



Original Work

Management, treatment outcome and cost of epilepsy in a tertiary health care facility in northern Nigeria

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ABSTRACT: This study aimed at reviewing the management and treatment outcome, and evaluating economic burden of antiepileptic drugs (AEDs) in Ahmadu Bello University Teaching Hospital, Kaduna (ABUTH). It was a retrospective study involving use of patients' medical records. Data retrieved from the medical records included demographics, clinic attendance, laboratory investigations, type of seizure diagnosed, effect of seizure on social life, medication use and treatment outcome. Cost of medications for patients who adhered to their therapy consistently between November 2003 and October 2004 was calculated. Data analysis was by descriptive and inferential statistics using SPSS version 16. Epilepsy had negative effects on education and marital life of patients in this study. More than half (59.3%) of the patients were diagnosed as having generalized seizure disorder. Carbamazepine was the most commonly prescribed medication (91.2%). Patients who were less than 2 years of registration in the facility had the highest percentage of those who were not regular in their clinic attendance 2 (64.7%) and low remission rate (9.8%). Chi-square analysis showed that adherence to medications had a significant effect ($p < 0.05$) on attainment of remission among patients who had received care in the facility for more than a year. Seizure types had no significant effect ($p > 0.05$) on attainment of one-year remission. Average annual cost of AEDs was Nigerian Naira 30, 986.67 (\$258.2). There was a strong correlation between clinic attendance and cost of AEDs ($r = 0.454$, $p = 0.006$) as cost of AEDs increased with increased in clinic attendance. Correlation analysis ($p < 0.05$, $r = 0.358$) also showed that cost of AEDs used by the patients reduced with increased in years since registration at this healthcare facility. Cost of AEDs did not depend on seizure type but increased with increase in clinic attendance and decreased with increase in years since registration in the healthcare facility.

KEY WORDS: *Epilepsy; Cost; Management; AEDs; Remission*

INTRODUCTION

Epilepsy is the most common neurological disorder and it is one of the most common non-communicable diseases in the world^{1,2}. Worldwide, it is estimated that epilepsy affects about 50 million people, among who 40 million are living in developing countries^{1,3} where 80–90% of people are believed to receive inadequate/no treatment at all⁴. Epilepsy affects about 2.5 million people in United States and about 200,000 new cases of

epilepsy are diagnosed in the United States yearly⁵. In the low-income countries, the incidence of epilepsy, may be as high as 190 per 100 000 people³. Consequently, in the context of the large and rapidly increasing populations in developing countries, epilepsy is a significant health and socioeconomic burden requiring immediate attention³. Provision of adequate medical care faces many constraints and difficulties in many countries. The major problems encountered by health professionals and people with epilepsy all over the world especially in developing countries include lack of drug supply due either to logistics or to economy, poor community knowledge and awareness, cultural beliefs, stigma, lack of

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government resources, poor economy, and lack of infrastructure⁴.

Epilepsy affects the quality of life of the sufferers⁶ and the condition is highly stigmatized because of the commonly held misconception that epilepsy is contagious and negative meanings are attached to its outward manifestation (seizures)⁷. Epilepsy affects morbidity and mortality of patients as well as their 'quality of life', which is composed of physical, social and mental well being⁸. Epilepsy has been shown to have a negative impact on social life (employment, driving, marriage, social isolation, and education opportunities) of the sufferers⁴. Epilepsy has psychosocial effect on caregivers, siblings, work and other interpersonal relationships of everyone involved in the care of a member with epilepsy⁹. Aside from the psychological effect, patients with epilepsy often sustain physical injury especially during status epilepticus attacks. Moreover, studies have also shown that people with epilepsy have an increased risk of premature death 2-3 times higher than the general population¹⁰. Half of these deaths occurs at home and are sudden unexpected deaths. Suicide accounts for 7-22% of death in epilepsy and these patients are 5-10 times likely to commit suicide than the general population. Suicidal tendency has been reported to be worse with patient with temporal lobe epilepsy¹¹.

The choice of medication for management of epilepsy varies depending of the type of seizure. In developing countries, phenobarbitone has been reported to be the most commonly prescribed medicine not because of its efficacy but due to its availability and low cost^{12,13}.

