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## AN ANTIPILEPTIC DRUGS FOR SEIZURE CONTROL IN EMERGENCY ROOM AND ASSESSMENT OF PATIENTS' SATISFACTION TO ANTIPILEPTIC MEDICATION IN TERTIARY CARE HOSPITAL

Ankit R. Mistry<sup>1</sup>, Sapna D. Gupta<sup>2</sup> and Supriya D. Malhotra<sup>\*1</sup>

Department of Pharmacology<sup>1</sup>, Smt. Department of Emergency Medicine<sup>2</sup>, NHL Municipal Medical College, Ahmedabad - 380006, Gujarat, India.

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### Correspondence to Author:

**Dr. Supriya D. Malhotra**

Professor and Head,  
Department of Pharmacology,  
NHL Municipal Medical College,  
Ahmedabad - 380006, Gujarat, India.

**E-mail:** supriyadmalhotra@gmail.com

**ABSTRACT: Background:** Epilepsy is a common neurological disorder which results in significant morbidity. Epilepsy accounts for a significant proportion of the world's disease burden, affecting around 50 million people worldwide. **Aims:** In this study, evaluate anti-epileptic drug for seizure control in Emergency room and effectiveness of various anti-epileptic drugs in terms of time to Seizure control. To assess the treatment satisfaction measured using the Treatment Satisfaction with Medicines Questionnaire (SATMED-Q). **Materials & Methods:** A Prospective observational study of 18 months duration carried out in patients presenting with seizure at Emergency department during the study period. The study began after the approval of study protocol by the Institutional Review Board. Statistical analysis was done using Microsoft Excel Office 2019 and rechecked with SPSS (version 25.0). P value <0.05 was considered as statistically significant. **Result:** Total 121 patients presented with seizure in Emergency, were recruited in the study during study period. About 98 patients completed the study and 23 were lost to follow-up. Out of 121 patients 80 (66%) were males and 41 (34%) were females. About 34 patients (28%) had focal seizures whereas 67 (55.37%) had generalized seizures. In our study, 24 patients received Inj. Lorazepam, and 22 patients received Inj. Midazolam among 46 patients who were active seizures. The time of seizure control was less who received Lorazepam as compared to Midazolam which statistically significant ( $p < 0.001$ ). There was negative Pearson's correlation between age and total score on followup. The correlation coefficient was  $-0.674$  ( $p < 0.05$ ) means with increase in age there was a decrease in total score. **Conclusion:** This is first kind of study in our setup to evaluate the drug used in emergency for seizure control and also evaluating effectiveness of drugs for seizure control in terms of time. Here, in this study as it has been shown that BZD like Lorazepam and Midazolam interrupt active seizure which reduces the chance of developing SE and improves outcomes. The study indicates an increasing trend toward clinical usage of newer AEDs as well as increasing trend of polytherapy. In our study, drugs were prescribed using generic names and brand name in equal proportion. Factors decreasing treatment satisfaction generally are low level education and older age. Our study indicated higher globally satisfaction with treatment in majority of the patients.

**INTRODUCTION:** Epilepsy is a chronic non-communicable disease of the brain that affects people of all ages.

It is characterized by recurrent seizures, which are brief episodes of involuntary movement that may involve a part of the body (partial) or the entire body (generalized) and are sometimes accompanied by loss of consciousness and control of bowel or bladder function<sup>1</sup>. Epilepsy accounts for a significant proportion of the world's disease burden, affecting around 50 million people worldwide. The estimated proportion of the general population with active epilepsy (*i.e.* continuing

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seizures or with the need for treatment) at a given time is between 4 and 10 per 1000 people. Globally, an estimated five million people are diagnosed with epilepsy each year. In high-income countries, there are estimated to be 49 per 100 000 people diagnosed with epilepsy. In low- and middle-income countries, this figure can be as high as 139 per 100 000. This may be due to endemic conditions such as malaria or neurocysticercosis; higher incidence of road traffic injuries; birth-related injuries. Close to 80% of people with epilepsy live in low- and middle-income countries<sup>2</sup>.

Epilepsy is the second most common and frequently encountered neurological condition that imposes a heavy burden on individuals, families and also on the healthcare system<sup>3</sup>. In caring for the seizure patient in the Emergency Department (ED), we should give first priority to vital signs, cardiovascular and respiratory support, and treatment of seizures. If patient is not acutely ill, the initial evaluation will focus on whether there is a history of earlier seizures. If this is the first seizure, then the emphasis will be: (1) to establish whether the reported episode was a seizure or any other paroxysmal event, (2) to determine the cause of the seizure by identifying precipitating events and risk factors, and (3) to decide whether anticonvulsant therapy is required<sup>1</sup>.

