Research Article

International Journal of Spine Surgery and Research

Infantile and Post-Infantile Epileptic Spasms (West Syndrome) Presenting in Psychiatric Clinic of Sarkin Maska Shehu Hospital (SMASH) Funtua, Katsina State, Nigeria

Raji Saheed Olanrewaju[1]*, Garba Tukur[2], Dambo Fatima[3], Adamu Hannatu[3], Ahmad Adam[1], Musa Kabir[3] and Sulaiman Ridwanu[3]

[1]*Department of Clinical Services, Sarkin Maska Shehu Hospital (SMASH) Funtua, Katsina State, Nigeria.*

[2]*Department of Nursing Services, General Hospital Malumfashi, Katsina State, Nigeria.*

[3]*Department of Nursing Services, Sarkin Maska Shehu Hospital (SMASH) Funtua, Katsina State, Nigeria.*

***Correspondence:**
Raji Saheed Olanrewaju, Department of Clinical Services, Sarkin Maska Shehu hospital (SMASH) Funtua, Katsina State, Nigeria.

Received: 01 Nov 2024; **Accepted:** 03 Dec 2024; **Published:** 14 Dec 2024

Citation: Raji Saheed Olanrewaju, Garba Tukur, Dambo Fatima, et al. Infantile and Post-Infantile Epileptic Spasms (West Syndrome) Presenting in Psychiatric Clinic of Sarkin Maska Shehu Hospital (SMASH) Funtua, Katsina State, Nigeria. Int J Spine Surg Res. 2024; 1(1): 1-8.

ABSTRACT

Epileptic spasm is a type of seizure disorder, uncommonly diagnosed and under-recognized nosological condition with possibility of neuropsychological deterioration. This study aims to estimate the burden, identify the possible aetiological factors and the prognostic factors of epileptic spasm in psychiatric clinic of Sarkin Maska Shehu Hospital (SMASH) Funtua. Questionnaire detailing sociodemographic and clinical variables were administered to participants with symptoms of epileptic spasm who were recruited from psychiatric clinic over six months and followed up for another minimum period of six months. Data analysis was done with PSPP (free version of statistical package for social sciences, SPSS).

Data was collated from 57 out of 59 participants diagnosed of epileptic spasms during the study period. 30 (52.60%) were males, infancy was the modal age of symptom onset, though usually presented at toddlers and school age group with median frequency of 10-spasms per day. Cerebral Infection/infestation 16 (28.07%), precipitate labor 14 (24.56%) and hypoxic-ischemic-encephalopathy (HIE) 11(19.30%) were the leading contextual factors recognized in the study. Total spasm abatement was attained in 21 (56.76) out of 37 participants placed on prednisolone therapy. None of the factors studied is associated or predict response to prednisolone therapy.

Epileptic spasm is relatively common in the study setting. Onset is usually in infancy, though usually presented in toddler and school-age, with few adult onset and presentations. Cerebral Infection/infestation, precipitate labor and perinatal asphyxia were the leading contextual factors. Prednisolone was the only first-line treatment option in the study center with total symptom abatement in most participants.

Keywords
Infantile, Post-infantile, Epileptic, Spasm, West syndrome.

Introduction

Global Burden of Epilepsy

Seizure Disorder remains an important cause of morbidity and mortality across ages and cultures. It is the commonest neurological disorder affecting about 50-million people worldwide and its effect are more deleterious in developing brain of paediatric age group [1] as it impairs further development. Affected children from low and middle income countries (LMICs) suffer more than their counterparts from higher income countries due to the higher rate of multi-morbidity, lack of specialist expertise (Neurologist, Psychiatrist, Paediatricians, Neurosurgeons etc) and equipments (electroencephalogram, computer tomography / magnetic resonance imaging scan, transfontanelle ultrasound scan) for assessment and diagnosis, limitations of available antiepileptic drugs (AED) options, non-availability/non-affordability of surgical

treatment and other non-pharmacological treatment option (eg electroconvulsive therapy, vagal nerve stimulation, deep brain stimulation, seizure alert devices etc.) all occasioned by poor social and economic situation in LMICs [2].