Several studies have been carried out in different part of Africa on management of epilepsy with results showing that the choice of Anti Epileptic Drugs (AEDs) varied with health institutions^{12,14}. It is known that about 70% of people with epilepsy could live seizure-free lives if treated with AEDs⁵. While there are plethora of studies on the management and cost of epilepsy worldwide¹⁴⁻¹⁷ only few studies have been undertaken in Nigeria^{18,19}. However, studies combining detail management, treatment outcome and the cost of treatment of epilepsy are rare in the country particularly in the northern part of Nigeria. This study aimed at reviewing the management and evaluating economic burden of AEDs in Ahmadu Bello University Teaching Hospital, Kaduna.

METHODOLOGY

Sampling

The psychiatry clinic of Ahmadu Bello University Teaching Hospital (ABUTH), Kaduna is now relocated to Zaria where the University is sited. ABUTH is the largest teaching hospital in the

northwest of Nigeria. It is also a referral centre for other secondary healthcare facilities in the region. The study is a retrospective design using selected patients' folders and medical records in the clinic.. A whole population of patients diagnosed with epilepsy who had attended clinic between January 2003 and December 2004 were enrolled for the study. The hospital's number of patients who attended clinic at least six times during this period was sorted out for the second stage of data collection. This sampling criterion was based on the fact that stable patients were usually given a minimum of sixteen weeks interval between appointments (personal communication from clinician).

Data collection procedure

The hospital unit numbers of patients diagnosed with epilepsy in ABUTH who attended clinics between January 2003 and December 2004 were collected from the out patients' clinic department register which usually held twice a week, Mondays and Thursdays. The data was analyzed using Statistical Package for the Social Sciences (SPSS) version 16.0 and the frequency of attendance was determined.

The case note/medical records of patients that had 6 or more clinic attendances were further used for data collection using structured data. Data collected included socio-demographic data, age at first registration at this healthcare facility, age of onset of epilepsy, years since registration at this healthcare facility, occupation, effect of epilepsy on marital life and education.. Others included risk factors , alternative therapy if ever used, signs and symptoms, diagnosis and laboratory investigations. The following data were also collected: other comorbid diseases or disorder, medications used, side effects of medications used, overall clinic attendance and general treatment outcome.

Patients diagnosed with epilepsy who had attended clinics for more than one year were used to determine patients who were free of seizure for at least one year. Within this group, those that attained one-year remission were compared to those who had not (as of their last clinic visit) with respect to regular clinics attendance (patients who had missed clinic appointment at least for 4 months were regarded as those not regular in clinic attendance), adherence to therapy (those who had at least one record of poor adherence between 2003 and 2004 were said to have poor adherence to therapy).

Cost of epilepsy involves direct medical cost of patients with "active" epilepsy (i.e. epilepsy with recurring seizures and/or under current treatment). In this study, patients (within the epilepsy patients' population) who had attended clinics regularly between November 2003 and October 2004 (1 year

follow-up) and did not miss any clinic attendance and had no record of non-adherence to therapy were used. The cost item evaluated in this study was basically the cost of medications used by patients during this period.

Inclusion Criteria

- All patients that have been diagnosed with epilepsy in the study centre and had at least 6 clinic attendances between January 2003 and December 2004, irrespective of their age or sex.

Exclusion Criteria

- Patients that were not diagnosed with epilepsy
- Patients diagnosed with epilepsy in the study centre and who had less than 6 clinic attendances between January 2003 and December 2004.
- Patients newly diagnosed with epilepsy.

Data Analysis

Data was entered into Statistical Package for the Social Sciences (SPSS) version 16 and analyzed. Frequencies of variables were determined, chi-square was used to determine levels of significance at $p < 0.05$ of effect years of care in this facility on attainment of remission, effect of adherence on attainment of remission among patients who had received care in the facility for more than a year and effect on seizure type on attainment of remission. Correlation analysis was used to test for relationship between cost of AEDs and clinic attendance and year since registration in the healthcare facility ($p < 0.05$ was considered significant).

The research protocol was approved by the local ethical committee of the hospital before the study was carried out.

RESULT

Ninety-two patients were diagnosed with epilepsy and had at least 6 clinic attendances within the study period. One folder was empty (devoid of notes) and could not be used further. The results indicated below were obtained from the other 91 epilepsy patients.

