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Prescribing pattern of antiepileptic drugs in accordance to generations of older and newer by neurologist and neurosurgeon

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ABSTRACT
The use of antiepileptic medications by neurosurgeons and neurologists has increased recently, according to study. Due to improved patient compliance, fewer side effects, and greater efficacy of newer AEDs, older AEDs are progressively being replaced. Prescription behavior is undergoing this transition or change. The most commonly prescribed newer AED for GTCS and focal seizures is levetiracetam. This is due to the fact that it has advantages over older AEDs, including the fact that it is safe to use while pregnant, has excellent efficacy and tolerability, has fewer drug interactions, and has fewer side effects. Levetiracetam is a more recent AED that is advised for GTCS, GTCS add-on treatment, and partial seizures. Other more modern AEDs include brivaracetam, topiramate, and lacosamide. It cannot be said that all newer AEDs are effective at controlling seizures and all older AEDs are ineffective at controlling seizures because the choice of AEDs relies on the type and severity of the seizure and medication therapy differs from patient to patient. Levetiracetam is often mixed with older AEDs like phenytoin and sodium valproate. Patients continue to use older generation AEDs despite a growing tendency toward using newer generation AEDs. AEDs of both the more recent and earlier generations have advantages over one another.

Keywords: sodium valproate; levetiracetam; lamotrigine; phenytoin; antiepileptic; GTCS; partial; complex.

I. INTRODUCTION

A central nervous system illness called epilepsy is characterized by paroxysmal cerebral dysrhythmia, which manifests as brief episodes (called seizures) of loss of consciousness or mental confusion, with or without associated physical movements (convulsions), sensory, or psychiatric problems. These incidents can happen at any time, and their frequency varies greatly. The location of the focus, the area into which the discharge extended, and the postictal depression of these regions all play a role in how epilepsy manifests. Epilepsy has a focal origin in the brain. [1]

The episodic high-frequency discharge of impulses by a collection of brain neurons, sometimes referred to as the focus, is linked to seizures. A local aberrant discharge that begins elsewhere in the brain may later spread there. The symptoms that are created, which can range from a momentary lapse in attention to a full convulsive fit lasting for several minutes, as well as unusual feelings or behaviors, depend on the location of the original discharge and the amount of its propagation.[2]

Types of seizures

Divides seizures into two basic categories based on the region of the brain where the abnormal discharge starts. The seizures are referred to as "generalized" if both hemispheres of the brain are initially activated simultaneously. Seizures are classified as "partial" or "focal" if they begin in a specific region of the brain. [3]

1. Generalised seizures

Generalised tonic-clonic seizures (GTCS, major epilepsy, Grand mal): Usually lasts 1-2 minutes. Aura, cry, unconsciousness, tonic spasm of all body muscles, clonic jerking, followed by extended sleep and depression of all CNS processes, is the typical progression.
Absence seizures (minor epilepsy, Petit mal): common among kids, lasts for roughly half a minute. Brief unconsciousness, patient appears to freeze, and patient stares in one direction without any jerking movements on either side of the body. The EEG displays a typical spike and wave pattern with three cycles per second.
Atonic seizures (Akinetic epilepsy): due to strong inhibitory discharges, unconsciousness accompanied by complete muscular relaxation There's a chance the patient will trip and fall.
Myoclonic seizures: brief tightening of muscles in a limb or the entire body that feels like a shock.
Infantile spasms (Hypsarrhythmia): observed in babies. Probably not an epileptic disorder. Muscle

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spasms that come and go and a decline in mental capacity. The interseizure EEG shows diffuse alterations.

2. Partial seizures

Simple partial seizures (SPS, cortical focal epilepsy): lasts 0.5–1 minute. Frequently secondary. Depending on the region of the cortex engaged in the seizure, convulsions are limited to a certain group of muscles or a localized sensory disruption without a loss of consciousness.

Complex partial seizures (CPS, temporal lobe epilepsy, psychomotor): Attacks of strange and confusing behavior, irrational motions, emotional changes that continue for one to two minutes, and consciousness impairment. Auras frequently precede. The temporal lobe is where the seizure focus is.