Therapy for a patient with seizure disorder is usually multimodal and includes treatment of underlying conditions that cause or contribute to the seizures, avoidance of any precipitating factors, and suppression of recurrent attack by prophylactic therapy with AEDs or surgery<sup>4</sup>. Primary objective of anticonvulsant therapy is to suppress seizures and provide neuroprotection by minimizing deleterious effects from seizure attacks<sup>5</sup>. In emergency, intravenous (IV) access should be obtained for almost all patients.

In 2010, The Indian Epilepsy society recognizing this lacuna took the lead to develop guidelines for the management of Epilepsy in India (GEMIND). These guidelines have been formulated by the group of experts from IES (Indian Epilepsy Society) based upon a consensus arrived at after reviewing the available scientific literature. The GEMIND are expected to help improve medical

decision-making in India, mainly act at the general medical practitioner level. Regardless of overall recommendations for any medical disorder, the problems of an individual patient are still the most important factor while deciding on treatment options. Costs, drug availability, ease to use, severity of medical condition and many other factors play an important role in decision-making<sup>6</sup>.

Today, the seizure treatments have a success rate in only 50 % patients, about 25% has satisfying and manageable results, rest do not have a record to be appreciated by medical sciences. Patients with seizure disorders are common in the ED, yet little is known<sup>3</sup>. Seizures represent 1% of visits to ED in the United States and a small proportion of these patients will need immediate ICU management<sup>7</sup>. However, none of the currently available drugs are absolutely safe for patients. Acute side effects in emergency patients could be CNS manifestation, allergic drug reactions or thrombocytopenia. Therefore, the treating physician must choose the appropriate AED or combination of drugs that best controls seizures with a satisfactory degree of untoward effects.

Epilepsy is a chronic disorder that has been known to mankind since its own existence<sup>6</sup>. Any chronic disease requires long term treatment. Many scales have been used to measure treatment satisfaction. Treatment Satisfaction with Medicines Questionnaire (SATMED-Q) is designed to assess patient treatment satisfaction in chronic diseases. Hence, this study was performed to define demographic characteristics, evaluate the utilization pattern of AEDs for seizure control, treatment satisfaction among Seizure patients and outcome of the patients presenting with seizures in ED at tertiary care hospital.

#### **AIMS & Objectives:**

- Evaluation of anti-epileptic drug used for seizure control in Emergency room
- Evaluation of effectiveness of various anti-epileptic drugs in terms of time to Seizure control.
- To assess the treatment satisfaction measured using the Treatment Satisfaction with Medicines Questionnaire (SATMED-Q).

**METHODOLOGY:** This study was a prospective, observational, follow-up study of 18 months carried out in patients presenting with seizures in ED. Data collection for the study began after obtaining approval for the study protocol from Institutional Review Board (IRB) under the number nhlirb/2020/10/27/no.1. All patients who present with seizures and gave written informed consent were enrolled for the study on the basis of inclusion and exclusion criteria mentioned below:

#### Inclusion Criteria:

- Patients who were willing to give their written informed consent.
- Patients 18 years and above belonging to either of gender.
- All the patients who were presenting to emergency room with active seizures or recent history of seizures.

#### Exclusion Criteria:

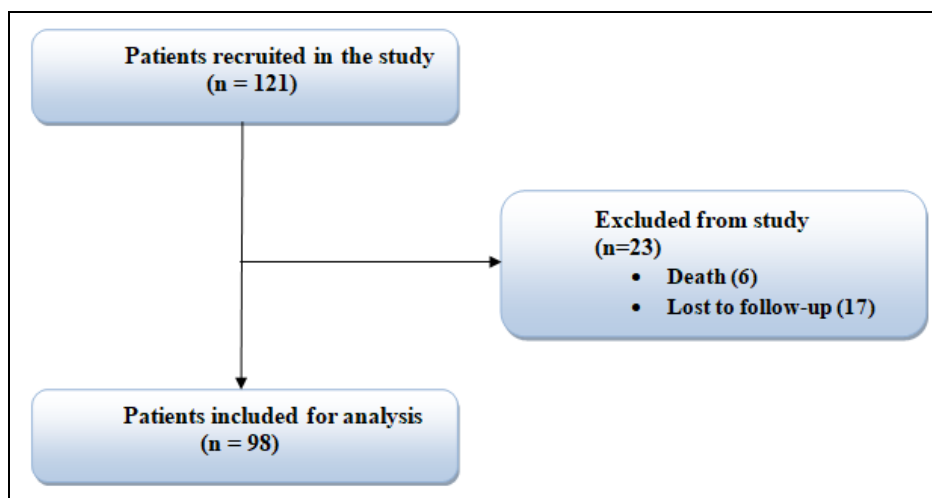
- Patients were discharged from or died in the Emergency Room
- Patients who left against medical advice or were transferred to other hospital.