Age distribution of patients diagnosed with epilepsy as seen at ABUTH

More than half of the patients were teenagers while some were in their twenties at the time of their registration with the healthcare facility. Thirty-six patients had no record of age of onset of epilepsy. Majority (74.6%) of the patients were less than 20 years of age at the time of onset of epilepsy disorder. (Figure 1 and 2)

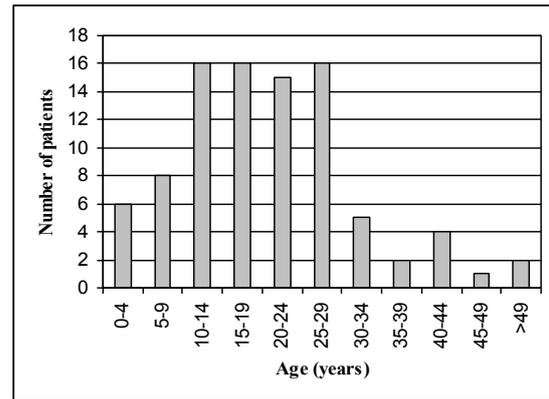


Figure 1: Age at first contact with orthodoxy facilities of patients with epilepsy

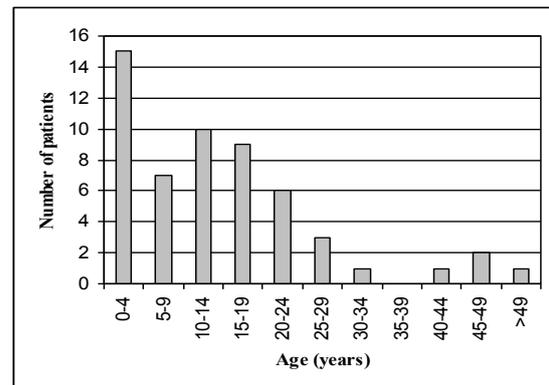


Figure 2: Age of onset of epilepsy in the epileptic patients

Demographic Data of Patients

The demographical data of the patient are presented in Table 1.

Risk Factors for Epilepsy

Risk factors are factors that predispose an individual to epilepsy. Risk factor was indicated for 53 of the 91 patients. The most common risk factor for seizure disorder among the patients was febrile convulsion. It is depicted in the pie-chart below (Figure 3).

Diagnosis of Epilepsy

More than half (59.3%) of the patients were diagnosed as having generalized seizure disorder tonic-clonic seizure (53-generalized tonic clonic and 1 myoclonic seizure). While, 39.0% were diagnosed as partial seizures (20 complex, 2 simple partial and 1 partial motor seizure). (Table 2)

Effect of epilepsy on education and marital life

Out of the 91 patients used for this study, 36 patients had record of the effect of epilepsy on their education, 69.5% of them were either withdrawn

from school or slow in learning or could not even go to school because of epilepsy. (Table 3)
 The effect of epilepsy on marital life was also taken into consideration (18 years was considered as marriageable age). Thirty nine patients (42.9%)

were below marriageable age. Two patients were divorced as a result of epilepsy while 25 (27.5%) were above the marriageable age at onset of epilepsy and one of these 25 patients was unable to marry because of epilepsy.

Table 1: Demographic data of patients

Demographic Factors	Option	Frequency	Percentages
Sex	Male	48	52.7
	Female	43	47.3
	Total	91	100
Marital status	Single	66	72.5
	Married	23	25.3
	Divorced	2	2.2
	Total	91	100
Educational level	No formal education	5	12.8
	Koranic education	3	7.7
	Nursery school	4	10.2
	Primary school	14	35.9
	Secondary school	9	23.1
	Tertiary	4	10.2
	Not recorded	52	57.1
	Total	91	100
Occupation	Child	36	39.6
	Student	18	19.8
	Housewife	11	12.1
	Privately Employed	11	12.1
	Applicants	4	4.4
	Civil Servant	5	5.5
	Not recorded	6	6.6
	Total	91	100