Nomenclature/Taxonomy; Epileptic Spasm (infantile and post-infantile onset and presentations)

Epileptic spasm (ES) is a type of seizure disorder that is characterized by episodic jerky flexion or extension of the neck, trunk or limb muscles over few seconds with or without the hypsarrhthmic features on electroencephalography (EEG) and developmental anomaly. It was first described in 1841 by Dr William James West in his own four-month old baby [3], hence the eponym "West Syndrome". The original description of West syndrome usually refers to the triad of infantile spasm, hypsarrhythmia with developmental anomaly of delay, arrest, regression or retardation in psychological, intellectual, speech and/or motor functions [4]. However, the eponymous terminology is still used to describe the spasm in literatures irrespective of infantile or post-infantile age of onset/presentation with or without the presence of the other two features of the triad [5] and this will be adopted in this study. Other terms that are also used in describing the spasm are "jackknife epilepsy" "lightning attack", "salaam attack" [4]. The spasm usually start in the first year of life (infantile) but can present later in some up till adolescence [3,4]. Cases of adult onset of similar symptoms have also been reported in literature [6]. This probably call for the change of name of this clinical condition as the term "epileptic spasm", ES (as opposed to the term 'infantile spasm', IS) is now favoured in the most recent operational classification by the International League Against Epilepsy (ILAE 2017) commission for classification and terminology [7].

Diagnostic Dilemma

It is also realized that some types of seizure disorders are grossly under-recognised thus underdiagnosed even amidst specialists. Notable among the commonly misdiagnosed seizure disorders is the epileptic spasm. Under-recognition and diagnostic delay [8] may be due to the acclaimed rarity of this seizure subtype in most literatures. However, the author has realized the recent referral of so many of these cases to psychiatrist by other health care workers who misdiagnose these cases as other forms of seizure disorders, or seeking second opinion upon poor treatment response, as well as concerned family members and friends who assume this presentation to be due to childhood behavioural disorders in these patients. This is by far commendable and it's better than the neglect of this symptoms in childhood which usually progress to gross abnormality of brain development, with worsening, intractable and other syndromic seizures [3] (eg Lennox-Gastault syndrome), repetitive head injury (Figure 1), intellectual deterioration/ disability, regression of motor developmental milestone as well as speech /communication problems [9].

The country, Nigeria is not an exception in the under-recognition of this condition and this tarnish the image and repute of the healthcare sector in the country. It was reported in the year 2020 that a Nigerian baby boy was referred to an Indian hospital for treatment of infantile spasm by his relation who is also a healthcare worker [10]. Alas! this is an ailment that can be treated with few weeks of oral or parenteral medication without usually requiring any surgical intervention. Personal communication with some colleagues on this subject show that practitioners regard this as another type of epilepsy (especially myoclonic epilepsy) but the ailment will not subside most time till the appropriate treatment is given which can only occur if appropriate diagnosis is made as the situation doesn't respond to most readily available conventional antiepileptic drugs (AEDs). There is need for awareness of this deadly and debilitating illness amidst healthcare workers to enable early diagnosis, early intervention and averting complications.

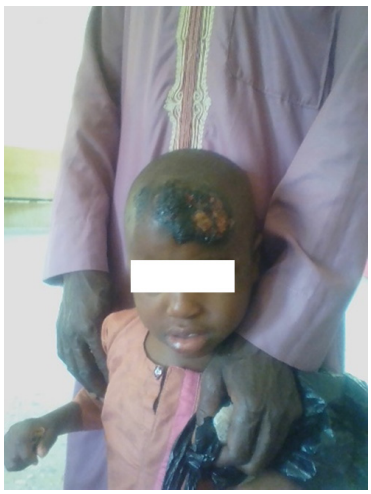

Figure 1: Picture of frontal scalp injury in a male child resulting from repetitive fall during episodic epileptic spasms (picture taken with parent's permission).

Associated Factors

Several social and clinical factors are attributed to development of ES in literatures. Male gender preponderance was reported in most literatures. 87.5% male predominance was reported in South African literature [4]. 19 (70.4%) out of 27 cases studied in Enugu, South-eastern Nigeria were male. Dr William West first reported this condition in his 4-month boy [3]. Mean age of symptom presentation was 4.8-month in Enugu study with modal age range of presentation of 6-12 months is in tandem with the earliest ever reported case (by Dr Williams West 180 years ago!). Mean age of symptom onset of 7.5-month was documented in South Africa. Birth trauma was considered as the leading aetiology in Enugu study (33%) as well as Lagos study (15%). Other perinatal conditions were associated with ES in 23% of cases in Enugu study. Up to 50% of cases in South Africa has identifiable perinatal aetiological factor [4]. Aetiology cannot be discerned in 26% & 12.5% of Enugu (Nigeria) and Kwa-zulu (South African) studies respectively [4,11]. 38.5% of cases are of cryptogenic aetiology in an Indian study [5]. Other associated factors mentioned in literatures are CNS infection eg meningoencephalitis, toxoplasmosis. Implication of diphtheria vaccine in ES aetiology is controversial, unsubstantiated and probably coincidental [3]. Advent of advance neuroimaging modalities enables the identification of further possible aetiologies though this is not usually affordable in our