Simple partial or complex partial seizures secondarily generalized: Tonic-clonic generalised seizures with loss of consciousness develop from the initial partial seizure.[1]

Etiology:

Epileptic seizures are brought on by aberrant neuronal discharges, which can result from any disease event that affects the cortical layer of the brain. Idiopathic epilepsies, which are those with a demonstrable hereditary component, presumably account for a third of all new instances of epilepsy. However, in a considerable number of cases, there is no recognized etiology; they are referred to as cryptogenic epilepsies. Cryptogenic epilepsy may have previously unexplained metabolic or biochemical abnormalities as well as microscopic lesions in the brain brought on by birth trauma, malformations of the brain, or other injuries. The phrase "symptomatic epilepsy" denotes the presence of a likely cause.[3]

Cause of Seizures:

Based on age:-[4]

Neonates (<1 month)	Perinatal hypoxia and ischemia Intracranial hemorrhage and trauma CNS infection Metabolic disturbances (hypoglycemia, hypocalcemia) Drug withdrawal Developmental disorders Genetic disorders
Infants and children (>1 month and <12 years)	Febrile seizures Genetic disorders (metabolic) CNS infection
Adolescents (12–18 years)	Trauma Developmental disorders Genetic disorders Infections Illicit drug use
Young adults (18–35 years)	Trauma Alcohol withdrawal Illicit drug use Brain tumor Autoantibodies
Older adults (>35 years)	Cerebrovascular disease Brain tumor Alcohol withdrawal Metabolic disorders (uremic, hepatic failure) Alzheimer's disease and other degenerative CNS diseases Autoantibodies

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Based on genetic factors:

The discovery of genetic alterations linked to a range of epileptic disorders has been the most significant recent development in epilepsy research. Even if the majority of the mutations discovered to date cause uncommon kinds of epilepsy, they have significantly advanced our understanding of various concepts.

Other gene mutations are showing to be connected to pathways affecting the development of the central nervous system or neuronal homeostasis.[4]

Diagnosis

The requirement to first show a tendency to repeated epileptic episodes makes the diagnosis of epilepsy challenging. The unpredictable and transitory nature of epilepsy is the only aspect that sets it apart from all other diseases. Epilepsy is diagnosed clinically, and the patient's and, if feasible, an eyewitness's accounts of what transpired during the attacks are also required.

Syncope, breath-holding episodes, transient ischemic attacks, psychogenic attacks, etc. are few more illnesses that may result in impairment or loss of consciousness and which can be mistakenly recognized as epilepsy.

Neuroimaging with magnetic resonance imaging (MRI) is the most valuable investigation when structural abnormalities such as stroke, tumor, congenital abnormalities or hydrocephalus are suspected.[3]

Approach to the patient Evaluation of the adult patient with a seizure require the following:

CBC complete blood count, CNS central nervous system, CT computed tomography, EEG electroencephalogram, MRI magnetic resonance imaging.

Differential Diagnosis of Seizure: [4]

Syncope	Transient ischemic attack (TIA)
Vasovagal syncope	Basilar artery TIA
Cardiac arrhythmia	Sleep disorders
Valvular heart disease	Narcolepsy/cataplexy
Cardiac failure	Benign sleep myoclonus
Orthostatic hypotension	Movement disorders
Psychological disorders	Tics
Psychogenic seizure	Nonepileptic myoclonus
Hyperventilation	Paroxysmal choreoathetosis
Panic attack	Special considerations in children
Metabolic disturbances	Breath-holding spells
Alcoholic blackouts	Migraine with recurrent abdominal pain and cyclic vomiting
Delirium tremens	Benign paroxysmal vertigo
Hypoglycemia	Apnea
Hypoxia	Night terrors
Psychoactive drugs (e.g., hallucinogens)	Sleepwalking
Migraine	
Confusional migraine	
Basilar migraine	

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Mechanism of Seizures Initiation and Propagation:

Since epilepsy lacks a pathognomonic lesion, it differs from the majority of neurological illnesses. In any normal brain, any number of distinct electrical or chemical stimuli might readily cause a seizure. An electroencephalogram (EEG) can show the distinctive feature of epilepsy, which is a very rhythmic and recurrent hyper-synchronous discharge of neurons, either localized in a region of the cerebral cortex or generalised throughout the brain (EEG).

Each neuron in a vast network of interconnected neurons is connected to hundreds of other neurons through synapses. Neurons emit a tiny electrical current that causes synaptic amounts of neurotransmitters to be released, allowing them to communicate with one another. There are two main types of neurotransmitters: inhibitory and excitatory. As a result, when a neuron discharges, neurons linked to it may be excited or inhibited. While an inhibited neuron won't, an excited neuron will stimulate the one after it. The central nervous system communicates, transmits, and processes information in this way.

A typical neuron fires repeatedly at a low baseline frequency, and a typical EEG records the combined electrical activity produced by the neurons of the cortex's superficial layers. A shift in the discharge pattern may occur if neurons are hurt, damaged, or exposed to a chemical or metabolic assault.

