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Electroencephalographic findings in Tanzanian epileptic patients

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Summary

Electroencephalogram (EEG) of 524 Tanzanian epileptic patients seen between 1985 and 1987 were reviewed. Over two thirds were young patients between the ages of five and thirty. Four hundred and fifty (86%) had abnormal records. Eighty nine per cent of abnormal records had focal abnormality and 11% had centrencephalic abnormality. Grand mal seizures did not imply centrencephalic abnormality, only 13% had such abnormality. Petit mal seizures are rare, over one third of these had temporal focal abnormality. Partial seizures were associated highly with focal abnormality. However, complex partial seizures did not imply temporal focal abnormality. Implications of EEG findings to correlation with epileptic seizures is discussed.

Résumé

Les électroencéphalogrammes de 524 épileptiques Tanzaniens examinés de 1985 à 1987 ont été interprétés. Plus des deux tiers étaient de jeunes malades agés de cinq à trente ans. 450 (86%) avaient des enregistrements anormaux. 89% des cas anormaux avaient une anomalie focale et 11% une anomalie centro-encéphalique. Les attaques du grand mal ne comprenaient pas forcément une anomalie centro-cérébrale. Seulement 13% avaient une telle anomalie. Les attaques du petit mal sont rares and plus d'un tiers des cas ont une anomalie temporale focale.

Les attaques partielles étaient associées à un haut degré de corrélation à une anomalie focale. Cependant, des attaques partielles complexes ne comprenaient pas une anomalie temporale focale.

Les implications des résultats des EEG quant à la cause possible de l'épilepsie sont discutées dans cet article.

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Introduction

Epilepsy constitutes one of the most common neurological conditions in developing countries. The prevalence of epilepsy in African countries is higher than in developed countries in the world [1,2]. The highest prevalence of epilepsy in the world have been reported in some African communities, 20/1000 population in the Wapogoro of Tanzania [3] and 50/1000 population in the Bassa and Kpelle in Liberia[4]. Previous earlier studies on epilepsy in Africa were based on clinical impression[5,6,7]. However, as more trained personnel in the neurosciences became available and the advent of ancillary investigations, recent studies have been relatively comprehensive as those of developed countries[8,9,10].

Electroencephalogram (EEG) is an important ancillary investigation in the study and classification of seizures [11]. It is also useful in the diagnosis and management of seizures. EEG became available as a routine investigation in Muhimbili Medical Centre, Dar es Salaam since mid 1970. In spite of its long use, there have been no reports of EEG findings in Tanzanian epileptics. The lack of previous studies has stimulated this study of EEG findings in Tanzanian epileptics and their correlation with clinical seizures. The study presents EEG abnormalities found in Tanzanian epileptics who had EEG examination between 1985 and 1987.

Materials and methods

Description of seizures were obtained from patients and their relatives by one of the authors (WM) after being referred for EEG examination. Records of 524 patients with reliable details of their seizure types, who have had more than two afebrile seizures were reviewed by both authors. Patients with unclear description of seizure, one seizure or febrile

convulsive seizures were excluded from the study. The underlying brain disease or aetiology was not analysed.

The EEG records of patients were obtained with the use of the modified Maudsley system of montages using stick-on electrodes with colloidin and an eight-channel Mingograf EEG 8. The EEG recording was usually done inter-ictally with the patient awake. Activating techniques included hyperventilation for three minutes and when possible photic stimulation. Occasionally, in uncooperative children, records were made during sleep after sedation with diazepam or chloral hydrate. Routine speed was 30mm/sec, with occasional 150mm/sec to clarify phase relations. The gain was set 100μV/cm, with a step up to 50μV/cm for low voltage signals, with a time constant of 0.3 sec and 70Hz filler. Abnormality on the EEG was recorded if:

(a) There were high-voltage sharp spikes or spike and wave complexes appearing in paroxysmal discharges against normal background.
(b) Paroxysmal slow-wave (theta or delta) forms of high voltage with normal background.
(c) Widespread slow wave complexes forming the background activity.

Centrencephalic abnormality included generalized form of symmetrical and bilateral paroxysmal synchrous discharges.
Absence attacks were recorded if there were classical three-per-second spike and wave forms.
Hypsarrythmia were generalised symmetrical spike and polyspikes on diffuse high voltage arrythmic slow wave activity.
Focal abnormal EEG were classified if

(a) Phase reversals occurred over definite sites, or
(b) There were marked asymmetry in amplitude, or
(c) Abnormal signals such as slow delta and/or theta complexes, sharp-spikes and polyspikes were localised over one hemisphere, whether or not secondary centrencephalic propagation was observed.

Temporal lobe forms was diagnosed when the focal abnormalities occurred over the temporal lobe region. Other focal abnormality in other regions were grouped together. Non-specific abnormality with no definite localizing or lateralization were grouped in the normal EEG.

Results

Age and sex distribution

The age and sex distribution is shown in Table 1. The majority of patients suffering from epilepsy referred for EEG were young. Three hundred and thirty four (64%) of 524 patients were between ages 5-30 years. The mean age was 17.3 years. A preponderance of males was referred with a ratio of Male: Female of 1.3:1.