study setting. Tuberous sclerosis, cerebral leucomalacia, atrophy and infarction, corpus callosum agenesis, are some of the featured found in the CT/MRI scan studies. Though most neuroimaging studies done in the subjects with ES are usually normal in more than 50% of cases.

Study Rationale

Numerous studies conducted in western countries claimed that ES is rare worldwide. Early reviewed literatures and meta-analytical studies on the subject even claimed there were no reports of ES in Africa [4,12]. Though sparse, there are instances of documented cases of infantile seizures/ epileptic spasms in Nigeria. Egbuna reported 13 cases of infantile spasms who were treated in Lagos over six-year period in 1975 [11], Izuora also made a retrospective review of 27 cases of ES who were on treatment in Enugu between 1977 to 1980 [11]. In 2019, Salisu and Senbajo reported 6 cases of West Syndrome amidst 200 cases that were studied over six-month period in their EEG unit in Lagos [13]. The situation is not better in sister African countries. Only 8 cases of IS were found in a retrospective review of over 2000 cases of seizure disorders that were treated over a decade (2005-2015) in a paediatric neurology clinic of a quaternary hospital in Durbar, South Africa [4]. This trend suggests improvement in the awareness of this condition over decades in Nigeria and the world at large. Most of these studies recognized peripartal factors (like hypoxic-ischemic encephalopathy) meningoencephalitis, cerebral malaria etc as the commonly associated risk factors. These factors are commoner in African settings than the western countries and implies that the condition may actually be commoner in African than non-africans but are most likely underrecognised.

ES also sometime coexist with other commoner seizure types as well as other neuropsychiatric ailment which diagnoses may overshadow or be confused with that of ES.

Study Aim

The study aims to determine the burden of IS, contextual factors and prognostic factors in paediatric and adult patients.

Methodology

The study was conducted in the psychiatry unit of Sarkin Maska Shehu Hospital (SMASH, aka General Hospital) Funtua, which is a regional secondary health care facility under Katsina State Hospital Services Management Board that sub-serve the Katsina south senatorial district. The psychiatry unit of the hospital offers mental health services to walk-in and referred cases of all age groups on outpatient basis. Inpatient mental health services are also offered in paediatric, maternity, gynaecology, adult female and male wards, while those requiring electroconvulsive therapy and those who are at high risk of dangerousness to self or others are referred to the state owned psychiatric hospital in the capital city of Katsina for possible inpatient care. In the month of May 2021, A total of 956 clients were seen in the mental health clinic, 406 (42.47%) of which are cases of epilepsy, infantile spasms were recognized in 8 (4.57%, 3 new cases, 5 old cases) of them.

Ethical Approval

Ethical approval to conduct the study was obtained from the ethics committee of Katsina state ministry of health prior to commencement of the study.

Recruitment of Participants

Old and new patients that were clinically diagnosed as cases of ES were recruited for the study after getting informed consent from the caregiver or adult patients. Assent also obtained from older children and adolescent without co-occurring intellectual disability.

Study Instruments, duration

A semi-structured questionnaire was administered to each participant to inquire about the age, gender, settlement, family history of seizure or neuropsychiatric illnesses, prenatal and perinatal complications, neonatal jaundice, severe neonatal/ childhood illness, comorbid neuropsychiatric illness (eg ADHD, ASD) other types of seizure disorders, Illness complications (eg head injury, delayed milestone, blindness, speech defect etc), previous and current treatments with their outcomes. Anthropometric, laboratory, radiologic and neurophysiologic findings were also documented. Study was conducted between September 1st 2021 to February 28th 2022 and follow-up care continued till August 30th 2022 (twelve months) during which 59-cases were found but two of them were discarded due to non-completion of information.

