between embolism & thrombosis, which presented as sudden neurological deficit.^[14] A comprehensive evaluation of children with stroke should also include hematologic, metabolic, and angiographic studies, as recent evidence suggests that the identification of multiple risk factors predicts worse long-term outcome.^[15] Treatment should be directed to the underlying cause if it is identified. Thrombolytic therapy is recommended in special situations, but should

only be considered at institutions able to support its complications.^[16] The decision is individualized based on the underlying etiology or the stroke.^[17]

Hemorrhagic Stroke (HS) is defined as an acute focal neurological deficit lasting more than 24 hours with neuroimaging evidence of intracranial hemorrhage not associated with ischemic infarction. The incidence of HS in children is estimated at 1.5 to 5.1 per 100,000 children per year. The majority of cases of HS in children are intraparenchymal intraventricular, subdural, and subarachnoid space may also be involved.^[18] The risk factors for HS include vascular malformations (blood disorders^[19], arteriovenous malformations^[20]), and malignancy.^[18] The acute management of children with HS should include aggressive treatment of blood pressure, infection, fever, seizures, and intracranial pressure. The treatment for vascular malformations includes surgery, endovascular embolization, and radio surgery.^[21]

Cerebral venous thrombosis (CVT) is defined as an acute onset of systemic or focal neurological symptoms consistent with cerebral venous thrombosis and neuroimaging evidence of thrombosis within cerebral veins or venous sinuses.^[22] The incidence of CVT in children is estimated at 0.4 to 0.6 per 100,000 children per year and is highest in the 1st year of life.^[23]

MATERIALS AND METHODS

This study was carried out in Children Welfare Teaching Hospital/ Medical City Complex/ Baghdad as retrospective study from first January 2015- first January 2018. The total of 51 patients who were admitted with age range of 9 months to 14 years, who presented with sign & symptoms of acute onset of stroke (hemiparesis, fever, fit & depressed consciousness).

Patients who had weakness due to Gullian-Barre syndrome, poliomyelitis & congenital hemiplegia were excluded.

The following data for each patient was obtained from patient's record as: name, age, sex, clinical features at presentation (fever, convulsion, depression of consciousness, weakness & its side, & other manifestations, & the investigations such as:

- 1) CBP + blood film.
- 2) PT, PTT, Hb electrophoresis.
- 3) C3, C4, anti phospholipids Ab.
- 4) EEG.
- 5) CT, MRI, brain x-ray.
- 6) ECG, echocardiography.

Statistical analysis

Data entered and analyzed using SPSS (Statistical Packages for Social Sciences) program, version 18. Descriptive statistics were (frequencies & percentages) used to examine relationship between factors that had been studied.

RESULTS

During three years period of study, 51 patients with different causes of hemiplegia were enrolled, 28 (54.9%) were males & 23 (45.1%) were females as shown in fig. (I). Thirty seven (72.5%) patients were less than 5 years & fourteen (27.4%) patients were more than five years old, as shown in fig. (II).

This study showed 31 cases (60%) had intracranial infections, 6 cases(12%) had cardiac disorders, 5cases (10%) of unknown etiology, 4 cases (8%) had brain tumor, 3 cases (6%) had hematological disorders & 2 cases (4%) had postgastroenteritis stroke, as shown in table (1), fig (III).

Among intracranial infections, 13 patients (41.93%) had acute septic meningitis & 18(58.06%) were ultimately diagnosed as acute viral encephalitis, as shown in fig. (IV).

In strokes due to intracranial infections, 19 patients (61.29%) were less than five years, 7 patients (36.4%) were males & 12 (63.1%) were females, 12 patients (38.7%) were more than five years, 7 patients (58.33%) were males & 5 patients (41.6%) were females, as shown in table (2), fig.(V).

All of these patients with intracranial infection had hemiplegia, 21(66.74%) had right sided hemiplegia & 10(32.25%) had left sided hemiplegia as shown in table (3).

