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A Review on Medication Adherence in People with Epilepsy

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ABSTRACT: Epilepsy is a disorder that is best viewed as a symptom of disturbed electrical activity in the brain caused by a wide variety of etiologies.Epilepsy is a tendency to have seizure that in the brain. The brain uses electrical signals to pass messages between brain cells. If these cells are disturbed this can lead to seizure. Epilepsy is usually diagnosed when someone has had more than one seizure.

KEY WORDS: Epilepsy, sign and symptoms, Treatment

I. INTRODUCTION

Epilepsy is a brain disorder in which clusters of nerve cells or neurons, in the brain sometimes signal abnormally. In epilepsy the normal pattern of activity become disturbed causing strange sensation, emotion and behaviour or sometimes convulsions, muscle spasm, loss of consciousness.

Epilepsy is a disorder that is best viewed as a symptom of disturbed electrical activity in the brain caused by a wide variety of etiologies. It is a collection of many different types of seizures that vary widely in severity, appearance, cause, consequence, and management. Epilepsy implies a periodic recurrence of seizures with or without convulsions. Seizures that are prolonged or repetitive can be life-threatening. The effect epilepsy has on patients lives can be extremely frustrating. Indeed, studies have shown that patients with epilepsy who do not experience complete seizure control have lower self-reported quality of-life scores than patients who are seizure-free. It is also important to recognize that seizures may be just one (albeit the most obvious) symptom of an epileptic disorder. Not uncommonly, patients have other comorbid disorders, including depression, anxiety, and potentially neuroendocrine disturbances. Patients with epilepsy also may display neurodevelopmental delay, memory problems, and/or cognitive impairment. While, by convention, the focus of drug treatment is on the abolition of seizures, clinicians also need be attentive to addressing these common comorbidities.

TYPES OF EPILEPSY

I. Partial seizures (seizures begin locally)
A. Simple (without impairment of consciousness)
1. With motor symptoms
2. With special sensory or somatosensory symptoms
3. With psychic symptoms
B. Complex (with impairment of consciousness)

1. Simple partial onset followed by impairment of consciousness—with or without automatisms
2. Impaired consciousness at onset—with or without automatisms
C. Secondarily generalized (partial onset evolving to generalized tonic-clonic seizures)
II. Generalized seizures (bilaterally symmetrical and without local onset)
A. Absence
B. Myoclonic
C. Clonic
D. Tonic
E. Tonic-clonic
F. Atonic
G. Infantile spasms
III. Unclassified seizures
IV. Status epilepticus

ETIOLOGY:

- Genetic influence
- Head trauma
- Brain condition
- Infectious disease

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- Prenatal injury

SIGN AND SYMPTOMS:

Common:

- Blackout or period of confused memory
- Involuntary movement of arms and legs
- Fainting spells
- Muscle spasms
- Visual hallucinations
- Emotional change
- Convulsion
- Strange sensations
- Unexplained period of unresponsiveness
- Loss of consciousness and awareness
- Panic or anger
- Peculiar changes in senses, such as smell, touch, sound

RISK FACTORS:

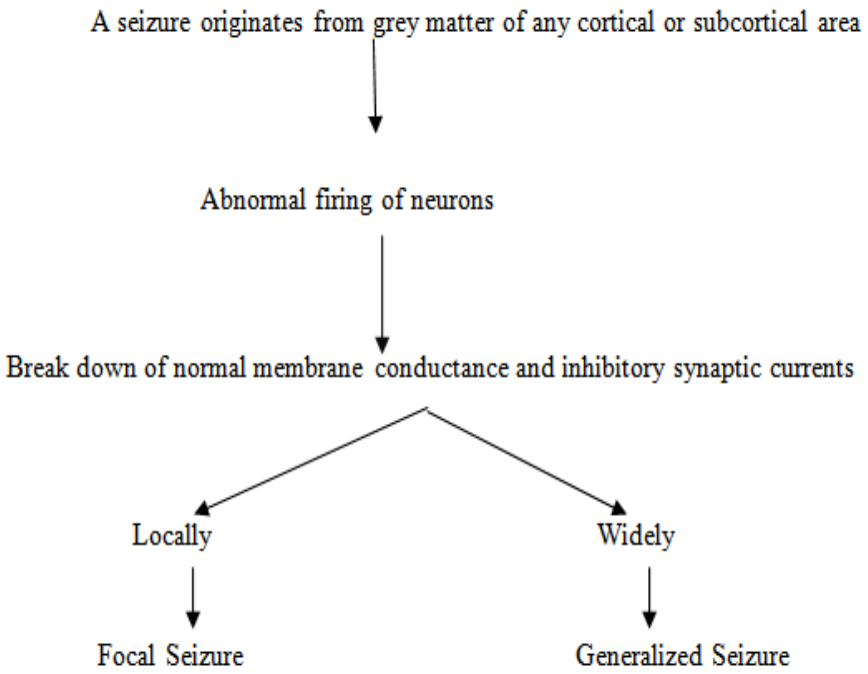
- Age
- Family history
- Dementia
- Head injury
- Stroke and other vascular diseases