Data Analysis

Data obtained were displayed in tables and figures, then analysed using the PSPP (free version of statistical package for social sciences, SPSS).

Relevance of the Study to Clinical Practice

This study is expected to expatiate our clinical understanding of ES, possible aetiological factors, elaborate more on its presentation patterns, discuss the available treatment options and evaluate the treatment outcomes/prognosis in our setting.

Management Approach

History taking, physical examination, laboratory investigations, brain imaging and electrophysiological studies were conducted as part the clinical assessment of the participants. Blood pressure, blood sugar and anthropometry were assessed in all participants before commencement of moderate dose corticosteroid (prednisolone) therapy of 10mg per day in two divided doses for initial duration of 1-2 weeks and increased gradually during follow up visits to a maximum dose of 20mg/day during follow up period of at least six months. Prednisolone is tapered off gradually when participants has been spam free for at least 2-weeks. Blood pressure, anthropometry, glucose monitoring and clinical assessment were repeated during subsequent clinical visitation as hypertension, obesity, hyperglycemia and neuropsychiatric symptoms can be part of the adverse effects of steroid therapy. Patients with respiratory tract infection or suspected symptoms of tuberculosis had mantoux test, sputum gene-x-pert and/or chest x-ray before commencement of steroid therapy. Coexisting acute and chronic illnesses were

managed before considering patient for first-line prednisolone therapy and all were on follow-up care for a minimum period of 6-months. Aderenocorticotrophin (ACTH) and Vigabantrine which are the other drugs of choice amidst the three first-line medications were not available in the country as at the time of this study. Only few participants can afford the high cost of electrographical study with interictal EEG and brain imaging (CT or MRI) studies as most participants fund their treatment on out of pocket basis.

Result

A total of fifty-nine enrollees were recruited for the study, but only 57 results were analysed. 30 (52.60%) of which were males. Participants' age ranged from 4-months to 70-years. Most patients (25, 43.90%) were presented within the age ranges of 5 – 12-years (school age), with mean symptom duration of 27.82 months. Infancy is the modal age group (17, 29.80%) for symptom onset.

Only 8 participants (14.04%) were seeking health care for this illness at the study setting for the first time, the remaining have had previous orthodox, herbal, syncretic or multiple sources of care before presenting to this study setting. Only 8 (14.04%) of the participants reported symptom improvement from previous care pathway. About 40% (23 participants) have speech delay, regression, regain or have no meaningful speech. Less than 50% (27, 47.30%) reported no abnormality of developmental milestone, others have either delayed, regression or regain (after initial regression) of motor developmental milestone. Forward flexion is the spasm type experienced by most participants (49, 85.96%), other spasm type reported are extension (backward) mixed and sideways spasms.

Hypsarrhythmia is found on EEG tracing of only one participant, sharp epileptiform waves was found in 4 tracings, phase reversals in three tracings. Others (49, 89.56%) cannot afford the cost of EEG. Brain Imaging studies was found to be normal in only 2 (3.51%) participants, various structural cerebral anomaly like infarction, hydraencephaly, mass lesion, atrophy and normal variants of ventricular asymmetry were found in six (10.53%) other participants. Others (49, 89.56%) cannot afford the cost of brain imaging studies. Most participants (52, 91.23%) have no health insurance (Table 1a).

Various comorbid illnesses accompanied the epileptic spam in the remaining participant. Generalised tonic clonic seizure disorder (30, 52.63%), cerebral palsy (20, 35.10%) and intellectual disability (8, 14.04%) were the leading comorbid conditions. No co-morbid illness was identified in 10 (17.54%) of participants (Table 1b).

No recognizable contextual factor could be found in about a quarter (14, 24.56%) of participants (Table 1c, Table 1d and Table 2). None of the identified contextual factors studied attained statistical significance when their association with response to prednisolone therapy was explored ($p \geq 0.05$, Table 3).

Table 1a: Clinical and sociodemographic Variables.