Regular low-frequency discharges are replaced by brief high-frequency discharges in epilepsy, which are typically followed by periods of inactivity. A single abnormally discharged neuron typically has no clinically significant effects. An epileptic seizure can only start when a large number of neurons discharge simultaneously and abnormally. This aberrant discharge could stay in one spot or it might travel to nearby regions, enlisting more neurons as it grows. Through cortical and subcortical channels, such as colossal and thalamocortical ones, it may also generalize throughout the entire brain. [3]

The epileptic focus is the location where the aberrant discharge starts. Depending on which part of the brain is implicated, how the discharge progresses, and how the discharging areas project to the superficial cortex, an EEG recording made during one of these abnormal discharges may reveal a number of atypical symptoms. Focal seizure activity can start in a fairly isolated area of the cortex before slowly spreading to nearby areas. The electrographic "spike" that characterizes an established seizure is often caused by intense, nearly simultaneous firing of several local excitatory neurons, which seems to be hyper synchronized excitatory bursts across a sizable cortical region. The influx of extracellular calcium (Ca 2+) causes a relatively long-lasting depolarization of the neuronal membrane, which causes the opening of voltage-dependent sodium (Na +) channels, influx of Na +, and formation of recurrent action potentials in individual neurons. Depending on the kind of cell, this is followed by hyperpolarizing after potentials mediated by GABA (gamma-amino-butyric acid) receptors or potassium (K +) channels. An EEG "spike discharge" is produced when enough neurons fire off synchronized bursts to do so.

By maintaining hyperpolarization and a "surround" inhibition produced by the feedforward activation of inhibitory neurons, it is believed that the spreading seizure wave front will eventually decelerate and stop. A number of synaptic and non-synaptic mechanisms, such as: (1) an increase in extracellular K +, which blunts hyperpolarization and depolarizes neighboring neurons; (2) accumulation of Ca 2+ in presynaptic terminals, leading to enhanced neurotransmitter release; and (3) depolarization-induced activation of the N-methyl-D-aspartate (NMDA) subtype of the excitatory amino acid receptor, which cause recruitment of surrounding neurons, are activate. (4) ephaptic interactions including alterations in the osmolarity of the tissue and cell swelling. Excitatory currents spread into nearby regions via local cortical connections and to farther-off regions via extensive commissural pathways like the corpus callosum when enough neurons are recruited.

Neuronal excitability is influenced by a wide range of circumstances, and as a result, there are numerous potential pathways for changing a neuron's propensity to burst into activity. Changes in the conductance of ion channels, the response properties of membrane receptors, cytoplasmic buffering, second-messenger systems, and protein expression as defined by gene transcription, translation, and posttranslational modification are examples of mechanisms unique to the neuron.

Changes in the quantity or type of neurotransmitters at the synapses, the regulation of receptors by extracellular ions and other chemicals, and the temporal and spatial characteristics of synaptic and non-synaptic input are examples of extrinsic neuronal mechanisms. Many of these

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pathways also include non-neural cells, including oligodendrocytes and astrocytes.[4]

Treatment

Antiepileptic medicines (AEDs) are the mainstay of treatment for epilepsy, however in cases of uncontrolled or drug-resistant epilepsy, brain surgery may be necessary. About 70% of the time, conventional AEDs are successful in managing seizures, although adverse effects frequently restrict their use. About 70% of the time, antiepileptic medications are successful in treating seizures, although side effects frequently restrict their use. Antiepileptic medications are also used to treat or prevent convulsions brought on by various brain conditions, such as trauma (especially after neurosurgery), infection (as an adjuvant to antibiotics), brain tumors, and stroke. They are occasionally referred to as anticonvulsants rather than antiepileptics for this reason. More and more antiepileptic medications are being discovered to help non-convulsive illnesses such bipolar depression and neuropathic pain.[2]

Treatment for a patient with a seizure disorder is almost always multimodal and involves addressing a range of psychological and social issues in addition to treating underlying conditions that result in or contribute to the seizures, avoiding precipitating factors, and suppressing recurrent seizures through prophylactic therapy with antiepileptic medications or surgery. Given the many distinct forms and causes of seizures as well as the variance in the efficacy and toxicity of antiepileptic drugs for each patient, treatment approaches must be customized.[4]

Initiation of Antiepileptic Drug Therapy

Suppression of epileptic discharges and the avoidance of epileptic seizures are the goals of therapy. The majority of the time, complete seizure control is achievable, and in some people, medications may lessen the frequency or intensity of seizures. The amount and frequency of attacks, the existence of triggering events like alcohol, drugs, or flashing lights, and the presence of underlying medical disorders must all be carefully evaluated before treatment choices are chosen. The amount and frequency of attacks, the existence of triggering events like alcohol, drugs, or flashing lights, and the presence of underlying medical disorders must all be carefully evaluated before treatment choices are chosen. There is a reason for delaying therapy if there are significant stretches of time (more than two years) between seizures. Treatment may not be required if there are more than two attacks that can be definitively linked to a precipitating cause, such as alcohol or a fever. Therapy is a lengthy process that typically lasts at least three years and, in some cases, even for the rest of one's life. Introduce the first-line AED gradually, starting with a minimal dose that is appropriate for the person's particular type of seizure. This is because an introduction that happens too quickly could have negative impacts that make the person lose confidence.[3] The goal of medication is to completely stop all seizure activity while minimizing negative effects. The drugs chosen and the dosage are dependent on the patient's needs, seizure types and number of seizures.[1]

General principles of treatment

The goal of treatment is to control seizures with a single medication at the lowest effective dose with the fewest side effects.