EPIDEMIOLOGY:

Each year, 120 per 100,000 people in the United States come to medical attention because of a newly recognized seizure. At least 8% of the general population will have at least one seizure in a lifetime. Recurrence of a first unprovoked seizure within 5 years ranges between 23% and 80%. The age adjusted incidence of epilepsy is 44 per 1, 00000 people –years.30% are in people under the age of 18 at the time of diagnosis. Nearly 80% of people with epilepsy live in low- and middle-income countries.

Epilepsy is a chronic disorder characterized by recurrent seizures .The age-adjusted incidence of epilepsy is 44 per 100,000 person-years. Each year, about 125,000 new epilepsy cases occur; of these, 30% are in people younger than age 18 at the time of diagnosis. There is a bimodal distribution in the occurrence of the first seizure, with one peak occurring in new born and young children and the second peak occurring in patients older than age 65. The relatively high frequency of epilepsy in the elderly is now being recognized. At least 10% of patients in long-term care facilities are taking at least one antiepileptic drug (AED)

PATHOPHYSIOLOGY:



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- Abnormality of potassium conductance
- Defect in voltage sensitive ion channels
- Deficiency of ATPase
- Deficiency of inhibitory neurotran

Increase in excitatory neurotransmitters

Neuron membrane instability
Abnormal neuronal activity

Promote seizures

DIAGNOSIS:

EEG: An EEG or electroencephalogram, is test that can help diagnose epilepsy, during EEG the electrical signals of the brain are recorded. This electrical activity is detected by electrodes, or sensors placed on the patient scalp and transmitted through a machine that records the activity.

MRI: It reveals the structure of brain which can be useful for identifying the brain tumours and other structural abnormality.

Blood test: Blood samples are often screened for metabolic or genetic disorders that may be associated with seizure.

Neurological examination or neurophysiologic test: Doctor test for behaviour motor ability and mental function and other symptoms.

PET (Position emission tomography): Used to visualise active area of brain and detect abnormality

TREATMENT :

Pharmacological treatment

Classification of anti- epileptic drug

First generation drugs

- Phenobarbital
- Phenytoin
- Primidone
- Ethosuximide
- Carbamazepine
- Sodium valproate
- Clonazepam
- Clobazam

Second generation drugs

- Vigabatrin
- Lamotrigine
- Gabapentine

Common mechanism of action

The mechanism of action of most AEDs can be categorized as either affecting ion channels, augmenting inhibitory neurotransmission or modulating excitatory neurotransmission. The ion channels affected include the sodium and calcium channel .increase in inhibitory neurotransmission affect CNS concentrations on GABA, whereas efforts to decrease excitatory neurotransmission are focused primarily on glutamate and aspartate.

Dosing and administration

Almost all AEDs are associated with depressed CNS function early in the course of treatment, but some tolerance usually develops in 7 to 10 days .therefore, except in life threatening situation. AEDs should be started in low doses and increased gradually until seizure control is achieved or intolerable side effects occur [(6)]

Phenobarbital

MOA: Enhancement of GABA mediated inhibition(opening of chloride channels is prolonged by facilitating GABA action)

Blockade of AMPA recepters , direct opening of cl channels(after high doses), blockade of Na+ Ca+ channels(at high doses)

Pharmacological effect: suppression of the excessive discharge of the seizure focus, prevention of the spread of excitation from seizure focus.