Variable	Frequency (n=57)	% (100)
Gender		
Male	30.00	52.60
Female	27.00	47.40
Age Class at Presentation		
Infancy (≤ 12 months)	4.00	7.00
Pretoddler (13 -24 months)	5.00	8.80
Toddler (25 – 59 months)	14.00	24.60
School-age (6 – 12 years)	25.00	43.90
Teenage (13 – 19 years)	1.00	1.80
Young Adult (20 -39 years)	4.00	7.00
Middle Age (40 – 64 years)	3.00	5.30
Elderly (≥65 years)	1.00	1.80
Age Class (at symptom Onset)		
Infancy	17.00	29.80
Pretoddler	8.00	14.00
Toddler	12.00	21.10
Schoolage	13.00	22.80
Young Adult	3.00	5.30
Middle Age	3.00	5.30
Elderly	1.00	1.80
Previous Treatment		
None	8.00	14.04
Herbal	26.00	45.61
Syncretic	28.00	49.12
Orthodox	20.00	35.10
Response to Previous Treatment		
Improvement	8.00	14.04
No improvement	64.00	112.28
Worsening	2.00	3.51
Speech		
Normal Speech	31.00	54.39
No Speech	7.00	12.30
Delayed Speech	6.00	10.50
Regress Speech	10.00	17.50
Regained Speech	3.00	5.30
Milestone		
Normal	27.00	47.40
Delayed	16.00	28.10
Regress	7.00	12.30
Regained	7.00	12.30
Spasm type		
Flexor/forward Spasms (jacknife/Salaam attack)	49.00	85.96
Extensor/Backward Spasms (spread-eagle type)	5.00	8.77
Mixed	2.00	3.51
Sideways	1.00	1.75
EEG findings		
Hypsarrythmia + sharp wave	1.00	1.75
Other epileptiform waves (Sharp wave)	4.00	7.02
Phase reversal	3.00	5.26
None	49.00	85.96
Brain Imaging Study		
None	49:00	85.96
Normal	2:00	3.51
Ventricular asssymetry	1	1.75
Hydraencephaly	1	1.75
Intracranial mass	1	1.75
Occipital infarction	1	1.75
Parietal infarction	1	1.75
Cerebral atrophy	1	1.75

Head Injury		
Yes	17.00	29.82
No	40.00	70.18
Health insurance		
Yes	5.00	8.77
No	52.00	91.23

Table 1b: Comorbidities.

None	10	17.54
Generalised Tonic Clonic Seizure Disorder	30	52.63
Complex Partial Seizure Disorder	2	3.51
Hypeactiviy Disorder	3	5.26
Autistic Spectrum Disorder	2	3.51
Speech Disorder	2	3.51
Cerebral Palsy	20	35.1
Intellectual Disability	8	14.04
Blindness	3	5.26
Nystagmus	1	1.75
Ataxia	1	1.75
Hypertension	5	8.77
Hypercholesterolemia	1	1.75
Diabetes mellitus	1	1.75
Severe malaria	1	1.75

Table 1c: Contextual Factors.

	n	**%**
None	14	24.56
Family History of Similar illness	4	7.02
Febrile Convulsion	1	1.75
Peripartal Asphyxia	11	19.30
CSM-CM	16	28.07
Maternal Eclampsia	1	1.75
NNJ	4	7.02
Postmaturity	1	1.75
First Twin	1	1.75
Precipitate Labor	14	24.56
Caesarian Section	1	1.75
Head Injury	2	3.51
Prolonged Labour	4	7.02
Severe Childhood Illness	1	1.75
Family History of NeuroPsychiatric illness	2	3.51
PROM	1	1.75
Delayed Second Stage of Labor	-	-
Recent DPT/ Pentavalent Vaccine	-	-

Table 1d: Therapeutic response.

	Frequency	**Percentage**
IS abatement with Prednisolone	21	36.80
Is improvement with prednisolone(>50% spasm reduction")	12	21.10
Unresponsive to prednisolone	3	5.26
Worsening with prednisolone	1	1.75
Is abates with carbamazepine	1	1.75
Is abates with valproate	1	1.75
Is abates with levatiracetam	1	1.75
Is abates upon treatment of comorbidity	3	5.26
Unknown/default after initial treatment	14	24.56

Table 2:

Variables	**N**	**Minimum**	**Maximum**	**Median**
Age at symptoms onset (months)	57	0.25	840.00	36.00
Age in Months (at presentation)		4.00	840.00	72.00
Symptoms Duration (Months)		0-.10	230.00	12.00
Symptoms frequency		0.10	100.00	10.00