Maintenance dosage

There isn't a specific AED dosage that works for all patients. The required dosage varies depending on the individual and the medicine. Drug dosages should be gradually increased to an initial maintenance dosage after a gentle introduction.

Withdrawal of drugs

AEDs should not be withdrawn abruptly with barbiturates and

Benzodiazepines, in particular, rebound seizures may occur. Withdrawal of individual AEDs should be carried out in a slow stepwise fashion to avoid the precipitation of withdrawal seizures (e.g., over 2–3 months).

Carbamazepine, 100–200mg every 2 weeks (as part of a drug change) 100–200mg every 4 weeks (total withdrawal)

Phenobarbital, 15–30mg every 2 weeks (as part of a drug change) 15–30mg every 4 weeks (total withdrawal)

Phenytoin, 50mg every 2weeks (as part of a drug change) 50mg every 4weeks (total withdrawal)

Sodium valproate, 200–400mg every 2 weeks (as part of a drug change) 200–400mg every 4 weeks (total withdrawal)

Altering drug regimens

Maximal tolerated dose of a drug does not control seizures, or if side effects develop, the first drug can be replaced with another first-line AED.

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the second drug should be added gradually to the first. Once a good dose of the new drug is established, the first drug should then slowly be withdrawn.[3]

Newer AEDs

Over the past 20 years or more, numerous brand-new antiepileptic medications have been created in an effort to enhance their effectiveness and side-effect profile. Although controlling reverberate neuronal discharges would appear, on the surface, to be a much simpler problem than controlling those aspects of brain function that determine emotions, mood, and cognitive function, improvements have been gradual rather than spectacular, and epilepsy remains a difficult problem.[2]

Levetiracetam

Clinical efficacy in refractory partial seizures with or without generalization has been established for both adjuvant medicine and monotherapy. Unknown is the exact mechanism of action. By attaching to a particular synaptic protein known as "SV2A," it may alter the synaptic release of glutamate and GABA. It's possible that this explains the antiepileptic quality. Levetiracetam has a t12 of 6 to 8 hours before it is completely absorbed from the mouth, somewhat hydrolyzed, and then mostly eliminated in urine unaltered. It neither stimulates nor inhibits CYP enzymes, nor is it oxidized by them. It has no negative medication interactions as a result. There aren't many adverse effects including fatigue, vertigo, weakness, or erratic behavior. Driving could be dangerous. Levetiracetam is being used more frequently in CPS, GTCS, and myoclonic epilepsy, primarily as an add-on medication, due to its good tolerability. Children under the age of four are not permitted to use it.

Topiramate

When used in the kindling model, PTZ-induced clonic seizures, and maximum electroshock, this weak carbonic anhydrase inhibitor exhibits broad range anticonvulsant action. It appears to work through a number of different mechanisms, including the prolongation of Na+ channel inactivation similar to that of phenytoin, potentiation of GABA by a postsynaptic effect, antagonistic activity against some glutamate receptors, and hyperpolarization of neurons via specific K+ channels. Attention deficit disorder, drowsiness, ataxia, trouble finding words, poor memory, weight loss, paresthesia, and kidney stones are some of the negative effects.

Lacosamide

This antiseizure medication was very recently approved (in 2010 in India) and is solely meant to be used as add-on therapy for partial seizures in adults, whether they are generalised or not. It works by boosting Na+ channel inactivation and reducing neuronal repetitive firing. Lacosamide is broken down by CYP2C19 and eliminated through the urine. Ataxia, vertigo, diplopia, tremor, depression, and heart arrhythmia are side effects.

Zonisamide

Another more recent anticonvulsant that modulates maximal electroshock seizures and reduces kindling seizures, but does not conflict with PTZ, has a mild carbonic anhydrase inhibitory effect. It has been seen that Na+ channel inactivation can be prolonged and decrease repeated neural activity. Additionally, it has been observed to inhibit Ca2+ T-type currents in specific neurons. Zonisamide has a good oral absorption rate and is primarily eliminated unaltered in urine with a half-life of more than 60 hours. In refractory partial seizures, it is prescribed as an adjunct medication. Sleepiness, wooziness, headaches, irritability, and anorexia are side effects. Renal stones and metabolic acidosis are both possible. In patients who are sensitive to sulfonamides, zonisamide should be avoided.[1]

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Selection of anti-epileptic drugs[1]

Generalized-onset Tonic-Clonic	Focal	Typical Absence	Atypical Absence, Myoclonic, Atonic
First-line			
Valproic acid Lamotrigine Topiramate	Lamotrigine Carbamazepine Oxcarbazepine Phenytoin Levetiracetam	Valproic acid Ethosuximide	Valproic acid Lamotrigine Topiramate
Alternatives			
Zonisamide[a] Phenytoin Carbamazepine Oxcarbazepine Phenobarbital Primidone Felbamate	Topiramate Zonisamide[a] Valproic acid Tiagabine[a] Gabapentin[a] Lacosamide[a] Phenobarbital Primidone Felbamate	Lamotrigine Clonazepam	Clonazepam Felbamate

[a]As adjunctive therapy.