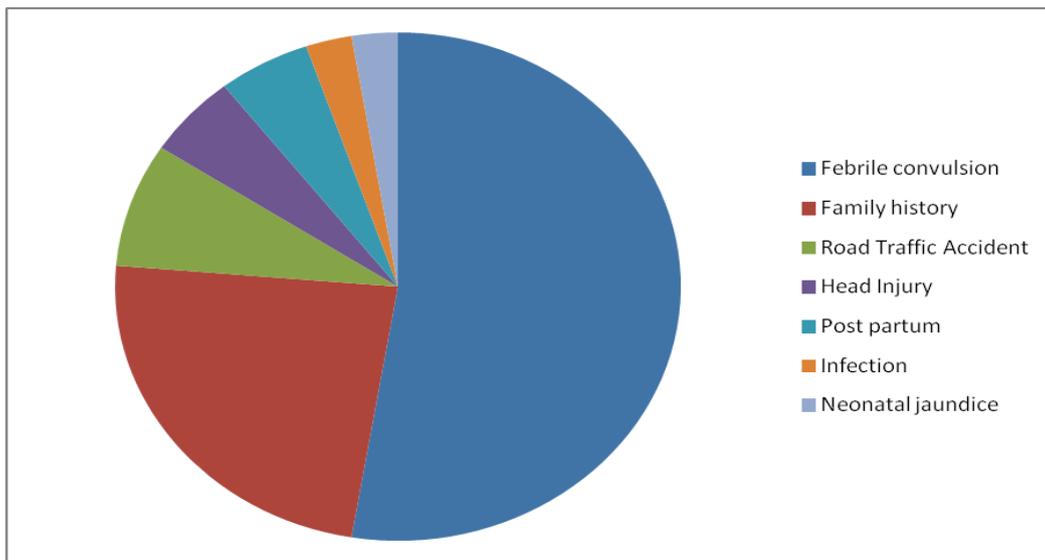


Figure 3: Risk factor among patients diagnosed of epilepsy

Table 2: Specific diagnosis of epilepsy

Class of seizure	Specific Diagnosis	Patients Number	Patients Percentage
Generalized	Tonic-clonic	53	58.3
Generalized	Myoclonic seizure	1	1.1
Partial	Partial motor seizure	1	1.1
Partial	Simple partial	2	2.2
Mixed seizure	Mixed seizure	2	2.2
Status epilepticus	Status epilepticus	1	1.1
Total		91	100

Table 3: Effect of epilepsy on education

Effect of Epilepsy on Education	Number of Patients	Percentage (%)
Dropped out because of embarrassment	1	2.8
Cannot go to school	4	11.1
Slow learning	3	8.3
Withdrawn from nursery school	2	5.6
Withdrawn from primary school	6	16.7
Withdrawn from secondary school	7	19.4
Withdrawn from tertiary	2	5.6
Doing well in school	11	30.6
Total	36	100

Laboratory investigations

The most common laboratory investigations carried out on these patients included serum urea & electrolyte, full blood count (FBC) & differential (27), malaria parasite test (8), stool microscopy (26), general hematological investigations, Microscopy culture and sensitivity of urine (14), urinalysis (7), liver function test (2), serum glucose test (12), Skull X-ray (6), fundoscopy (3), Electroencephalography (EEG) (7) and Computerized Tomography (CT) scan (2). Co morbid mental or neurological disorder was not recorded for 4 patients (2 patients of both sexes), 67 patients (77.0%) had no comorbid mental disorder (38 males and 29 females). Twenty patients (23.0%) presented with comorbid mental or neurological disorders (8 males and 12 females).

Treatment of epilepsy

Medication: Carbamazepine was the most commonly prescribed medication (91.2%) for the epileptic patients in ABUTH under the period of study. (Table 4)

Non-pharmacological Management: Non-pharmacological management carried out on the epileptic patients included counseling, psychotherapy and group counseling. Non-pharmacological management was not recorded for 20 patients. Counseling of patients by their doctors either to comply with treatment or follow-up is the most common form of non-pharmacological management noted in this study (84.5% of the patients). Psychotherapy was carried out on 12 (16.9%) patients. Only one patient underwent group counseling which is usually a form of counseling given to all ambulatory patients with mental disorder in the hospital. However, physiotherapy was recommended for a patient as a result of co-morbid disease (patient was experiencing weakness of flexors of his right hand for more than three days).

Use of alternative therapy prior to medical intervention was not recorded for 57 (62.6%) patients. Sixteen of 34 (47.1%) who had record of use of alternative therapy had never used alternative therapy. However, seventeen (50.0%) had used traditional medicine while one (2.9%) had undergone religious intervention.

Treatment outcome and remission

Patients who had missed clinic appointments for at least 4 months were regarded as those not regular in clinic attendance. Out of 91 patients enrolled in this study, only 39 (42.9%) were not regular in clinic attendance, while 52 (57.1%) were attending regularly. (Table 5)

Six of 22 (30.0%) patients who had been on treatment for more than 4 years attained more than 2 years remission, while 10 (50.0%) of them still experienced seizures within 6 months of their last clinic visit. (Table 6)

Out of 39 patients that has been attending clinic for more than 2 year, 17 (43.6%) attained one-year remission. There is a significant difference in attainment of remission and years of care in this facility. 2 x 2 Chi-square test with rate correction for continuity is 7.96, p value= 0.005. (Table 7)

Patients who had at least one record of poor adherence between 2003 and 2004 were said to have poor adherence to therapy. Eighteen (40.9%) of 44 patients that adhered to their therapy attained one-year remission, while 26 were not yet free of seizures. Adherence was also found to have a significant effect on attainment of remission among

patients who had received care in the facility for more than a year. 2 x 2 Chi-square test with rate correction for continuity is 6.881, p=0.009. (Table 8)