Discussion

A total of fifty-seven (out of fifty-nine) cases of infantile spasm that presented to the study centre within twelve months' study period by far outnumber 27 cases that were reported by Izuora in Enugu, Nigeria about four decades ago over a 3-year period (~9 cases per year) [11]. The number reported in our study is similar however to 520 cases reported over a period of 10 years (2010 -2019) in a Chinese longitudinal study [15]. Only 94 cases were registered as IS in a study conducted in Karachi, Pakistan within 2010 -2015 [17]. A meta analytic study has suggested a latitudinal difference in global epidemiology of IS with higher reportage in Scandinavian countries and total non-recognition in the entire continent of Africa [12]. This study implies the increasing recognition of IS/ES in Nigeria and the need to realize that the condition is not as rare as previously portrayed but grossly underecognised and underdiagnosed due to the usual late (post-infantile) presentation [18]. Most studies reported male preponderance in epidemiology of IS [17]. Izuora reported male- female preponderance ratio of 2.4:1 [11]. This is in sharp contrast to 1.1:1 male female ratio reported in this study, implying equal gender commonality which concur with findings in fewer reports [12].

Symptom presentation in this setting is usually at higher age (post-infantile). Most (43.9%) participants are already of school age upon presentation. Symptom onset however usually dated back to infancy in most participants which is similar to what is reported in other studies [12,18]. Post-infantile age of illness presentation (pre-toddler to elderly) was reported in over 70% of participants in this study, though infancy remains the modal age class for the symptoms onset (Table 1a, Table 2). The need to recognize the fact that any age group can be affected necessitate the call for change in the nomenclature of this nosological entity. The use of the term like "infantile spam", "infantile epileptic spam syndrome" may worsens the diagnostic confusion. A simpler term like "epileptic spasm" as suggested by the International League Against Epilepsy (ILAE) 2017 classification [7] or the eponym "west syndrome" is preferred. Post-infantile presentation has been reported and recognized in other studies [6,16-20].

Only 8 (14.04%) of the participants presented in this facility for the first time others have had herbal, syncretic, orthodox or attended multiple care settings prior to seeking treatment in the study setting with only 8 (14.04%) reporting some improvement during prior treatment. Others express no improvement or worsening symptoms with prior treatments. This shows that previous care path may constitute a delay in seeking specialist care without improving the clinical situation.

Table 3: Response to Prednisolone Therapy (speech disorder used as reference category on binary logistic regression).

	Response to Prednisolone Therapy (37)		Chi-square/ Fisher's exact	p-value	Odd ratio	95% confidence Interval	
	Abatement (21)	No Abatement (16)				Lower	Upper
Gender							
Male	8 (38.10)	11 (68.75)					
Female	13 (61.90)	5 (31.25)	3.416	0.065	419.20	2.13	8.25
Presentation							
Infantile	2 (9.52)	2 (12.50)					
Post-infantile	19 (90.48)	14 (87.50)		1.00	0.00	0.00	0.47
Onset							
Infantile	5 (23.81)	6 (37.50)					
Post-infantile	16 (76.19)	10 (62.50)	0.815	0.367	925.60	1.71	5.01
Symptom frequency							
<10 spams/day	11 (52.38)	5 (31.25)					
≥10 spasms/day	10 (47.62)	11 (68.75)	1.652	0.199	0.10	0.00	0.52
Symptoms duration							
< 12 months	10 (47.62)	6 (37.50)					
≥12 months	11 (52.38)	10 (62.50)	0.538	0.739	0.796	0.01	71.16
Previous treatment							
Yes	19 (90.48)	14 (87.50)					
No	2 (9.42)	2 (12.50)		1.00	0.00	0.00	0.21
Co-morbidity							
Yes	18 (85.71)	15 (93.75)					
No	3 (14.29)	1 (6.25)		0.618	118.15	0.82	1.71
Speech Disorder							
Yes	10 (47.62)	10 (62.50)					
No	11 (52.38)	6 (37.50)	0.810	0.508	4.34	0.146	128.68
Motor milestone							
Abnormal	11 (52.38)	11 (68.75)					
Normal	10 (47.62)	5 (31.25)	1.009	0.315	0.676	0.036	8.61
Contextual Factor							
Present	14 (66.67)	15 (93.75)					
Absent	7 (33.33)	1 (6.25)		0.104	402.61	2.52	6.44
Scalp Injury							
Absent	14 (66.67)	11 (68.75)					
Present	(33.33)	5 (31.25)	0.018	1.00	0.168	0.01	4.80