All patients presenting to ED were broadly classified on the basis of demographics, disease details, treatment and drugs received, investigational data and Treatment Satisfaction with Medicines Questionnaire (SATMED-Q). SATMED-Q was designed to evaluate patient's satisfaction in chronic disease. (6) Data was

collected and recorded in case record form. The AEDs were analysed in relation to their brand name, generic name, dosage form, dose, route, dosing frequency at ER and at the time of discharge. Effectiveness of AEDs was also analysed in terms of time to seizure control. WHO Core Drug Prescribing Indicators were also assessed in the collected prescriptions at the time of discharge. SATMED-Q was administered to the patients at the time of their first follow-up at 1 month. SATMED-Q is a multidimensional generic questionnaire with 17 Likert-type items. Totalling the direct scores of the items yields a total composite score ranging between 0 and 68. The total composite score can be transformed to a more intuitive and easier to understand metric with a minimum of 0 and a maximum of 100.

**Statistical Analysis:** The statistical evaluation was done with the help of Statistical Package for Social Science (SPSS) version 25.0 manufactured by IBM (demo version) and Microsoft Excel 2019. The data analysis included a Descriptive analysis of patients' socio demographic characteristics, types of seizure, etiologies, treatments given in ED (details of drugs given such as dosage form, dose route, frequency and duration), and patterns of antiepileptic prescriptions at the time of discharge. Unpaired T test was used. P value < 0.05 was considered statistically significant.

**RESULTS:** Total 121 patients presented with seizures in emergency, were recruited in the study during the study period. Out of 121 patients enrolled, 98 completed the study and 23 were lost to follow-up. For assessing drug utilization for seizure control we included 121 patients.



**Demographic Characteristics:** Out of 121 patients 80 (66%) were males and 41 (34%) were females. The Male: Female (M: F) ratio was 1.95:1. In this study the youngest patient was 18 years of age and the oldest patient was of 83 years of age with the mean age being  $44.89 \pm 19.82$  years. Median and Mode ages were 43 years and 25 years respectively. Majority of patients 35 (28.92%) belonged to the age group of young adults i.e. 21-30 years. 103 patients out of 121 had co-morbidities such as Hypertension, Diabetes Mellitus Hypothyroidism or Hyperthyroidism etc. Most common co-morbidity found was hypertension followed by diabetes mellitus. Out of

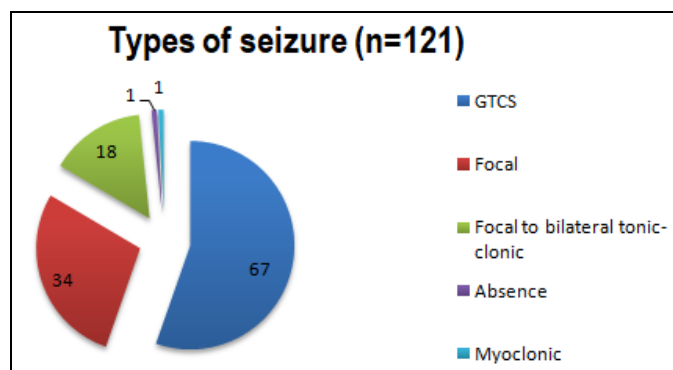
121 patients, only 7 patients (5.78%) had family history of epilepsy and all those patients had first degree relatives (parents, siblings) with epilepsy. About 28.92% were unemployed (including homemakers) and 15.70% were students. Majority of patients belonged to the lower middle or middle socioeconomic status were 39.66% and 37.19% respectively. About 28.07% patients were smokers, alcoholics and tobacco chewers. About 28 patients had a significant past medical history which included trauma, neurological disease, psychiatric illness, HIV and Pheochromocytoma. Patient demographic characteristics were mention in **Table 1**.

**TABLE 1: DEMOGRAPHIC CHARACTERISTICS OF PATIENTS (N=121)**

Variable	Frequency (n)	Percentage (%)
Age	$44.89 \pm 19.825$ years	
Weight	$63.28 \pm 10.5106$ kg	
Male: Female	1.95:1	
<b>Socioeconomic class</b>		
Lower	16	13.22%
Lower middle	48	39.66%
Middle class	45	37.19%
Upper	12	9.91%
<b>Marital Status</b>		
Married	73	60.33%
Unmarried	48	39.66%
<b>Education</b>		
Illiterate	13	10.74%
Primary	18	14.87%
Secondary	24	19.83%
Higher secondary	29	23.96%
Graduate	37	30.57%
<b>BMI</b>		
<25	64	52.89%
25-30	43	35.53%
>30	13	10.74%
<b>Co-morbidities</b>		
Present	103	85.12%
Absent	18	14.87%
<b>Occupation</b>		
Home maker	35	28.92%
Student	19	15.70%
Job	17	14.04%
Own business	18	14.87%
Worker	16	13.22%
Retired	10	8.26%
Teacher	4	3.30%
Farmer	2	1.65%