Table 1: Age and sex distribution

Sex	Age 1	1 - 4	5 - 10	11 - 20	21 - 30	31 - 40	41 - 59	60 and above	Total
Male	9	31	64	87	54	34	23	3	305
Female	6	42	36	55	38	26	13	3	219
Total	15	73	100	142	92	60	36	6	524

Mean age = 17.3

Abnormal EEG

This was found in 450 (86%) of 524 patients with epilepsy as shown on Table 2. Of these 399 (89%) were focal abnormalities and 51 (11%) were classified as centrencephalic. One hundred and fifty eight (84%) of 188 children under the age of ten years had abnormal EEG and 292 (87%) of 336 patients above the age of ten. Thirty (16%) of 188 patients below the age of ten years had generalized abnormality. In contrast, 19 (6%) of 336 patients above the age of ten years had generalised abnormality. Generalized abnormality was found significantly more in under ten years than those above this age. X^2 (Yates correction) 15.9 PO < P < 0.005. There was no significant difference between focal abnormality in the under ten year old patients and those above ten years.

Table 2: Age and EEG correlation

Age Group	EEG Abnormal		Normal	Total
	Generalized	Focal		
Below 10 years	32	128	30	190
10 years and above	19	271	44	334
Total	51	399	74	524

Seizure type and EEG correlation

As shown on Table 3 partial clinical seizures correlated well with focal abnormal EEG, where 204 (82%) of 250 patients with partial seizure had focal abnormality. Generalised seizures of grand mal type correlated poorly with centrencephalic abnormality where 21 (10%) of 201 patients had generalised abnormality. Four out of 5 patients with petit mal absence had focal abnormality in the temporal region.

Table 3: Seizure type and EEG abnormality (%)

	Seizure Type	Centrencephalic			Focal		Normal	Total
		Generalised	3Hz	Hypsarrythmia	Temporal	Others	Normal	
A.	GENERALIZED							
	Tonic-clonic	26	1	—	60	89	25	201 (38.4)
	Absence	—	5	—	4	—	—	9 (1.7)
	Infantile spasm	1	—	2	—	—	—	3 (0.6)
	Myoclonic	2	—	—	—	1	1	4 (0.8)
	Multiple seizures*	4	—	—	10	20	6	40 (7.6)
B.	PARTIAL							
	Simple	3	—	—	8	48	10	69 (13.2)
	Complex	5	—	—	83	65	28	181 (34.5)
C.	UNCLASSIFIED	2	—	—	7	4	4	17 (3.2)
	Total	43 (8.2)	6 (1.2)	2 (0.4)	172 (32.8)	227 (43.3)	74 (14.1)	524 (100)

*36 patients had partial seizures with secondary generalisation. 4 patients had multiple generalised motors seizures with or without absences.

Forty eight (86%) in non-temporal region and 91 (45%) of 204 patients with complex partial seizures had temporal focal abnormalities. Seventeen patients could not be easily classified because the information on type of seizures was not clear cut. The latter, 11 (65%) had focal abnormality and 7 (64%) of these were in the region of the temporal lobe.

Discussion

Patients with epileptic seizures referred for EEG examination at Muhimbili Medical Centre were young with a preponderance of males which is inconsistent with other African studies [9,10]. However, in this study the male:female ratio was almost equal 13:10. Female epileptic patients are presenting equally as males for treatment in Tanzania, contrary to other previous African studies [6,7,8]. Over a third of patients were under ten years of age in this study. Of these, over two thirds were above five years, which suggest that seizures are sequel of some form of childhood brain-insult from birth injury, febrile seizure or malnutrition [12,13,14].

In this study, 86% patients had abnormal EEG which was higher than in other African studies [8,9]. This could have been due to a bias of referral, reflecting a picture of probable more patients with cerebral lesion referred for EEG. However, the aetiology of cerebral lesion were not analysed in this study to substantiate this fact. Detailed history of the

observed seizures from relatives could have also contributed to the inclusion of patients with more abnormal cerebral dysfunction. Focal abnormality accounted for 89% of all abnormal EEG which is consistent with other recent African studies [8,9,10] unlike in previous reports [2,6,7]. This finding conforms with widespread acquired aetiological factors as cause of brain lesion [13,14].

Temporal lobe abnormality accounted for 45% of all focal abnormality which conforms with vulnerability of medical temporal lobe due to childhood anoxia from complicated febrile seizures [15], which is the commonest attributable cause of epilepsy in the African epileptic [13,14]. Generalised abnormality in EEG was rare. However, when present, it was found significantly more in children. It could also be a reflection of referral bias being made on those who have structural brain disease than in those who have idiopathic epileptic seizures which have better control and abate with age.

Absence seizures and 3Hz per-second EEG abnormality was rarely encountered during the time of this study. This finding has been reported in many other studies in Africa [5,8,9]. Clinical features of petit mal are so subtle that lack of awareness of its symptom could be the explanation for this constant finding. Four of 9 patients with absence seizures had focal temporal lobe abnormality. This again is a reflection of difficulties in obtaining a clear description of temporal lobe partial seizures in clinical practice and emphasises the importance of EEG record in such patients.

Over 70% patients with generalised clinical seizures of Tonic-clonic type also had focal abnormality suggesting the difficulties of describing auras in these patients, particularly when the control of secondary generalization seizure has not been achieved by antiepileptic drugs. It also suggests the presence on organic cerebral tissue, even in generalised seizure in the African epileptic.

In conclusion, EEG abnormality in Tanzanian epileptics are frequent reflecting widespread organ cerebral insults mostly from preventable diseases. Focal abnormality are the most frequent even where clinical features are those of generalised seizures. Absence abnormality is rare.

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