II. MATERIALS AND METHOD:

The design of this study was prospective and observational. In observational studies, the researcher does not alter the results of the study; instead, they observe and draw conclusions. All of the measured outcomes and data were collected during the research period, making the study prospective in design.

The study's key objective is to comprehend and examine how physicians are using antiepileptic medications in different ways.

Through data collecting forms created for the purpose, necessary study data were gathered from neurosurgeons and neuro-physicians from all throughout India.

STUDY SITE

Neuroscience Department

STUDY DESIGN

Prospective and Observational study

SAMPLE SIZE

100 Neurosurgeon and Neuro-physician

Data collection tool

Questionnaire send in person or online

III. METHODOLOGY:

The neurosurgeon and neuro-physician received a specifically designed questionnaire form through mail and in person, which was used to collect and record all the study-related data. A total of 100 responses, including those from neurosurgeons and neurologists, were gathered.

A specific set of questions are included in the questionnaire addressing the current course of therapy, increased use of more recent AEDs, safe drugs for expectant mothers, adverse effects of more traditional AEDs, current first-line treatment, etc. The questions had a multiple-choice format with room for comments, more than two options, and various drugs that were authored by doctors. Responses are gathered from both public and private hospitals across India (through online). All age groups and pregnancies are covered by the collected data, which is sufficient to offer all information on antiepileptic drug prescription and assess changes in antiepileptic drug trends.

Analysis of the information gathered from the questionnaires was done in two parts: drug use in GTCS and partial seizures. From the data, a statistical ratio and graph were created, and the findings were deduced based on the ratio.

Data collection tool:

For data collection a specially design questionnaire form is made which included 24 questions. Questions are designed such that all the information required for the study is collected, for some questions options are provided.

Sample Questions:

•In your experience what is the most common seizure type in your clinical practice?

•Your current First line of drug treatment for patient with GTCS and partial epilepsy?

• Your preferred antiepileptic for add on therapy for partial epilepsy and GTCS?

• Primary factors deciding for choice of antiepileptic medication for a patient?

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• Your reason for the change in prescription pattern?
• Any preferred newer antiepileptic drug you currently used for GTCS?
• According to you which generation of antiepileptic drugs are better in controlling seizures? (Older or newer)
• You have observed any preferred Advantage, using levetiracetam (new drug) for Generalised and focal seizures?

Response: -

Specialty
Years of experience
No. of patients with seizure attended in OPD
Most common type of seizure observed
Current first line treatment for GTCS
Current first line treatment for partial epilepsy
Addon therapy for GTCS
Addon therapy for partial seizures
Factors deciding choice of AEDs
Reason for change in prescription
Newer AEDs currently used for GTCS
Which generation of AEDs are better
Advantages of using levetiracetam
AEDs for women of childbearing age
AEDs for patient with obesity
Side effect encountered using valproate sodium

Responses provided by 100 neurologists and neurosurgeons: click here

IV. RESULTS

In our analysis of 100 replies, neurologists made up 37% and neurosurgeons 63%. In an OPD, about 56% of clinicians saw 0–10 patients with seizure disorders, 31% saw 10–20 patients, and 13% saw more than 20 patients per day. The same is displayed in the table no.1:

Table no. 1:

Percentage of no. of patients been attended by the doctors	**No. Of patients reviewed in the OPD**
56	0-10
31	10-20
13	>20

In the clinical practice of 100 doctors, generalised tonic clonic seizures (GTCS) were discovered to be the most prevalent seizure type (73%).
The most prevalent seizure type can be calculated using the below formula: -

$$\text{prevelent type} = \frac{\text{seizure type}}{\text{total data collected}} \times 100$$

$$= \frac{\text{GTCS (69)}}{100} \times 100 = 69\ \%\ \text{(GTCS cases from collected data)}$$

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Table no.2:

Types of seizure	Percentage (%)
Generalized tonic clonic seizure	69
Partial seizure	27
Complex partial seizure	4

The most common type of seizure is found to be generalized tonic clonic seizure which is the most common type found among 69% of the patients followed by 27% of partial seizures and 4% of complex partial seizures.