**Characteristics of patients with seizures:** About 67 patients (55.37%) had generalized seizures whereas 34 (28%) had focal seizures. Absence seizure was diagnosed in 1 patient and Myoclonic seizure in 1 patient. Focal seizures with secondary

generalization were observed in only 18 patients (14.87%). Among the generalized seizure all patients presented with generalised tonic clonic seizure (GTCS) as shown in **Fig. 1** and **Table 2**.



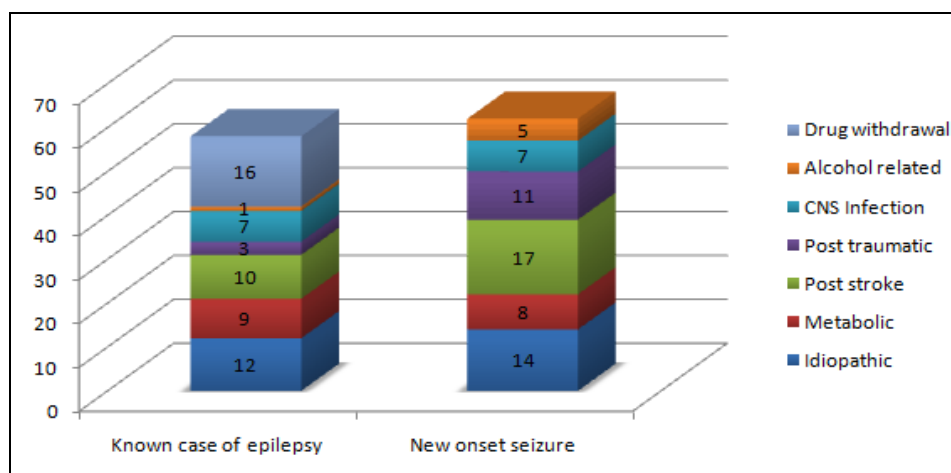
**FIG. 1: TYPES OF SEIZURE AMONG STUDY POPULATION**

Out of 121 cases, 66 patients had a single episode of seizure while 55 cases had multiple episodes of seizures **Table 2** while 16 cases and 4 cases were known case of Status epilepticus and scar epilepsy respectively.

Out of 121 patients, 59 patients were diagnosed with epilepsy. 62 patients developed first time seizure onset. Among 59 patients who had history of epilepsy, 21 patients were non adherent to treatment while 38 patients were compliant.

**Etiology of Seizures:** In this study, idiopathic seizures (22.31%) and post stroke seizures (22.31%) were the commonest causes, followed by metabolic (14.04%), drug withdrawal (13.23%), post traumatic (11.57%), CNS infection (11.57%) and alcohol related seizure (4.95%). Idiopathic (6.61%) seizures were the most common etiology in 21-30 years and also post traumatic seizure (7.43%) were more common etiology with same age group. Post stroke seizures (6.61%) were also the most common etiology in 71-80 years. As shown in **Fig. 1**, Most of the seizures were commonly presented as GTCS irrespective of etiologies.

Among metabolic causes, hypoglycemia (4.95%) was the most common cause of seizures followed by hyponatremia (4.13%) followed by hypocalcemia (3.30%) and hypomagnesemia (1.65%). Among CNS infections, 5.78% of patients were because of encephalitis followed by meningitis (3.30%) and tuberculoma (2.47%).



**FIG. 2: ETIOLOGIES WITH NEW ONSET OF SEIZURES**

Neuroimaging was normal in 24 patients. Single or multiple calcific ring lesions or dense lesions were noted in 3 patients and infarct were noted in 23 patients. Single or multiple intracranial haemorrhage in the form of intraparenchymal haemorrhage, subarachnoid haemorrhage,

intraventricular haemorrhage, subdural haemorrhage, epidural haemorrhage or haemorrhagic contusions were found in 15 patients, of which 10 were because of trauma and 5 were because of stroke. EEG and CSF examination at baseline was also performed **Table 2**.