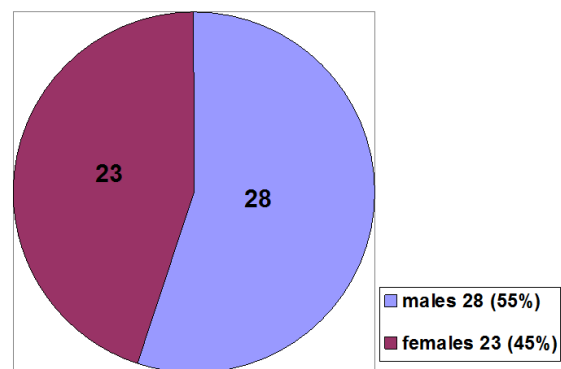
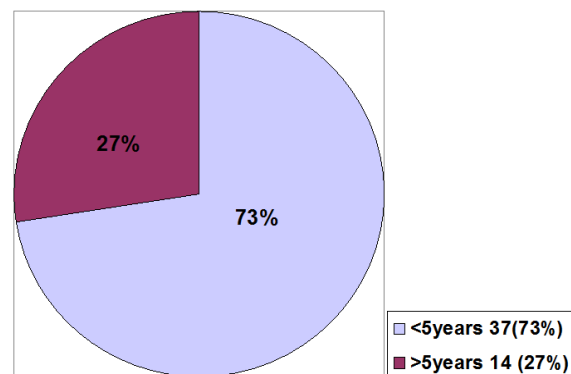
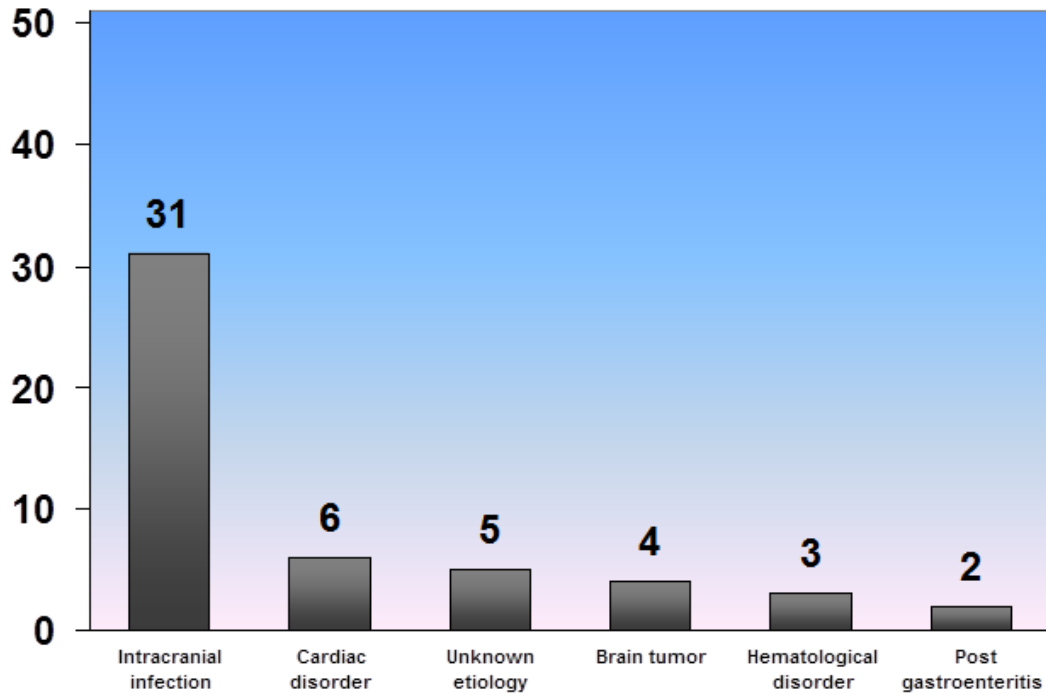


Figure (I): Sex Distribution of 51 patients.



Figur (II): Age Distribution of 51 patients.



Figure(III): Etiology of stroke.

Table (1): Etiology of stroke of 51 patients.

Etiology	No.	%
Intra cranial infection	31	60
Cardiac disorder	6	12
Unknown etiology	5	10
Brain tumor	4	8
Hematological disorder	3	6
Post gastroenteritis	2	4

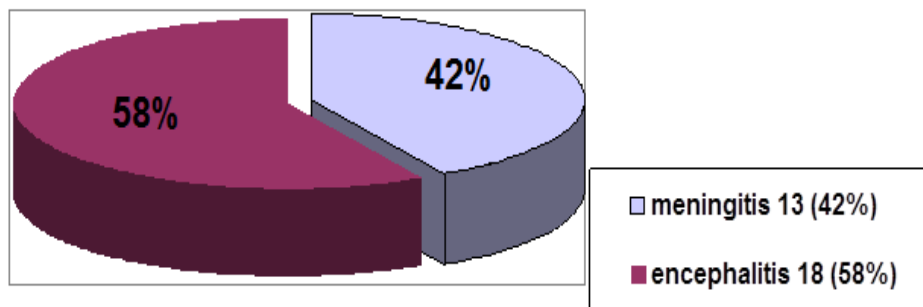


Figure (IV): Etiology of Stroke due to Intracranial Infection of 31 patients.

Table (2): Age & sex distribution of hemiplegic stroke due to intra cranial infection of 31 patients.