Table no.3:

Drug of choice for GTCS (first generation)	Percentage (%)
Sodium valproic acid	76
Phenytoin	70
Carbamazepine	32
Phenobarbitone	24

Sodium valproic acid, followed by phenytoin and carbamazepine, is the first-generation antiepileptic drug of preference for GTCS in about 76% of doctors (out of 100%). Each drug's proportion is expressed as a percentage of 100%.

Table no.4:

Current first line drugs for GTCS	Percentage
Sodium valproic acid	44%
Phenytoin	34%
Phenobarbitone	14%
Carbamazepine	8%

Sodium valproic acid, followed by phenytoin and carbamazepine, is the first-generation antiepileptic drug of preference for GTCS in about 76% of doctors (out of 100%). Each drug's proportion is expressed as a percentage of 100%.

Table no. 5:

Current first line drugs for GTCS	Percentage
Sodium valproic acid	44%
Phenytoin	34%
Phenobarbitone	14%
Carbamazepine	8%

The recommended newer antiepileptic medication for GTCS is levetiracetam. (Each drug proportion is a fraction of 100%)

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Table no. 6:

Drug used for add-on therapy for GTCS	Percentage
Levetiracetam	35%
Valproic acid	20%
Phenytoin	19%
Lacosamide	10%
Clobazam	6%
Topiramate	5%
Perampanel	3%
Brivaracetam	2%

Levetiracetam, Valproic acid, and phenytoin are the three add-on therapies that physicians prefer to use for GTCS.

Table no.7:

Drug used for addon therapy for partial seizures	Percentage
Levetiracetam	73%
Valproic acid	10%
Lacosamide	10%
Topiramate	8%
Gabapentin	8%
Clobazam	7%
Phenytoin	4%
Brivaracetam	2%
Zonisamide	1%

Levetiracetam is the recommended adjunct therapy for partial seizures, followed by valproic acid and lacosamide. (each drug's proportion as a whole of 100%)

Table no. 8:

Current first line therapy for partial seizures	Percentage
Sodium valproate	69%
Levetiracetam	60%
Phenytoin	57%
carbamazepine	30%
Topiramate	13%
Gabapentin	11%

Sodium valproate (69%) is currently the first drug used to treat patients with partial seizures, followed by levetiracetam (60%) and phenytoin (57%). (Each drug's proportion is 100%)

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Table no. 9:

Generation of Antiepileptic Drugs	Percentage
Older	61.6%
Newer	38.4%

According to data gathered from physicians, newer antiepileptic drugs (new generation) are better at controlling seizures. (The entire number is 100%)

Table no.10:

Reason for change in prescription pattern	Percentage
Patient compliance is better	82.1% (78 count of response)
Lesser side effect	75.8% (72)
Newer ones are more efficacious	32.6% (31)
Financially more affordable	21.1% (20)

Out of all physicians, approximately 61% have changed their first-line antiepileptic medication for GTCS, and 54.1% have changed their first-line antiepileptic medications for partial seizures. In the past two years, 67.2% of physicians have altered their prescription routine. The most significant factor influencing the shift in antiepileptic drug prescription patterns for GTCS and partial seizures is patient compliance. (Each percent is a deviation from 100%)

Table no.11:

Factors deciding for choice of AEDs	Percentage
Drug efficacy	76%
compliance	63%
Side effects	57%
Tolerability	51%

Choosing an antiepileptic drug for a patient with epilepsy relies on a number of primary factors, with drug efficacy being the most popular primary factor. (Each variable is less than 100%)

Table no.12:

Advantage of using Levetiracetam	Percentage
Safe in pregnancy	90%
Good efficacy and tolerability	88%
Low rate of drug interaction	43%
Few side effect	40%

Levetiracetam's preferred benefit for generalised and focal seizures. (Each percent is a deviation from 100%)

Table no.13:

AED for woman of childbearing age	Percentage
Levetiracetam	98%
Lamotrigine	23%
Topiramate	16%
Others	2%

Levetiracetam, with a 98% preference, is the preferred first-line antiepileptic medication for females and women of childbearing age. (each medication out of 100%)

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Table no.14:

AEDs obese patient with GTCS	Percentage
Levetiracetam	55%
Phenytoin	28%
Lacosamide	5%
Topiramate	3%
Brivaracetam	1%
Perampanel	1%
Phenobarbitone	1%

Phenytoin and Levetiracetam are most recommended drug for patient with obesity has GTCS.

V. DISCUSSION

A seizure, also referred to as an epileptic seizure, is a period of symptoms brought on by abnormally high or synchronised neuronal activity in the brain. The external manifestations range from uncontrollable shaking movements involving a large portion of the body and loss of consciousness (tonic-clonic seizure) to controlled shaking movements involving a smaller portion of the body and varying levels of consciousness (focal seizure). It's possible to lose bladder control.

