Original Article

Drug Utilization and Evaluation of Antiepileptic Drugs in a Tertiary Care Hospital

Arifa Begum SK[1,*], Ch Vaishnavi Durga[2], B Sahithi[2], K Leema[2], K Vaishnavi[2], R P Swathi[2], B Swathi [3], V Rajendra[4], Shaheen Begum[5]

[1]Department of Chemistry, Bharat Institute of Technology, Mangalpally Ranga Reddy, (Affiliated to JNTUH), Telangana, INDIA.
[2]Department of Pharm D, Avanthi Institute of Pharmaceutical Sciences, Guntapally, Ranga Reddy (Affiliated to JNTUH), Telangana, INDIA.
[3]Bharat School of Pharmacy, Mangalpally, Ibrahimpatnam, Telangana, INDIA.
[4]Critical Care Consultant, Aware Global Hospital, L.B Nagar, Ranga Reddy, Telangana, INDIA.
[5]Institute of Pharmaceutical Technology, Sri Padmavati Mahila Visvavidyalayam, Tirupati, Andhra Pradesh, INDIA.

ABSTRACT

Aim: Drug utilization and evaluation (DUE) study of antiepileptic drugs in a tertiary care hospital. **Methods:** A total of 110 case records of patients were included in a prospective observational study which was conducted for duration of 6 months. The prescription pattern was analyzed based on age, gender, route of administration, indication, duration of therapy, type of seizures, generation of Anti-Epileptic Drugs (AEDs), and rationality. **Results:** AEDs were prescribed more for patients between the ages of 51-60 years. The majority of patients receiving AEDs were males and AEDs were mostly used in the neurology department followed by neurosurgery and general medicine. Levetiracetam was prescribed most commonly as monotherapy. Lorazepam and midazolam were the most common add-on drugs. Gabapentin was mostly prescribed for severe neuropathic pain. The oral route was the common route of administration of AEDs. AEDs were highly prescribed for prophylaxis of seizures. Second-generation AEDs were highly used compared to other drugs. **Conclusion:** Second-generation AEDs were used as monotherapy and were found to be effective in reducing seizures and economically affordable for patients. As monotherapy, levetiracetam was the drug of choice followed by lorazepam.

Keywords: Drug Utilization Evaluation (DUE), Epilepsy, Antiepileptic drugs, Levetiracetam, Phenytoin, Seizures.

INTRODUCTION

Drug use evaluation (DUE) is a criteria-based evaluation of drug use that ensures the appropriate use of medicine. Inappropriate usage of medicines seriously declines the quality of patient care.[1] Commonly prescribed drugs, expensive drugs, drugs with potential drug interactions, new drugs, drugs with narrow therapeutic index, drugs that cause frequent adverse drug reactions, and the drugs that are used in high-risk patients are the most common targets for DUE studies. Important parameters which are included in DUE studies are drug indications, doses prescribed, duration of therapy, cost, and therapeutic duplication. In a prospective DUE, scheduled drug therapy is evaluated before it is dispensed to a patient. Prescription drug dosage, route of administration, drug interactions, and duplicate therapy can be evaluated.[2]

Concurrent DUE is performed during the treatment and pharmacists can alert prescribers regarding potential problems with the drug therapy while in retrospective DUE, patient medications are observed to determine if the drug therapy is meeting the approved criteria. DUR improves the health care quality, and therapeutic results and reduces healthcare expenditures.[3]

DOI: 10.5530/ijopp.15.4.58

Address for correspondence:
Dr. Arifa Begum SK,
Associate Professor,
Department of Chemistry,
Bharat Institute of Technology,
Mangalpally Ranga Reddy,
(Affiliated to JNTUH),
Telangana, INDIA.
Email id: arifa.medchem@gmail.com

www.ijopp.org

A seizure results from the neurologic dysfunction of the cerebral cortex. It is a condition in which recurrent, unprovoked seizures as a result of a known or unknown cause.[4] A generalized seizure at the bedside can be recognized when there is the presence of tonic-clonic activity. If the patient is actively seizing, attempt to observe motor activity, as posturing eye deviation may provide more to the epileptic focus. A partial seizure may be an isolated seizure with/without loss of consciousness. The care for partial seizures is more important and requires consultation with a neurologist. Antiepileptic drugs are used to treat epileptic and non-epileptic conditions. The choice of the correct antiepileptic drug depends on the type of seizures and also the demographics of the patient. Seizure control may be achieved by monotherapy in about 80% of the patients, with the other 20% requiring two to three AEDs. Generally, monotherapy is the first line of treatment because it has few drug interactions and side effects, tolerability, increased compliance, and quality of life.[5-9]

MATERIALS AND METHODS

Before initiating the prospective observational study, approval was taken from Institutional Ethics Committee (Approval number: AIPS/02/IEC/02-15). The study was conducted at Aware Gleneagles Global Hospital a 300-bedded multispecialty hospital located at L.B Nagar, Hyderabad, Ranga Reddy, and Telangana. The prospective observational study was conducted for 6 months (August 2019 to January 2020). A written consent form was obtained from all the patients, and those willing to sign the informed consent were only included in the study.