There were 64 patients who had more than one year since registration in the facility. 2 x2 Chi-square test with rate correction for continuity is 2.613, p value =0.106. (Table 9)

Cost of seizure disorders

Conversion of Nigerian Naira (₦) to US dollar (\$) was ₦120 to \$1, at the time of data collection. The patients whose data were tabulated in Table 10 are patients who were consistent in their clinic attendance between November 2003 and October 2004 (100.0% clinic attendance). Two patients' occupation was not recorded. Eight were either self-employed or civil servants. Majority of the patients (66.7%) were unemployed (students, children, housewives or job-applicants) who depend on their parents or husband for financial support. This implies that the cost of treatment of their illness is the sole responsibilities of their caregivers. (Table 10)

Table 4: Anti-epileptic medications prescribed for epileptic patients in ABUTH, Kaduna between 2003 and 2004

Medication prescribed	Class/Subclass	Number of patients using medication	% of patients using medication
Carbamazepine	Iminostilbenes	83	91.2
Diazepam	Benzodiazepines	31	34.1
Phenobarbitone	Barbiturate	18	19.8
Clonazepam	Benzodiazepines	14	15.4
Phenytoin	Hydantoin	7	7.7
Primidone	Deoxybarbiturate	4	4.4
Sodium Valproate	Valproic acid	4	4.4
Ethosuximide	Succinimides	1	1.1
Nitrazepam	Benzodiazepine	1	1.1

Table 5: Cross tabulation of years since contact with orthodox facilities and clinic attendance

Years since contact with orthodox facilities	Clinic Attendance		Total
	Not regular in clinic attendance	Regular in clinic attendance	
<2 years	18 (35.3%)	33 (64.7%)	51(100.0%)
2-4 years	9 (45.0%)	11 (55.0%)	20 (100.0%)
>4years	12 (60.0%)	8 (40.0%)	20 (100.0%)
Total	39 (42.9%)	52 (57.1%)	91 (100%)

Table 6: Cross tabulation of general treatment outcome and years since registration at this healthcare facility

Years since registration at this healthcare facility	General Treatment outcome				Total
	<i>Free of Seizure in > 2years</i>	<i>Free of Seizure between 1-2 years</i>	<i>Seizure between 6month-1year</i>	<i>Seizure in <6months</i>	
<2 years	-	5 (9.8%)	14 (27.4%)	32 (62.7%)	51
2-4 years	4 (20.0%)	5 (25.0%)	5 (25.0%)	6 (30.0%)	20
>4years	6 (30.0%)	2 (10.0%)	2 (10.0%)	10 (50.0%)	20
Total	10	12	21	48	91

Table 7: Cross tabulation of years since contact with orthodox facilities and remission of epileptic patients as seen at ABUTH

Years since contact with orthodox facilities	Remission		Total
	<i>1 year remission</i>	<i>Not in remission</i>	
>1-2 years	5 (13.9%)	31 (86.1%)	36 (100.0%)
> 2years	17 (43.6%)	22 (56.4%)	39 (100.0%)
Total	22	53	75

Table 8: Cross tabulation of adherence and remission of epileptic patients as seen at ABUTH

Adherence	Remission		Total
	<i>One-year remission</i>	<i>Not seizure free</i>	
Good	18 (40.9%)	26 (59.1%)	44 (100.0%)
Poor	4 (12.9%)	27 (87.1%)	31(100.0%)
Total	22	53	75

Table 9: Cross tabulation of type of seizure and remission of epileptic patients as seen at ABUTH

Type of seizure	Remission		Total
	<i>One-year remission</i>	<i>Not seizure free</i>	
Generalized	10 (22.2%)	35 (77.8%)	45 (100.0%)
Partial	8 (42.1%)	11 (57.9%)	19 (100.0%)
Total	18	46	64

Table 10: Diagnosis and cost of medications of patient who had 100% clinic attendance between November 2003 and October 2004