Types of seizures

- Generalized seizures
- Partial seizures

In contrast to a study , which found that the most prevalent kind of seizures was GTCS detected in 73.0% patients (total 996 patients), our study found that generalised tonic clonic seizures (69%), partial seizures (27%) are the most common seizure type.[5]

According to this study, neurologist and neurosurgeons choose phenytoin (70%) and sodium valproic acid (76%) as first-generation antiepileptic medicines for GTCS. As their current first line treatments for patients with GTCS, doctors prescribe phenytoin (34%) and sodium valproic acid (44%) to the greatest percentage of patients. This can be compared to a study which found that sodium valproate is the drug of choice for generalised epilepsies with tonic-clonic, absence, and myoclonic seizures. If sodium valproate cannot be prescribed, carbamazepine, phenobarbital, and phenytoin may be prescribed instead.[6]

The most popular newer antiepileptic medications that neurologist and neurosurgeons prefer for the treatment of GTCS are Levetiracetam (89%), Lacosamide (66%) and Brivaracetam (63%) are discovered to be. The preferred antiepileptic medication for GTCS add-on therapy is Levetiracetam (35%), Valproic acid (20%), Phenytoin (19%), Lacosamide (10%), Clobazam (6%), Topiramate (5%), Perampanel (3%), and Brivaracetam (2%). This study can be compared to the one by Vidaurre.j, which found that the broad-spectrum antiepileptic medication brivaracetam is an effective treatment for generalised tonic-clonic seizures and is well tolerated. An alternative first-choice medication is levetiracetam. According to a study, topiramate and lacosamide are also effective as first choices.[7]

Levetiracetam (73%) is increasingly being prescribed by neurologists and neurosurgeons as an adjunctive treatment for GTCS and partial seizures. Valproic acid (10%), lacosamide (10%), and topiramate (8%) are also increasingly being used. Our research's findings differ from those of a study performed in 2005, in which pregabalin administration was found to be a highly effective and usually well-tolerated adjunctive therapy for partial seizures.[8]

According to this research, neurologist and neurosurgeons frequently prescribe these medications as the first line of treatment for partial epilepsy: sodium valproic acid (69%), levetiracetam (60%), phenytoin (57%), and carbamazepine (30%). Carbamazepine, phenytoin, and valproate are the first-choice medications for partial epilepsy, according to the research.[6]

Since the main goal of this research was to comprehend how doctors were shifting from conventional AEDs (older AEDs) to newer AEDs, there has been a change in the use of antiepileptic drugs given to patients in recent years. The ability to control seizures is greater with newer generation antiepileptic drugs (61.6%) compared to older generation antiepileptic drugs (38.4%). An earlier study by Jacqueline A found that newer generation

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AEDs have both increased tolerability and safety compared to older agents, suggesting that they may be more tolerable than the standard older generation AEDs.

Antiepileptic drug prescription patterns have altered. Improved patient compliance (82%), fewer side effects (75%), and newer ones being more effective (32%), among other factors, are some of the reasons for the shift in prescription pattern. This can be compared to a study, which found that third-generation antiepileptic medications offer novel mechanisms that reduce the likelihood of side effects and drug-drug interactions.[9]

There are many variables that affect how a patient is treated and what medications are chosen. Drug efficacy (76%) is the key element in determining a patient's choice of antiepileptic medication, followed by compliance (63%), side effects (57%), and tolerability (51%). Antiepileptic drug selection is based on medication efficacy and minimal adverse patient effects, can be used to compare this.[6]

This research documented some of the favoured benefits of levetiracetam for use in patients with generalised and focal seizures, which have led to an increase in its use in GTCS and partial seizures. In comparison to the study conducted, levetiracetam is safe and has good tolerability with rapid and complete absorption, low drug interaction, and side effect rates of 43% and 40%, respectively. It is also safe during pregnancy (90%) and has good efficacy and tolerability (88%) as well as a low rate of drug interactions (43%).[10]

According to the research, there were significant differences in the use of AEDs among women of childbearing age. Levetiracetam (98%), Lamotrigine (23%), and topiramate (16%) are the preferred first-line antiepileptic medications for women of childbearing age. The study's findings are consistent with those of Kimford J. et al., who found that levetiracetam or lamotrigine were the most widely used antiepileptic drugs.

The preferred AEDs for treating obese patients are levetiracetam (55%) and phenytoin (28%); however, sodium valproate use in obsessive GTCS patients has been linked to weight increase. This can be compared to a research by Biton. V., which found that the best therapeutic options for weight loss were phenytoin, levetiracetam, and lamotrigine. Some medications, like carbamazepine and valproate, cause weight gain while topiramate causes weight loss.