**TABLE 2: BASELINE CHARACTERISTICS AND CLINICAL PRESENTATION OF PATIENTS**

Types of seizure	Frequency		Percentage (%)
	Generalized		
	GTCS	67	55.37
	Absence	1	0.82
	Myoclonic	1	0.82
	<b>Focal seizure</b>		



Nature of seizure	With awareness	22	18.18
	Without awareness	12	9.91
	Focal with bilateral secondary	18	14.87
	Single episode	66	55.37
	K/C/O epilepsy	29	23.96
	New onset	38	31.40
Associated complain	Multiple episodes	55	44.62
	K/C/O epilepsy	29	23.96
	New onset	25	20.66
	Fever	16	13.22
Associated complain	Headache	22	18.18
	Vomiting	31	25.61
	Giddiness	53	43.80
	Baseline investigations	<b>EEG</b>	
	Normal	21	17.35
	Not available	86	71.10
	<b>CSF</b>		
	Normal	25	20.66
	Not available	81	66.94

### Pharmacotherapy of Seizure in Emergency Room:

During the study period, 46 patients (38.01%) presented with active seizures while others had already had seizure episodes at home or any other place. In our study, 24 patients received Lorazepam (IV) and 22 patients received Midazolam (IV) among 46 patients who presented with active seizures. These patients also received other antiepileptic drugs like Levetiracetam, Lacosamide, Valproate and Phenytoin given intravenously. Out of 121 patients, 75 patients had seizure episode at home or other place and then

patient came to hospital. Among them, 49 patients (40.49%) received monotherapy of Levetiracetam followed by 11 patients who received Lacosamide (9.09%) alone. 15 patients received polytherapy with Inj. Levetiracetam, Inj. Lacosamide and Inj. Valproate at the time of admission.

Total mean time for seizure control was  $105.43 \pm 45.05$  seconds after Lorazepam or Midazolam administration. Mean time of seizure control was  $72.08 \pm 13.82$  seconds and  $141.81 \pm 38.50$  seconds respectively **Table 3**.

**TABLE 3: COMPARISON BETWEEN TIME OF SEIZURE CONTROL AND TREATMENT GIVEN IN ER (N=46)**

	Lorazepam (n=24)	Midazolam (n=22)	P value
Mean $\pm$ SD (Time of seizure in second)	$72.08 \pm 13.82$	$141.81 \pm 38.50$	0.0001*

(\*Unpaired t-test p-value <0.05 considered statistically significant).

**Drugs Prescribed at the time of Discharge:** Out of 121 patients, 98 patients were discharged, and their prescribed AED therapy was categorized into conventional, new and combination of both. 6 patients (6.12%) were on conventional AEDs alone; 37 (37.75%) were on new drugs alone and 55 (56.12%) were on combination therapy.

**Who Drug Core Prescribing Indicators at the Time of Discharge:** Average number of anti-epileptic drug prescribed per patient which is calculated as:

Average number of AEDs/patient = Total number of AEDs prescribed for all patients / Total number of patients

=180/98

=1.83

Out of 98 patients, only 5 patients were prescribed oral antibiotics in their prescriptions. In this study out of all AEDs prescribed 79% of drugs were prescribed from Indian National Essential drug list 2022. Use of injections was null & number of encounters with injection was 0 out of 98 cases.

Total number of AEDs prescribed per prescription was 1.83. The pharmacotherapy of AED on discharge comprised of monotherapy in 44 (44.89%) patients, dual therapy in 35 (35.71%) patients and triple therapy in 13 (13.26%) patients. Most commonly prescribed AEDs in our study was Levetiracetam prescribed in 80 patients (81.63%) followed by Sodium Valproate in 27 (27.55%) patients and Clobazam in 15 (8.33%) patients.

The drugs prescribed and dose ranges are depicted in **Table 4**. New generation AEDs formed a total of 116 drugs out of 180 drugs (64.44%). Newer generation AEDs such as Levetiracetam, Brivaracetam, Lacosamide, Perampanel,

Zonisamide were used. Conventional AEDs formed a total 64 drugs out of 180 (35%) drugs like as Valproate, Phenytoin, Carbamazepine and Phenobarbitone were used.

**TABLE 4: COMMONLY PRESCRIBED AEDS WITH DOSE RANGE**

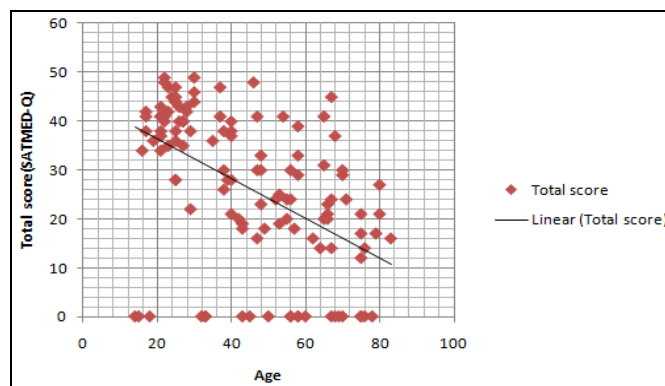
AEDs	Number	Percentage (%)	Dose range (mg)
<b>Conventional</b>			
Phenytoin	9	5%	100-500
Valproate	27	15%	500-1000
Carbamazepine	8	4.44%	200/300/400
Phenobarbitone	4	2.22%	30/60/90
Clobazam	15	8.33%	5-10
<b>NEW</b>			
Levetiracetam	80	44.44%	500-1000
Oxcarbazepine	13	7.22%	150/300/450/600
Lacosamide	14	7.77%	100-200
Brivaracetam	4	2.22%	50-100
Zonisamide	2	1.11%	100
Parempanel	1	0.55%	10
Chlordiazepoxide	1	0.55%	10
Divalproax	1	0.55%	750
Etizolam	1	0.55%	0.25