Normal speech was reported in more than half of the participants (31, 54. 39%), motor developmental milestone is normal in less than half (27, 47.30%) of participants. Developmental anomalies is recognized as one of the triads and complications of west syndrome in other studies [4,5]. Flexor spam type (forward) was reported in 49 (85.96%) of participants, extensor backward spasm was reported in 5 participants (8.77%) while two cases were mixed presentations of flexion and extension spasms. One participant presented with sideways spasm movement of head and neck. Predominance of salaam/jackknife/ flexor spasm over eagle-spread /extensor /backward spasm is reported in numerous other studies [5,11,18]. This flexor spasm is characterized by forward flexion of head neck upper limb, trunk and hip to different extent. Sudden severe and recurrent cases can make most pre-toddlers, toddlers and pre-school age group to lose their balance, fall and sustain frontal head injuries (Figure 1). This was found in up to 17 (29.82%) of participants in this study and will potentially add to the pre-existing brain insults with neuropsychological sequelae. This associated neuro-divergent presentation and complication of head injury was not found in any of the reviewed literature.

Spasm frequency in our study varies from 0.1 (once in ten days) to 100 episodes per day (median =10/day, Table 2) which is less than frequency range of 2 -180 reported in an American study [18]. Subjective parental report is used in our study which may not be as reliable as videographic/ EEG monitoring which has shown up to 15 (fifteen) fold frequency when compared with parental/ subjective reporting [18]. Brain Imaging Studies was done also by only 8-particiapnts, only 2 of which were found to be normal. Ventricular asymmetry that was found in one of the participants may also be a normal variant. Other structural anomalies found in this study were hydraencephaly, Intracranial mass, occipital infarction, parietal infarction, and cerebral atrophy.

Only 8 participants in this study had interictal EEG as part of their assessment. The typical hypsarrhythmia was found in only one of the participants. Hypsarrhythmia is one of the clinical triads in the traditional definition of IS, however it has been found to be absent to varying degrees in various studies, especially in studies that describe and report significant numbers of post-infantile presentations like ours [11,18-20]. Hypsarrhythmia may therefore not be reliable diagnostic criteria in post-infantile presentation,

though this doesn't reduce its significance as an ancillary monitoring tool and biomarker in seizure management [21].

Ancillary investigations like electroencephalography and brain imaging studies are not usually within the reach and range of affordability in Nigeria. First line medication for ES may need to be given in suspected cases where the EEG or imaging study cannot be done. Response of such patient can as well be a strong pointer to diagnosis of ES. Empirical treatment or trial of therapy is based on clinician's observation and experience with the treatment which is considered as being effective for the suspected ailment and may as well be diagnostic. Example of such is found in the use of edrophonium in diagnosis and management of myasthenia gravis. This same principle is the basis of trial of scar, trial lenses, hydrotubation, laparoscopy, paracentesis etc used in management of various surgical conditions

Treatment outcomes

The standard first line medication for treatment of infantile spam are Adreconocrtical Hormone (ACTH), Vigabantrine (especially in patients with tuberous sclerosis) and Prednisone/prednisolone [14] according to United Kingdom Infantile Spasm Study (UKISS) treatment sequence. Attempt was made to treat co-morbid illnesses detected during the clinical workup with the presumption that the IS symptoms may be part of the sequelae. IS symptoms abates in three of such instances (Table 1d). IS also abated totally with typical AEDs in only three out of participants with other comorbid seizure disorders each of which were placed on carbamazepine, sodium valproate and levatiracetam AED monotherapy. Treatment response could not be assessed in 14-participants because they defaulted after initial treatment and were not reachable via phone or verifiable address.