Age	Cases	Male	Female
<5year	19(61.29%)	7(37%)	12(63%)
>5year	12(38.7%)	7(58.33%)	5(41.66%)

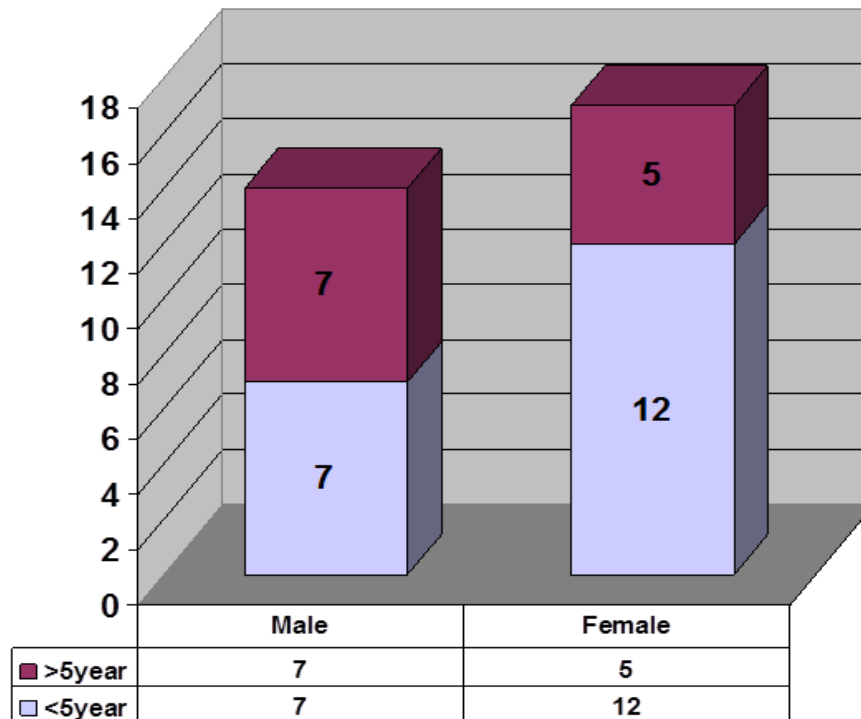


Figure (V): Age & sex distribution of patients with stroke due to intracranial infection.

Table (3): Pattern of stroke after intracranial infection of 31 patients.

Age	Left hemiplegia No.	%	Right hemiplegia No.	%
<5year	6	19.35%	19	61.29%
>5year	4	12.9%	2	6.45%

DISCUSSION

This study sheds light upon 51 cases of acute hemiplegia who were admitted to Children Welfare teaching Hospital in Baghdad in the last three years for different causes of hemiplegia.

Twenty eight patients (54.9%) were males, while 23 patients (45.1%) were females. This finding is similar to a recent study which showed that stroke is more common in boys, but most of previous studies showed that there was no gender differences.^[24]

The study showed that the majority (72.5%) of hemiplegia cases were less than 5years of age, which was associated with seizure at onset, with fever either before or at onset of hemiplegia. This is similar to what was found by Raman *et al*, 1997.^[25] In this study, intracranial infections were the most common etiology & causing stroke in 31 patients (60%). These results were similar to what was found by Herguner 2005.^[26]

Five patients (9.8%) had stroke of sudden onset in the absence of any fever, fit, signs & symptoms of encephalopathy & clinically all patients were stable.

In this study, patients were not tested for protein C & protein S, anti thrombin, anti phospholipids antibodies, factor V leiden, methyltetra hydrofolate reductase gene

& MRI due to lack of facilities. These patients were at increased risk of recurrent strokes, which could be prevented if etiology was known.

Migraine can cause recurrent strokes, however the history of migraine was absent in our patients. This finding is similar to the study of Saeed 2005.^[27]

In this study, it was found that acute bacterial meningitis 13(41.93%) & acute viral encephalitis 18 patients (58.06%).

Diagnosis of viral encephalitis was made on basis of clinical features (fever, headache, vomiting, abnormal behavior, fit & drowsiness), analysis of CSF & findings on brain CT-scan. Though MRI is the neuroimaging of choice in suspected cases of viral encephalitis, diagnosis can be predicted by clinical features & neuro-diagnostic tests in 80% of cases, similar finding has been reported by Kennedy 2004.^[28]

This study demonstrate that 19 (61.29%) of the cases were less than five years old & 12(38.70%) of the cases were more than five years old, in stroke due to intracranial infections which is similar to Saeed 2005.^[27]

The cases of right & left hemiplegia of intracranial infection patient that recovered were (68%) & (32%)

respectively, which are close to Michael V J 2008^[4]; which showed right hemiplegia is twice as common as left hemiplegia.

CONCLUSION

Intracranial infections were the most common cause of stroke in pediatric age group, especially in those less than 5 years old age. Boys were at greater risk of stroke regardless of stroke subtype, age, or etiology.

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