Levetiracetam was prescribed as monotherapy as well as in combination (35.71% and 31.63%). Valproate was second most frequently prescribed as monotherapy as well as combination (27.55% and 14.28%).

The total number of drugs prescribed was 674. The number of drugs per prescription varied from 2 to 12. The average number of drugs per prescription in this study was 6.89. Total drugs prescribed for treating seizure were 180 amongst which 79 (43.88%) were prescribed with Generic name and 101 (56.11%) were prescribed with Brand name. Among the 121 patients, 98 (80.99%) patients were successfully discharged while 6 (4.95%) patients were expired.

**Analysis of SATMED-Q:** A total of 98 patients were subjected to SATMED- Questionnaire in their vernacular language at 1 month follow up visit and their responses were recorded. As far as analysis of global satisfaction concerned 60.2% were satisfied with their treatment and leaving 40% unsatisfied. More than half patients reported their physical activities were limited due to experiencing side effects. 50% of respondents were satisfied with effect of medicine as well as impact of medicine. As far as Convenience and ease of use concerned 55.1% patients founded convenient. 68.36%

patients were aware of their medical history as inform by their treating physician.



**FIG. 3: SCATTER PLOT BETWEEN AGE AND TOTAL SCORE**

Scores obtain on SATMED were correlated with like age, BMI and Number of AEDs prescribed to the patient **Table 5**. **Fig. 3** shows; there was negative Pearson's correlation between age and total score on follow-up.

The correlation coefficient was  $-0.674$  ( $p < 0.001$ ) suggesting that increase with age there was decrease in treatment satisfaction. Although there was positive correlation between BMI and treatment satisfaction, but which was not statistically significant.

**TABLE 5: PEARSON CORRELATION COEFFICIENT (R) IN DIFFERENT VARIABLES (N=98)**

		Age	BMI	No. of AEDs prescribed	Total score
Age	Pearson Correlation	1	0.140	-0.004	<b>-.674</b>
	Sig. (2-tailed)		0.128	0.969	<b>0.05***</b>
	N	121	121	98	98
BMI	Pearson Correlation	0.140	1	0.007	0.008
	Sig. (2-tailed)	0.128		0.943	0.939
	N	121	121	98	98
No. of AEDs prescribed	Pearson Correlation	-0.004	0.007	1	0.085
	Sig. (2-tailed)	0.969	0.943		0.405
	N	98	98	98	98
Total score	Pearson Correlation	-.674	0.008	0.085	1
	Sig. (2-tailed)	0.0001***	0.939	0.405	
	N	98	98	98	98

(Pearson's correlation; \*\*\*Correlation is significant at the 0.05 level).

For the purpose of correlating number of AEDs with SATMED-Q score, patients were divided into two groups. One group received only one AEDs and other group received more than one AED. **Table 5** shows Correlation coefficient 0.085 ( $p=0.405$ ) means patients on more than 1 AED had more treatment satisfaction but which was not significant. On analysis of SATMED Q-17 questionnaires, the average score was found to be  $38.70 \pm 5.79$  (range 0 to 68). Higher score indicates more satisfaction with treatment. The global satisfaction was 76.44%.

**DISCUSSION:** Epilepsy is a common neurological disorder which results in significant morbidity. Our study conducted in emergency medicine evaluated seizure patients in terms of types of seizures, etiology, frequency, use of AEDs drugs for seizure control, drug prescribing at the time of discharge and treatment satisfaction. In our study, total 121 patients admitted to ED were included in study with mean age of  $44.89 \pm 19.82$  years. Maximum numbers of patients were in the age group of 21-30 years (28%). In a study done by Pradeep *et al.*<sup>8</sup>, the mean age of patients was 41 years which is similar to our study. The probable reason for the disease affecting younger age group is attributed to the larger population belonging to younger age group in our country. Majority of the patients were diagnosed to have GTCS followed by Focal seizure and focal to bilateral tonic clonic seizure. Narayanan *et al.*<sup>9</sup>, Kanitkar *et al.*<sup>10</sup>, Sendil *et al.*<sup>11</sup> and Hirani *et al.*<sup>12</sup> also reported GTCS as the most common seizure type (55%, 70%, 64% and 60% respectively) in their studies. Focal seizures by far are the most prevalent seizure type in adults, however in most Indian studies the occurrence of