Prednisolone was the only available first line management after initial clinical workup in participants, if IS symptoms persists after addressing the comorbid illness or if no co-morbid illness could be recognized. Worsening symptoms was reported by one (1.8%) of the participants, 3 (5.3%) of the participants reported no change in symptoms frequency/intensity, 12 participants (21,1%) reported improvement in IS symptom (> 50% reduction in symptom frequency) while total abatement of symptoms was reported by 21 (36.80%) upon the use of moderate dose prednisolone therapy of 10-20mg per day. This is similar to the 36.99% seizure freedom rate reported in the use firstline regimens in a Chinese IS study [15]. This also implies that moderate dose prednisolone therapy may be a favoured option as it has similar treatment outcome to high dose prednisolone with lesser side effect propensity. Several other studies of effect of high dose (4mg/kg per/day with maximum of 40mg/day) and ultra-high dose (8mg/kg/ day with maximum dose of 60mg per day) indicated that these higher dosages have better spasm cessation rates [14,16] than the usual (medium) dose of 2mg per kg/day, (30mg/day is the maximum for medium dose) employed in this study [22]. It is noteworthy however that the symptom cessation of 48 hours and non-recurrence of 6-weeks employed as outcome measures in these studies may not suffice for longer term prognostication. The general Psycho/Pharmaco-therapeutic principle of starting an agent at minimal effective dose and gradual escalation according to patients' tolerability till attainment of satisfactory response for longer term maintenance treatment was employed. This may not show remarkably rapid response initially but will give a slower, steadier and sustained response as seen in our study with maintenance of spasms abatement for at least 6-months and the Chinese study [15] with 12-months spasm freedom. This is important as the recurring tendency is significant and the presence of several comorbid neuropsychological disorders as well as endocrine anomalies are not likely to be corrected within a short duration of 2 -6 weeks. The high dose steroid can bring more adverse effects if used for longer period.

A few number of patient experience recurrence of ES symptoms during/after 6-months of abatement. Treatment of suspected precipitant acute or chronic illness, with or without recommencement of prednisolone therapy led to successful suppression of the ES symptoms. Only one participant experience blood pressure elevation during follow up care, which subsided upon reduction of dose and the patient actually died of febrile illness during follow up care. Two participants that died of febrile illnesses within 6-months of follow up care, both are in the group that are partially responsive to prednisolone therapy.

Contextual Factors

Several predisposing, precipitating and perpetuating factors are associated with development of IS/ES in literatures. Based on caregiver reports; evidence of cerebral infection or infestation appear to be the leading contextual aetiology amidst participants. Retrospective reports of acute febrile illness with associated generalized seizure with prolonged loss of consciousness was given by caregiivers as preceding the first episode of IS/ES symptom. Cerebrospinal Meningitis (CSM) and Cerebral malaria (CM) are the leading diagnostic entities with these presenting symptomatology in Nigeria. CSM and CM are the recognized contextual factors in 16 (28.07%) of participants, similar to the report of Lagunju in Ibadan Nigeria for other types of seizure disorders [23].

Precipitous labour (labor of < 4-hours) was reported by 14 (24.56 %) of participants. Precipitous labor has been said to be harmless to babies [24] but this study suggest the possibility of its contribution to development of ES and the need for further exploration of its possible contribution to aetiology of other neuropsychological illnesses. Hypoxic-Ischaemic–Encephalopathy (HIE) was reported in 11-participants (19.30%) though a Pakistani study has considered it a leading aetiology in 45.20% of their enrolled participants. 14 participants (24.56%) have no recognizable contextual factor (cryptogenic cases) which is similar to 26% cryptogenicity reported in Enugu, Nigeria [11] in preceding four decades.

Conclusion

Infantile Spasm has been described to be a rare, uncommon type of epilepsy; it may not be as rare as portrayed in literatures in Africans and Nigerians in particular due to the high prevalence of

early life epileptogenic neurological insults. It has good response to a readily available and affordable prednisolone as one of the three first-line treatment options. None of the factors studied had any relationship with response to prednisolone therapy.

Limitations

Generalization of the findings of this study is limited by the availability and affordability of ancillary investigations like brain imaging studies and EEG. Only a little fraction of the participant can afford the imaging studies (14.04 %) and EEG (14.04 %). This also impacts on the skills, exposure and competence of the professionals working in this setting.

Phase reversal that was the commonest EEG finding in this study has been criticized to be of little or no nosological significance and a possible cause of over diagnosis even in high resource settings like United State of America (USA) [5]. Non-commonality of hypsarrhythmia as EEG finding in this study may cast a doubt on the diagnostic certainty, however several studies have demonstrated neurodiversity that hypsarrhythmia is not found in all cases of IS to varying extents (56 - 60%) [14,21]. Especially in post-infantile presentations. Inter rater reliability is poor for hypsarrhythmia as well as most other EEG findings [21]. Small sample size may be another limitation of this study which call for further elaborate studies on ES in Nigeria to enable more detailed characterization, generalisation and prognostication.

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