DOSE:pediatric dose-1 to 3 mg/kg, adult dose-50to100mg/kg two times daily

Phenytoin

MOA: Proposed mechanisms include alteration of ion fluxes associated with depolarization, repolarization, and membrane stability; alteration of calcium uptake in presynaptic terminals; influence on calcium-dependent synaptic protein phosphorylation and transmitter release; alteration of the sodium potassium ATP-dependent ionic membrane pump; and prevention of cyclic nucleotide build up and cerebellar stimulation.

DOSE: pediatric dose 15-20 mg/kg,adult dose 300-400 mg/kg

TREATMENT OF EPILEPTIC CHILDREN

The current guidelines of the German society of Neurology (DGN) explicitly recommend the anticonvulsive agent lev-etiracetam - in addition to lamotrigine - as the agent of first choice for initial treatment of focal seizures withor without secondary generalisation from the age of 16years onward. Furthermore, levetiracetam is indicated foradditional treatment of myoclonic seizures in adults and adolescents from the age of 12 years onward with juvenille myoclonic epilepsy or primary generalised tonic-clonicseizures with ldiopathic generalised epilepsy. Howeverfor a long time the drug was not authorised for use in young children. In 2004 levetiracetam was approved in Germany for additional treatment of focal seizures

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inchildren from the age of 4 years onward. In 2010 the agent was approved for additional treatment of focalseizures in children from the age of 1 month onward.Experts unanimously agreed that this therapy option has decisively improved the treatment of epilepsy in very young patients.

PHARMACOLOGICAL TREATMENT.

- Ketogenic diet
- Surgery
- Vagus nerve stimulation

KETOGENIC DIET: The ketogenic diet is a special high-fat, low-carbohydrate diet that helps to control seizures in some people with epilepsy. It is prescribed by a physician and carefully monitored by a dietitian. It is more strict, with calorie, fluid, and protein measurement and occasional restriction than the modified Atkins diet, which is also used today.

The name ketogenic means that it produces ketones in the body (keto = ketone, genic = producing). Ketones are formed when the body uses fat for its source of energy. Usually the body usually uses carbohydrates (such as sugar, bread, pasta) for its fuel, but because the ketogenic diet is very low in carbohydrates, fats become the primary fuel instead. Ketones are not dangerous. They can be detected in the urine, blood, and breath. Ketones are one of the more likely mechanisms of action of the diet; with higher ketone levels often leading to improved seizure control. However, there are many other theories for why the diet will work.

VAGUS NERVE STIMULATION: Vagus nerve stimulation (VNS) is designed to prevent seizures by sending regular, mild pulses of electrical energy to the brain via the vagus nerve. These pulses are supplied by a device something like a pacemaker.

The VNS device is sometimes referred to as a "pacemaker for the brain." It is placed under the skin on the chest wall and a wire runs from it to the vagus nerve in the neck.

The vagus nerve is part of the autonomic nervous system, which controls functions of the body that are not under voluntary control, such as the heart rate. The vagus nerve passes through the neck as it travels between the chest and abdomen and the lower part of the brain.