S/N	Diagnosis	Age	Occupation	Number of Clinics Attended	Years Since first contact with orthodox facilities	Total Cost of Drugs used (₦)	Total Cost of AEDS used (₦)
1	G. Tonic-clonic	20	Student	6	1.19	24,200(\$201.7)	18,270(\$152.3)
2	G. Tonic-clonic	11.5	Child	10	1.20	14,016(\$116.8)	13,300(\$110.8)
3	G. Tonic-clonic	17	Student	10	1.27	33,484(\$279.0)	33,033(\$275.3)
4	Seizure disorder	48	Petty trader	6	1.28	28,835(\$240.3)	25,550(\$212.9)
5	T.L.E	26	Petty trader	7	1.31	34,733(\$289.4)	34,569(\$288.1)
6	T.L.E	26	Housewife	11	1.38	37,971(\$316.4)	37,501(\$312.5)
7	Myoclonic	25	Housewife	13	1.46	43,300(\$360.8)	41,274(\$344.0)
8	G. Tonic-clonic	40	Farmer	12	1.54	57,105(\$475.9)	50,454(\$420.5)
9	Seizure disorder	8	Student	8	1.98	35,788(\$298.2)	33,705(\$280.9)
10	G. Tonic-clonic	50	Policeman	6	2.17	25,550(\$212.9)	25,550(\$212.9)
11	G. Tonic-clonic	12	Student	6	2.32	12,775(\$106.4)	12,775(\$106.4)
12	Mixed seizure	18	Student	9	2.37	45,690(\$380.8)	39,239(\$327.0)
13	Complex partial	39	Not recorded	7	2.39	40,643(\$338.7)	37,960(\$316.3)
14	G. Tonic-clonic	15	Student	4	2.58	15,890(\$132.4)	15,890(\$132.4)
15	G. Tonic-clonic	11	Child	9	2.58	27,515(\$229.3)	25,550(\$212.9)
16	G. Tonic-clonic	12	Student	8	2.60	27,736(\$231.1)	25,500(\$212.5)
17	G. Tonic-clonic	23	Not recorded	11	2.71	59,331(\$494.4)	55,172(\$459.8)
18	T.L.E	26	Student	6	3.27	41,809(\$348.4)	37,960(\$316.3)
19	G. Tonic-clonic	22	Unemployed	5	3.31	39,428(\$328.6)	38,115(\$317.6)
20	Complex partial	8	Child	5	3.62	27,160(\$226.3)	25,500(\$212.5)
21	T.L.E	25	Tailor	6	6.53	7,317(\$61.0)	5,390(\$44.9)
22	G. Tonic-clonic	4	Child	16	7.11	47,696(\$397.5)	45,958(\$383.0)
23	G. Tonic-clonic	9	Student	5	7.15	11,335(\$94.5)	9,415 (\$78.5)
24	Complex partial	12	Child	16	7.71	31,493(\$262.4)	29,402(\$245.0)
25	G. Tonic-clonic	21	Student	3	7.92	37,960(\$316.3)	37,960(\$316.3)
26	T.L.E	26	Unemployed	12	8.21	42,834(\$356.95)	32,096(\$267.5)
27	Status epilepticus	39	Teacher	5	8.96	40,880(\$340.7)	25,550(\$212.9)
28	G. Tonic-clonic	24	Farmer	6	11.51	2,256(\$18.8)	2,160(\$18.0)
29	G. Tonic-clonic	26	Civil servant	12	16.95	40,673(\$338.9)	39,900(\$332.5)
30	T.L.E	28	Student	10	29.83	75,510(\$629.3)	74,902(\$624.2)

TLE: Temporal Lobe Epilepsy

DISCUSSION

Majority of the patients were less than 20 years of age at the time of onset of epileptic disorder (**Figure 2**). Half of the patients were less than 20 years of age (50.6%) at first registration at this healthcare facility (**Figure 1**). Past studies have indicated that onset of epilepsy is common in patients less than 20 years^{7,19}. However, a recent study in southeastern Nigeria found that only 10% of the patients were less than 20 years of age¹⁸. Among the patients in this study, there were more males than females (**Table 1**). Many studies have also shown higher incidences of epilepsy in males than in female^{7,18,20,21}.

About half of the patients who had record of level of education were below primary school certificate level (**Table 1**). This is in agreement with the patients' age and marital status which supported that most (45.1%) were children/teenagers and were single. The fact that a good number were teenagers explains why more than two-thirds of the patients were unemployed and had no income and they rely on their caregiver for their medical upkeep.

Effects of epilepsy on social life

Epilepsy negatively affected the education of patients under study (**Table 3**). Children with epilepsy were reported to have lower performance at school than other pupils, including those suffering from other chronic diseases that affected their attendance at school^{22,23}. Studies have also shown that frequent seizure has a determining effect not only on education but also on marital life^{7,24-26}. The effect of epilepsy on education is enormous. If a patient has to drop school or is slow in learning or could not go to school at all because of epilepsy, his or her level of productivity will be affected. Moreover the emotional and psychological effect of late marriage over these patients in this part of the country where girls marry at the very tender age of 12-14 years cannot be overemphasized.