primary generalized seizures account for more than 50% of cases. A multicentre study in six tertiary level hospitals in three southern states of India reported an equal prevalence of partial and generalized seizures<sup>13</sup>. In contrast partial seizures accounted for only 28.09% of cases in this study. On analysing the past history of seizures, 59 (48.76%) cases had past history of seizure and the remaining 62 (51.23%) had new onset seizure. The mean age for the seizure patients with past history was  $41.98 \pm 19.12$  and for the new onset cases  $47.90 \pm 19.85$  years.

The percentage of new-onset seizures in the ED as reported by Huff *et al.*<sup>3</sup> was 26% and 62% as reported by Chhabra *et al.*<sup>14</sup> We noted that 51.23% of our patients had new onset of seizures. After an extensive evaluation for etiology, 11.57% of new onset episodes were idiopathic and 14.04% of new onset episodes were post stroke patients. Indian studies also report etiology as idiopathic in 31-60% of patients<sup>14</sup>. In our study, fraction of idiopathic was most common among all etiologies, so present study findings also support this statement. After evaluation for etiology for known case of epileptic patients we found that 13.22% were drug withdrawals and 9.91% were idiopathic. One-fourth of patients presenting to the emergency medicine for management of seizures were suffering from idiopathic generalized epilepsy which is consistent with that reported from the west<sup>14</sup>. The most common factor for drug withdrawal of AEDs in about 60–70% of patients is self-decision. Most of the patients become seizures free at 2 years and do not feel the need for treatment<sup>15</sup>. Jacoby *et al.* and Perucca *et al.* argue that doctors should help counsel those who are eligible for AED



withdrawal in particular and focus on the psychosocial implications of their decision<sup>15</sup>. Other reasons for discontinuation were cited as psychological factors, medication problems, social consequences and lack of counselling by their treating physician. Patient's adherence to treatment in epilepsy is cornerstone for management of this disease. In our study, mean duration of seizure was approximately 3 min (177.39±164.58 seconds) as compared to 6.23 min in a study by Bernal and Altman<sup>16</sup>. Maximum patients had seizure duration <5 min that is similar to the study done by Benbadis *et al*<sup>17</sup>.

Benzodiazepines (BZDs) are considered effective rescue therapies for seizures emergency. BZDs, such as Lorazepam (LZP), Midazolam (MDZ), Diazepam (DZP) and Clonazepam (CZP), are established first-line drugs for the acute treatment of seizures<sup>18</sup>. In our study, one-third of patients presented with active seizures in ED. They were either managed by Midazolam or Lorazepam intravenously.

The BZD have been the cornerstone for management of emergency seizures due to their rapid onset and predictable course of action. The American Epilepsy Society recommends a LZP dose of 0.1 mg/kg (a maximum single dose of 4 mg), which may be repeated<sup>19</sup>. In adults and children, IV LZP is established as an efficacious drug for stopping seizures lasting at least 5 min. In the present study, time to seizure control was 72.08±13.82 seconds following Lorazepam administration. On the other hand, MDZ is water soluble BZD with relatively short half-life around 1-4 hr. More recently, newer forms of administration (IV, IM, Intranasal, Transmucosal) have extended its use to treating prolonged seizures, seizure clusters and SE<sup>20</sup>. Current guidelines recommend 2.5 -5 mg intravenous doses of up to 15 mg in total and Midazolam can take up to 10 minutes to abort the seizure<sup>21</sup>. In our study, we used 5 mg intravenous dose of MDZ and time of termination of seizure after administration was approximately 3 minutes. We compared the efficacies of intravenous Lorazepam and intravenous Midazolam in terms of time to seizure control. The mean time to seizure control with Lorazepam was nearly half as compared to Midazolam which was highly statistically

significant. These findings suggest superior efficacy of Lorazepam over Midazolam. Both the drugs have rapid onset of action with Lorazepam having an intermediate duration of action (4-6hrs). In contrast Midazolam being ultra-short acting BZD might have faster waning of action. The other most frequently prescribed anti-seizure medications were IV Levetiracetam followed by Lacosamide and combination of both. Sodium Valproate and Phenytoin were prescribed less frequently. It was observed that the newer AEDs were more frequently used in comparison to the conventional AEDs. The prescribers perceive less safety concern with newer AEDs.