TREATMENT ALGORITHM FOR EPILEPSY

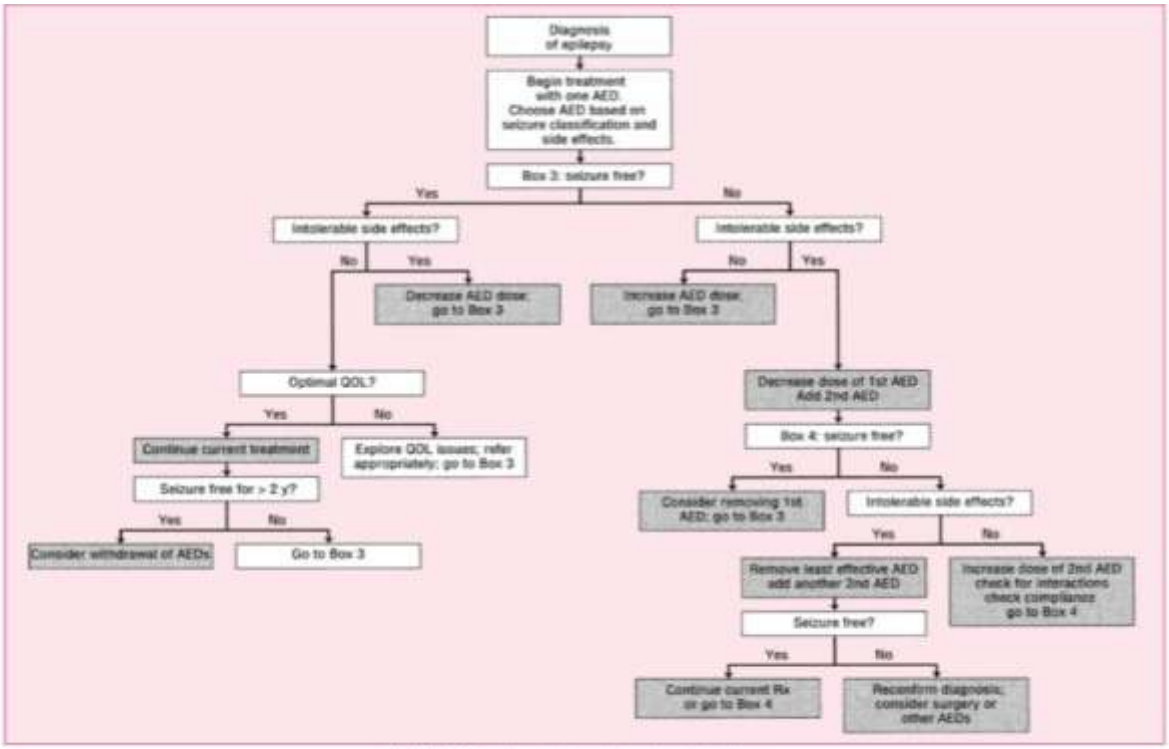

FIGURE 54–1. Algorithm for the treatment of epilepsy.

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Patient counselling

Sports

Most physicians encourage their patient to be achieve and promote participation in sports to help maintain good health.This attitude is equally important for epiletics, but certain factors must be taken in to consideration.

Marriage

Epilepsy in no way jeopardizes the legality of the marriage contract but in fairness, prospective spouses are entitled to complete information about their partner's condition.

Driving

The physician must be decided if the epileptic patient is competent to operate a vehicle safely.it is more difficult to assess the adult who has had a solitary seizure. Automobiles have become so much a part of our lives that losing the privilege of driving can have very least transportation and worst it may even mean giving up a job. The physician is allowed considerable discretion in these cases. However patients who drive passenger tansport or heavy commercial vehicle must stop during for one year after even one seizure. If no further seizure occur and if they are not taking anticonvulsant medication. It is considered safe for these patients to resume their previous driving privileges.

Adolescence and young adult patients tend to be less compliance with these restrictions. One can only hope that driver safety programmes in schools, will make clear to young, in experiences drivers the necessity of stringent regulations in the intres of public safety

Employment

Due to the variability of seizure and seizure pattern, it would be extremely unfair to lump together people with epilepsy in giving advice on employmentthe physician may have to consider several problems in addition to presence or absence of seizure. If there is associated mental retardation, employment opportunities would be limited to sheltered workshop or equivalent facility. Some patient with mild mental retardation and seizure degrees of social immaturity. Some unusual personality traits may occasionally be encountered certain forms of epilepsy.

Pregnancy

The physician may be asked for advised by couples who are planning to have children and women who are already become pregnant the absolute risk to the pregnant epileptic women is low,although some risk are higher than for the general population.Then increase in seizure frequency might be partly related to lower serum anticonvulsant level. This seems to occur in pregnancy even if medication is taken regularly. However, mothers consumed potential teratogenic risk may omit medication and morning nausea may cause a change in schedule.