A well-designed patient data collection form was developed according to the requirement of the study. Both male and female patients were included in neurology, general medicine, and psychiatry departments with or without co-morbidities (inclusion criteria). Patients who were not willing to participate were excluded from the study. Subjects are divided into two groups based on specific drugs received for seizures. Group-A: first generation anti-epileptic drugs Group B: Second generation anti-epileptic drugs.[10]

A total of 110 case records of patients were included. The prescription pattern was analyzed based on age, gender, route of administration, indication, duration of therapy, type of seizure, generation of AED and rationality. All the data was compiled and analyzed.

RESULTS

Age-wise distribution: Among 110 patients, the patients prescribed with antiepileptic drugs were found to be in between the age group of 51-60 years (26.3%), followed by 61-70 years (16.3%) and 41-50 years (15.4%) respectively and then 21-30 years (11.8%), 71-80 years (10.9%), 31-40 years (10%), 81-90 years (3.6%), 11-20years (3.6%), 1-10 years (0.9%) and 0-1 years (0.9%) (Table 1).

Gender-wise distribution: Among the patients enrolled, 74 (67%) were males and 36 (33%) were females.

Route of administration: As per the study conducted, the majority of the drugs were administered through the oral route (69%), followed by the intravenous route (25.5%), and through Ryle's tube (5.5%) (Table 2).

Indication of ADR use: In this study, the seizure was one of the major indications for the prescribed drugs, and distribution was found as generalized tonic-clonic seizures (GTCS) type (22%), partial seizures (9%), generalized seizure (17%) and uncategorized seizure (52%) (Table 3).

Cost per prescription and type of therapy: The cost per prescription of AEDs was under 1-300rs in 82 cases (74.1%), 301-600rs in 21 cases (21%), 601-900rs in 6 cases (5.4%), and 901-1200rs in 1 case (0.9%) (Table 4). Results showed that monotherapy (68%) was more prominent than polytherapy (32%) (Table 5). Seventy patients have been prescribed levetiracetam (32.7%) which means this drug is majorly used in the enrolled patients. It

Table 1: Age Wise Distribution of ADR prescribed.

Age (years)	Number of patients	Percentage
0-1	1	0.9%
1-10	1	0.9%
11-20	4	3.6%
21-30	13	11.8%
31-40	11	10.0%
41-50	17	15.4%
51-60	29	26.3%
61-70	18	16.3%
71-80	12	10.9%
81-90	4	3.6%

Table 2: Route of administration for different ADR.

Route of administration	Number of patients	percentage
Oral	76	69%
Intravenous	28	25.5%
Ryle's tube	6	5.5%

Table 3: Distribution of ADR use based on Seizure Type.

Type of seizures	Number of patients	percentage
GTCS	5	22%
Partial seizures	2	9%
Generalized seizure	4	17%
Uncategorized seizure	12	52%

Table 4: Distribution of Patients According to ADR cost per prescription.

Cost per prescription	No.of cases	percentage
1-300	82	74.5%
301-600	21	19%
601-900	6	5.4%
901-1200	1	0.9%

Table 5: Monotherapy Vs polytherapy.

Type of treatment	Number of cases	Percentage
Monotherapy	75	68%
Polytherapy	35	32%

was found that the use of second-generation drugs like levetiracetam, gabapentin, pregabalin, and lamotrigine has been increased due to lower risk compared with the 1st generation antiepileptic drugs valproic acid and phenytoin. Whereas, third generation drugs are gaining importance but are not being prescribed as frequently as the second-generation antiepileptic drugs. The study revealed the importance of levetiracetam, majorly prescribed (32.7%) for different purposes (Table 6). Pantoprazole was the most commonly co-administered drug in both cases of trauma and other conditions for which antiepileptics were prescribed.

Dosing Accuracy: It was observed that the right dose of AEDs was prescribed in 109 of 110 patients, indicating high dosing accuracy (Table 7).

DISCUSSION

In our study levetiracetam was prescribed to more patients due to its high efficacy, low cost, and safety. The reports of Mateti *et al.* suggested a positive impact of levetiracetam on health-related quality of life (HRQOL) based on the observations that seizure frequency was reduced by about 50% in all the patients enrolled.[11] 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

Table 6: Monotherapy According to Type of Epilepsy.