Risk Factors of Epilepsy

The most common risk factor among the patients was febrile convulsion as seen in **Figure 3**. Febrile convulsions, head trauma, meningo-encephalitis, perinatal causes, cerebral palsy etc. have been reported to be major causes of seizures in Nigeria²⁷, Sub-Sahara Africa⁷ and other parts of the world^{13,29}.

Diagnosis

Diagnoses were arrived at based on history (from patients and an eyewitness of seizure attacks) and also clinical presentations by the patients coupled

with clinical investigations. Most common laboratory investigations carried out (such as Electroencephalogram (EEG), Computerized Tomography (CT) scan, skull x-ray) were performed in some patients as indicated in past studies^{13,30}. Some of the laboratory investigations were actually carried out to identify any source of infections which could provoke seizures. For example, malaria parasite test was carried out in some patients who were found to have febrile convulsion which could later results in seizure³. Generalized seizures accounted for 54 patients (59.3%) with generalized tonic clonic accounting for 53 patients while partial seizures accounted for 23 patients (39.0%) as seen on **Table 3**. Al-Zakwani *et al*³⁰ in Oman (Arabian Peninsula) also indicated high percentage of (50.6%) of generalized tonic-clonic seizures among the epileptic patients in their study. The lower percentage of partial seizures reported in this study is similar (20%) to the study of Berhanu *et al*³¹ in Central Ethiopia. Ogunniyi *et al*²⁷ had earlier reported a high proportion of partial seizure (53.3%) in a community-based study in Nigeria.

Medication prescribed for treatment of epilepsy

Among all the medications prescribed, carbamazepine was the most commonly prescribed medication (**Table 4**). Phenobarbitone is generally regarded as the most commonly prescribed antiepileptic medication (AED) in developing countries^{15,16,20} on accounts of its being 5, 15 and 20 times cheaper than phenytoin, carbamazepine and sodium valproate respectively¹³. The studies of Ezeala-Adikaibe *et al*¹⁸ conducted in eastern part of Nigeria and Sanya and Musa¹⁷ conducted in Ilorin middle belt of Nigeria showed that carbamazepine was also the most commonly prescribed drug for epilepsy in those areas. In the study of Al-Zakwani *et al*³⁰ in Oman (Arabian peninsula), the most common AED refill was sodium valproate (35.4%) followed by carbamazepine (30.8%) and lamotrigine (9.7%). However, none of the newer AEDs such as gabapentin, lamotrigine, levetiracetam, tiagabine, topiramate and zonisamide were used in these patients in our study probably because of the cost and their unavailability in developing countries as noted by Krishnan *et al*¹⁴.

There was good rationale of drug use among the patients as medication prescribed was either first line or second line medication for the seizure type presented by each patient. For example, carbamazepine, used for majority of the patients is the medication of choice in both generalized and partial seizures except in myoclonic seizures. The benzodiazepines used in 49.4% are also generally effective in both classes of seizures in addition to myoclonic seizures. The latter medications are also

preferred to the barbiturates on account of their greater efficacy and lesser side effects. Phenytoin and sodium valproate were rarely prescribed possibly on account of their relatively high cost. Ethosuximide, indicated specifically for absence seizures, again was hardly used in these patients, probably because absence seizure was not diagnosed in any of the patients.

Non- pharmacological management

Counseling of patients by their doctors either to comply with treatment or follow-up is the most common form of non-pharmacological management noted in this study being carried out among some patients. Group counseling is a counseling method in which patients with similar psychological problems were brought together by the health care team and the psychologist to discuss their problems and how such can be tackled. This method is beneficial to the patients as they shared experiences.

Half of the patients with a record of use of alternative therapy had used traditional medicine before visiting the hospital. There have been reports of patients with epilepsy in Africa visiting traditional healers first before visiting hospitals^{13,31}. However, this study did not ascertain whether the use of these alternative therapies continued after commencement of treatment at ABUTH.