MEDICATION ADHERENCE IN EPILEPTIC PATIENTS

Decision to Use Antiepileptic Drug Therapy

Once a diagnosis of epilepsy is established, the decision to treat the patient with medication is based on the likelihood of recurrence. The need for AED therapy after a single seizure is controversial; however, recurrence of generalized tonic-clonic seizures is less likely if AED therapy is initiated after the f irst generalized tonic-clonic seizure.52 Therefore, at least for this one specific seizure type, early use of AED is supported. Whether this information applies to other types of seizure

Choice of Antiepileptic Drug

Felbamate (Felbatol), gabapentin (Neurontin), lamotrigine (Lamictal), topiramate (Topamax), tiagabine (Gabitril), levetiracetam (Keppra), oxcarbazepine (Trileptal), zonisamide (Zonegran), and pregablin (Lyrica) are effective for control of partial seizureswithorwithoutsecondarygeneralization.
Carbamazepine has several advantages that make it a preferred first-choice agent in the opinion of many clinicians. In comparisonwithphenytoin,carbamazepineislessseda tingand is not associated with dysmorphic effects, such as hirsutism.

HEMATOLOGIC TOXICITY

Aplastic anemiaandagranulocytosishaveoccurredinassociatio n with carbamazepine therapy.56 Several cases have been fatal; however, most casesoccurredinolderpatientstreated for trigeminal neuralgia. Many patients were receiving other medications, and occasionally the reports were incomplete.

HEPATOTOXICITY

Carbamazepine-related liver damage

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appears to be extremely rare despite its being frequently mentioned as a potential problem . In summary, hepatic and hematologic toxicities of carbamazepine are rare. Although potentially serious, they are best monitoredonclinicalgroundsratherthanbyongoing,intensive laboratory testing.

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Medication Adherence in Pregnancy

Despite the ample evidence in the literature of the important role of adherence with drug therapy in influencing treatment outcome in the general medical population, there is a relative paucity of studies that have focused specifically on whether pregnant women do or do not take their medication. Much of the research addressing medication compliance during pregnancy has been undertaken in women with HIVinfection although there are scattered reports in other medical conditions.

The information available suggests that no adherence with prescribed drugs is also a problem the pregnant population. 39% of women who received one or more prescriptions reported noncompliance during pregnancy when interviewed within two weeks after delivery. Reasons included doubts about the ue of the drug during pregnancy, expected side effects, disappearance of the complaints for which the drug where prescribed, or the complaint persisted notwithstanding drug therapy. Approximately 40% of women had had one or more questions about drug during their pregnancy with safety.(15)

Antiepileptic drug management in pregnancy

Manegement of AEDs during pregnancy can be complex. Clearance ofvirtually all of the AIDs increases during pregnancy, resulting in decrease in serum concentrations. Clearance of most of the AEDs normalizesgradally during the first 2 to 3 postpartum months. LTO metabolism, however, undergoes an exaggerated increases throughout pregnancy and quickly converts back tobaseline clearance within the first few weeks post partum.

Several physiologic factors contribute to the decline in AED levels during pregnancy.Important mechanisms include decreased albumin concentration and induction of the hepatic microsomal enzymes by the increased sex steroid hormones.The greater extent of increased LTG clearance during pregnancy probably reflects its distinctive metabolic pathway of glucuronidation. Approximately 50% of VPA elimation also is via glucuronidation and probably also accounts for its relatively higher increased clearance during pregnancy. VPA metabolism is complicated further by saturable protein binding. causing unpredictable changes in free concentrations as pregnancy progresses.(16)

The Problem of Nonadherence to AEDs

Epilepsy is a term used to describe a group of neurologic conditions that result in a chronic tendency to experience recurrent and unprovoked seizures. Successful treatment of epilepsy requires vigilant selfmanagement, including strict adherence to anti-epileptic drugs (AEDs). Adherence is defined as the extent to which a person's behavior coincides with medical or health advice.2,3Nonadherence to AEDS can result in negative outcomes in patients with epilepsy, such as increased seizure frequency, increased hospital admissions, loss of driving privileges, loss of employment, and death.

II. CONCLUSION

Epilepsy is the second most troublesome neurologic disorder worldwide in terms of disability-adjusted life years. Epilepsy is a global public health problem that affects more than 70 million people worldwide, and more than 85% ofthe global burden of epilepsy occurs in developing countries. In Africa, epilepsy affected about 10 million people. Ethiopia is also one of the highly affected countries in Africa with an estimated prevalence of 5.2/1000 population. Epilepsy is a debilitating illness that leads to neuropsychological impairment, impairment of quality of life, frequency physical injury, social stigma, poor academic performance, reduced employment rate, and shortened lifetime.

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