Sl. No	Antiepileptic therapy (Monotherapy)	Total prescription	Types of seizures					
			GTCS	Partial	Generalized	Un categorized	Other	percentage
1	Levetiracetam	36	1	0	2	3	30	32.7%
2	Lorazepam	10	0	0	0	0	10	9%
3	Gabapentin	19	0	0	0	0	19	17%
4	Alprazolam	2	0	0	0	0	2	1.8%
5	Phenytoin	1	0	0	0	0	1	0.9%
6	Pregabalin	2	0	0	0	0	2	1.8%
7	Midazolam	1	0	0	0	0	1	0.9%
8	Diazepam	1	0	0	0	0	1	0.9%

Table 7: Dosing accuracy.

Dose	No.of Cases	Percentage
Right Dose	109	99.1%
Overdose	1	0.9%
Under dose	0	0
Total	110	

as one of the best choices of new broad-spectrum AEDs, for the excellent safety record.[12]

CONCLUSION

The study concluded that second-generation AEDs were found to be effective in reducing seizures and cost-effective. As monotherapy, levetiracetam was prescribed most commonly followed by lorazepam. AEDs are prescribed more frequently in neuropathic pain and prophylaxis other than in epilepsy. From the total AED therapy, mostly there are no drug interactions available, but some of them contain a few potentially possible drug interactions which are not observed because of frequency adjustment by clinical pharmacists. This study also concludes that benzodiazepines were effectively used along with AEDs. As there are fewer specific guidelines for the usage of AEDs in India, the rationality was variable.

ACKNOWLEDGEMENT

The authors are thankful to the preceptors of Aware Global Hospitals and also to the college management for providing the facilities for the smooth conduction of the project work.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

REFERENCES

1. Rekha MM. A study on role of doctor of pharmacy in identifying and reporting of drug-related problems and its co-morbidities in inpatient units of a tertiary care teaching hospital. PharmaciaTutor. 2017;5(12):68.
2. Ashok P, Subramanian VT. Importance of drug utilization evaluation studies in patient health care. IJOPP. 2017;10(3):157-9. doi: 10.5530/ijopp.10.3.34.
3. Pramodh B, Kumar MA, Shanmugasundaram P. A prospective observational study on drug use evaluation of antiplatelet agents in tertiary care hospital. Res J Pharm Technol. 2017;10(12):4328-32. doi: 10.5958/0974-360X.2017.00793.4.
4. Halvorsen KH, Johannessen Landmark C, Granas AG. Prevalence of different combinations of antiepileptic drugs and CNS drugs in elderly home care service and nursing home patients in Norway. Epilepsy Res Treat. 2016;2016:5153093. doi: 10.1155/2016/5153093, PMID 27525114.
5. George J, Jose J, Kulkarni DA, Pol RR, Shalavadi MH, Mangannavar CV. Evaluation of Drug Utilization and Analysis of Anti- Epileptic Drugs at Tertiary Care Teaching Hospital. IJOPP. 2016;9(3):189-94. doi: 10.5530/ijopp.9.3.10.
6. Sil A, Das K, Das NK, Chakraborty D, Mazumdar G, Tripathi SK. Use of anti-epileptic drugs in a tertiary care hospital of Eastern India with emphasis on epilepsy due to neurocysticercosis. Indian J Pharmacol. 2012;44(1):106-10. doi: 10.4103/0253-7613.91882, PMID 22345881.
7. Raj T, Sylvia A, Chidambaranathan S, Nirmala P. A Prospective Study of drug utilization pattern of anti-epileptic drugs and their adverse effects in a tertiary care hospital. Henry Daniel. Int J Curr Pharm Res. 2017;9(6):42-5.
8. Morge A, Kulkarni M. Drug utilization study of antiepileptic drugs in tertiary care hospital. Int J Basic Clin Pharmacol. 2016;5(5):2257-60. doi: 10.18203/2319-2003.ijbcp20163271.
9. Hanaya R, Arita K. The new antiepileptic drugs: Their neuropharmacology and clinical indications. Neurol Med Chir (Tokyo). 2016;56(5):205-20. doi: 10.2176/nmc.ra.2015-0344, PMID 26935782.
10. Kassahun G, Moges G, Demessie Y. Assessment of patients' adherence to antiepileptic medications at Dessie referral hospital, chronic follow-up, south wollo, Amhara region, northeast Ethiopia. Neurol Res Int. 2018;2018:Article ID 5109615. doi: 10.1155/2018/5109615.
11. Mateti U, Prabhakaran P, Sanal T. Utilization patterns of benzodiazepines in psychiatric patients in a tertiary care teaching hospital. Asia Pac J Clin Trials Nerv Syst Dis. 2016;1(4):196-201. doi: 10.4103/2468-5577.193148.
12. Gunindro N, Kholi SM, Sarita Devi Y, Joshila L, Hemantakumar N, Pramodini Devi K. Prescribing patterns of antiepileptic drugs in epilepsy patients: A picture from the therapeutic drug monitoring unit in a medical institute in Manipur. Int J Contemp Med Res. 2018;5(1):1-4.