Treatment outcome and remission

Clinic attendance and general treatment outcome is depicted in Tables 5 and 6 respectively. Patients who had less than 2 years of registration in the hospital had the highest percentage among patients who were not regular in their clinic attendance; this could probably explain the low remission rate among this group of patients (Table 6). Generally, majority of the patients were not regular in their clinic attendance. But this was more common among patients who were <2 years since registration at this healthcare facility. It is worthy to know that this group also tended to have a poorer treatment outcome with 90.1% having seizures within the last year of their clinic attendance (Table 7). Adherence to therapy and attainment of one-year remission from seizure is depicted in Table 8. Adherence to therapy is paramount to seizure management as poor adherence with antiepileptic drugs (AEDs) usually leads to higher rates of seizure recurrence which in turn results in increase in medical resource utilization and costs³². The difference in the two groups' attainment of remission is statistically significant X^2 test $p=0.009$ ($p < 0.05$) (Table 8). Therefore, failure to adhere to therapy has a significant effect on attainment of remission in these patients. Patients that failed to adhere to therapy experienced increase in number

and severity of seizures^{13,33}. Poor adherence to prescribed medications is considered to be the main cause of unsuccessful medication treatment for epilepsy^{34,35}. Seizure type (either generalized or partial) has no significant (X^2 test $p < 0.05$) effect in the attainment of at least one-year remission after controlling for adherence level (Table 9). This suggests that patients with any type of seizure can attain remission provided the patient adhered to therapy. Other past studies in Ethiopia²³ and the United Kingdom showed that seizure type had no significant effect on the chances of achieving remission³⁶. Although Sirdharam³⁷ has a contrary view, he reported that partial seizure had lower rate of remission compared to generalized seizure.

Cost of epilepsy treatment in ABUTH Kaduna

The mean annual cost for AEDs is N30, 986.67 (\$258.2) (Table 10). The mean cost of total medications (both for epilepsy and other comorbid diseases) taken by these patients was N33, 697.10 (\$280.8). In India, Krishnan *et al*¹⁴, estimated cost of \$47 per outpatient. According to UNDP³⁸, more than 60% of people in the developing world are living on less than \$1 per day. The added burden of cost of epilepsy on the meager family budget is immense bearing in mind that majority of the patients (66.7%) were unemployed (students, children, housewives or job-applicants) who depend on their parents or husband for financial support. This implies that the cost of treatment of their illness is solely the responsibility of their caregivers.

Correlation analysis of clinic attendance and cost of AEDs showed that cost increased with increase clinic attendance ($r=0.454$, $p=0.006$). This could be due to the fact that medication(s) doses and frequencies of patients attending clinic frequently (less stable patients) may have been increased, therefore resulting in increase in their medication cost. Medication cost decreased with decrease in clinic attendance. These could be a result of good treatment outcome and therefore decrease in frequencies and doses of medication(s) prescribed for such patients. There is a positive correlation ($p < 0.05$, $r=0.358$) between years since registration at this healthcare facility and cost of AEDs. This result indicates that cost of AEDs used by the patients reduced with increase in years since registration at this healthcare facility. This finding is similar to that of Berto *et al*³⁹ and Forsgren *et al*⁴⁰, who showed that direct cost (which includes cost of medication) reduces with increase in year of clinic attendance/commencement of AEDs. Berto *et al*³⁹ also indicated that, direct cost accounted for 87.6% of total cost in which medication cost is 10.5%. This implies that medication cost (which was calculated in this study) accounted for a small percentage of the cost of illness. This therefore

means the cost of illness of epilepsy in Nigeria (if other cost items were included) will be substantially high and the economic burden on the patients, caregivers and the country as a whole cannot be overemphasized.

CONCLUSION

From this study, it is seen that epilepsy affects marital life and education of the patients in ABUTH, Kaduna, as it does in other parts of the world. Half of the patients were 20 years old at first registration at this healthcare facility, larger proportions were less than that age at the onset of epilepsy. The most common risk factor identified for epilepsy in this study was febrile convulsion. Diagnosis was made based on information from eyewitnesses of attacks, patients and clinical examinations, EEG and CT scan in a few patients. Generalized tonic-clonic seizure was most commonly reported in this hospital and carbamazepine was the most commonly prescribed medication in this study centre.

In general, patients that had less than 2 years since registration at this healthcare facility were not as regular in their clinic attendance when compared with those who had more than 2 years since registration. This study revealed that the longer patients stay on therapy, the better their outcome. Non-adherence to follow-up and therapy has a significant effect on the outcome of treatment in terms of attaining one-year remission while type of seizure (Generalized or Partial) does not have a significant effect on attainment of one-year remission of seizures. The cost of AEDs used by the patients per year was high considering the fact that majority of these patients were unemployed. Cost increased with increase in clinic attendance, but decreased with increase in years since registration at this healthcare facility. There was no significant difference in cost of medications (either total medications or AEDs) as regards the type of seizure.

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