A half of the epilepsy patients were managed with polytherapy. Though Prusty *et al*, Haroon *et al*, and Mandal S *et al* studies support polytherapy similar to our result,<sup>22</sup> many other studies had contrasting results, where monotherapy with AEDs was prescribed commonly<sup>23</sup>. The possible reason for polytherapy could be that many prescriptions for polytherapy contained 2nd/3rd generation newer AEDs which are mostly approved as adjunctive therapy.

Conventional AEDs recorded the highest frequency of use across many Indian studies. In this study, Phenytoin and Sodium valproate were replaced by newer AEDs like Levetiracetam, Lacosamide and Clobazam which had higher overall proportions of use along with conventional drugs like Phenytoin and Sodium valproate. The decreased use of Phenobarbitone despite its low cost and once daily dosing is surprising; however, this was probably due to its high drug interaction potential and adverse cognitive profile<sup>24</sup>. In our study, Levetiracetam (44.44%) and Sodium Valproate (15%) were the most commonly prescribed drug followed by Clobazam and Lacosamide. This was similar to the findings reported by a study by Sori and Gandigawad<sup>25</sup> which reported Levetiracetam as the most commonly prescribed AED followed by Phenytoin, Sodium Valproate and Carbamazepine. In a study by Gunindro *et al*. on prescribing patterns of antiepileptic drugs, it was stated that the use of phenytoin has declined due to its adverse effects when compared with the newer ones. This study mentioned levetiracetam as one of the good choices of new broad-spectrum AEDs, for the excellent safety record.

In our study, newer AEDs were prescribed more frequently than the conventional AEDs<sup>26</sup>. Prescribing by brand name was observed more than half of the prescription. The importance of sticking to the brand is prime for some of the AEDs with a narrow therapeutic index. Change from one brand to another or from brand to generic is usually not advisable with AEDs. These could put patients at risk of breakthrough seizures or other adverse events<sup>27</sup>.

The results of the study showed that the SATMED-Q questionnaire is relevant, reliable, and can be used in everyday clinical practice, both as a unidimensional tool (using overall treatment satisfaction) and to measure patient satisfaction with different aspects of treatment (for which the tool's subscales also proved to be relevant and reliable). The SATMED-Q seems to be a very well-prepared tool for assessing treatment satisfaction in patients with chronic diseases: original version  $\alpha = 0.879$ ; <sup>28</sup> French version  $\alpha > 0.87$ ; validation study conducted among Spanish hypertension patients  $\alpha = 0.916$  <sup>29</sup>. Our study aimed to assess the SATMED-Q in seizure patients in a Tertiary care Teaching hospital where 98 patients were included. As we calculated SATMED-Q score as a single point of contact at the follow-up after one month of discharge. We found the mean total score was  $38.70 \pm 5.79$  of 98 patients. The global satisfaction was 76.44%. Palestine<sup>30</sup> and Basir Nasir *et al.* observed global satisfaction around 60% which is less than to our study.

Patient satisfaction with regard to impact of the medication on daily activities was moderate. In present study, patients were less dissatisfied with regard to the undesirable side effect of medication. This might be due to the fact that they were prescribed newer AEDs at the time of discharge. In our study, satisfaction on treatment effectiveness and medical care were also higher than other study done by Basir Nasir *et al.*<sup>31</sup>. In this study, age appeared to be an independent variable which was compared with treatment satisfaction score. Patients aged  $\leq 50$  years showed a better score as compared to patients  $> 50$  years of age which was highly statistically significant. We found negative correlation between age and total score. Correlation coefficient was  $-0.674$  ( $p < 0.001$ ) as shown in results. In the study by Biderman *et al.*<sup>32</sup>, no

correlation was found between age and treatment satisfaction, while in the study by Brod *et al.*<sup>33</sup>, such a relationship has been confirmed. This study was prospective in nature that was carried out in our tertiary care teaching hospital on patients presenting with seizures in ED. Our study is one of the few done in the ED setting of a hospital and throws light on the spectrum of etiologies commonly encountered by primary care physicians. Our study also compared time to seizure control with treatment given in ED. According to our knowledge this study is one of the fewer studies in scientific literature using treatment satisfaction questionnaires (SATMED-Q) in epilepsy patients.

**CONCLUSION:** Lastly, our study is first kind of study in our setup to evaluate the drug used in emergency for seizure control and also evaluating effectiveness of drugs for seizure control in terms of time. Over the last several decades, different BZDs have been established as first-line therapies for SE, each of which has its own pharmacological characteristics with advantages and disadvantages. Here, in this study as it has been shown that BZD like Lorazepam and Midazolam interrupt active seizure which reduces the chance of developing SE and improves outcomes. The study indicates an increasing trend toward clinical usage of newer AEDs as well as increasing trend of polytherapy. Factors decreasing treatment satisfaction generally are low level education and older age. Our study indicated higher globally satisfaction with treatment in majority of the patients.

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