VI. CONCLUSION

According to the current research, neurosurgeons and neurologists are using antiepileptic drugs at higher rates than before. Older AEDs are gradually giving way to newer AEDs due to greater patient compliance, fewer side effects, and increased efficacy of newer AEDs. This shift or change in prescription patterns is occurring.

Levetiracetam is the most frequently prescribed newer AED for GTCS and focal seizures. This is because it has favoured benefits over older AEDs, such as being safe during pregnancy, having good efficacy and tolerability, having fewer drug interactions, and having fewer side effects.

The recommended newer AED for GTCS, add-on therapy for GTCS, and partial seizures is levetiracetam. Lacosamide, topiramate, and brivaracetam are some additional more recent AEDs. The choice of AEDs depends on the type and severity of the seizure, and medication therapy varies from patient to patient, so it cannot be said that all newer AEDs are good at controlling seizures and all older AEDs are poor at controlling seizures.

Earlier AEDs like phenytoin and sodium valproate are frequently combined with levetiracetam. Although there is a growing trend towards using newer generation AEDs, patients are still using older generation AEDs. Both newer and older generation AEDs have benefits over one another.

VII. SUMMARY

The central nervous system disorder epilepsy is marked by brief episodes (seizures) of loss of consciousness or mental confusion, with or without recognisable bodily movements (convulsion). Unpredictable and irregular seizures occur. The episodic discharge of impulses by a collection of neurons in the brain known as the focus is linked to seizures. The symptoms that are produced, which can vary from a short lapse in attention to a full convulsive fit lasting for several minutes, as well as odd sensations or behaviours, are determined by the location of the primary discharge and the extent of its spread.

Due to the creation of new antiepileptic medications over the past ten years, drug therapy for epilepsy has changed and improved. The main goal of the treatment is to make the patient's life and seizure condition better. The selection of suitable antiepileptic medications is influenced by a

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number of variables. The study's goal is to comprehend how doctors are switching from older AEDs to modern AEDs (newer generation and older generation antiepileptics drugs). To determine which AEDs are most frequently given to adults, expectant mothers, geriatric and paediatric GTCS and partial seizure patients. to determine why newer medicines are used more frequently.

The study's methodology was prospective and observational. Because all of the outcomes that were measured happened during the study time, the study was prospective in design.

The neurosurgeon and neuro-physician received a specially designed questionnaire form via mail and in person, which was used to gather and document all the study-related data. A total of 100 replies, including those from neurosurgeons and neurologists, were gathered.

A specific set of questions are included in the questionnaire regarding the present course of treatment, increased use of more recent AEDs, safe drugs for expectant mothers, adverse effects of more traditional AEDs, current first-line treatment, etc. All age groups and pregnancies are covered by the gathered data, which is sufficient to provide all information on antiepileptic drug prescription and assess changes in antiepileptic drug trends. Data gathered through inquiries was divided into categories such as partial and full drug use in GTCS.

In our research, we discovered that GTCS (73%) was the most prevalent seizure form. The first-generation antiepileptic drugs of preference for GTCS are sodium valproic acid and phenytoin, which are the current first-line antiepileptic treatments for GTCS patients. The most chosen additional therapies for GTCS are levetiracetam, valproic acid, and phenytoin, while the most preferred additional therapies for partial seizures are levetiracetam, valproic acid, and lacosamide.

According to the statistics gathered, patients' prescriptions for antiepileptic medications have changed. The latest generation of antiepileptic medication control seizures better. The most significant factor in the shift in antiepileptic drug prescription patterns for GTSC and partial seizures is patient compliance; other factors include fewer side effects, newer drugs being more effective, and cost savings. The choice of an antiepileptic drug for an epileptic patient relies on a number of primary factors, including drug effectiveness, compliance, side effects, and tolerability.

Levetiracetam, Lacosamide, Brivaracetam, and Topiramate are some of the more popular novel antiepileptic medications for GTCS. One of the most popular newer antiepileptics for GTCS and partial seizures is levetiracetam because it has some well-recognized benefits, including safety during pregnancy, excellent efficacy and tolerability, a low rate of drug interactions, and few adverse effects.

For women and girls who are of childbearing age, levetiracetam is the recommended first-line antiepileptic medication. Lamotrigine and topiramate are also used. Patients with GTCS who are fat are treated with levetiracetam and phenytoin.

The current study shows that there has been a gradual transition from older AEDs to newer AEDs. This change in prescription patterns is attributable to better patient compliance, fewer side effects, and improved efficacy of newer AEDs. Based on our study, we can say that although there has been an increase in the use of newer antiepileptics, the majority of patients continue to take older generation medications. Our research indicates that levetiracetam is most frequently used in pregnant women, obese patients, and as an adjunctive treatment for GTCS and partial seizures. It has the following benefits, including safety during pregnancy and high effectiveness. The choice of medication relies on the patient's condition and the nature of the seizures. Both generations have advantages and disadvantages.

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