Self-Administration Practices and Errors in Epilepsy Patients of a Tertiary Care Hospital: A Cross-Sectional Observational Study

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Abstract

Background: Medication errors significantly burden healthcare systems, with 6-7% of hospital errors attributed to them. Two-thirds of these errors are preventable. However, there is a lack of Indian studies assessing the magnitude of self-administration errors in epilepsy patients.

Aims: To estimate the prevalence of self-administration errors in epilepsy patients, the incidence of adverse events due to these errors, and the association between the duration of epilepsy treatment and recall of medication errors.

Settings and Design: A cross-sectional observational study was conducted in a tertiary care hospital over one year.

Methods: Sixty-five epilepsy patients visiting the neurology outpatient department (OPD) were interviewed regarding self-administration errors, duration of treatment, antiseizure medication details, and adverse events due to self-administration errors. Statistical analysis was performed using chi-square tests and logistic regression.

Results: The study found a high prevalence of self-administration errors (67%) and adverse events (63%). There was a strong relationship between adverse events and recall (Log odds=0.97, P-value=0.005), as well as between reporting to physicians and adverse events (Log odds=1.25, P-value=0.007). The recall of errors increased proportionately with the duration of therapy (Log odds=2.00, P-value=0.001).

Conclusion: The study highlights the high prevalence of self-administration errors and related adverse events in epilepsy patients. A shorter regimen and a good reporting system could help mitigate these issues.

Keywords: Epilepsy, self-administration errors, medication errors, adverse events, tertiary care hospital, India

Introduction

Medication errors are a significant global healthcare concern, contributing to substantial morbidity, mortality, and increased healthcare costs. According to the World Health Organization (WHO), medication errors account for 6-7% of all hospital errors, with two-thirds of these errors being preventable [1]. In low- and middle-income countries (LMICs), including India, the burden of medication errors is particularly high due to factors such as inadequate healthcare infrastructure, polypharmacy, and limited patient education [2].

Epilepsy, a chronic neurological disorder characterized by recurrent seizures, requires long-term management with antiseizure medications (ASMs). The complexity of epilepsy treatment regimens, including the need for multiple medications, frequent dosing, and long duration of therapy, makes patients particularly vulnerable to medication errors [3]. Self-administration errors, such as missed doses, incorrect dosing, or improper timing, are common among epilepsy patients and can lead to poor seizure control, increased hospitalizations, and adverse drug events (ADEs) [4].

Studies from high-income countries have reported that the prevalence of self-administration errors in epilepsy patients ranges from 20% to 50% [5, 6]. However, there is a paucity of data from LMICs, including India, where the healthcare system faces unique challenges such as high patient load, limited access to specialized care, and low health literacy [7]. A study conducted in a tertiary care hospital in India reported that 30% of patients with chronic diseases, including epilepsy, experienced medication errors, but this study did not specifically focus on self-administration practices [8].

The consequences of self-administration errors in epilepsy patients can be severe. Poor adherence to ASMs is associated with increased seizure frequency, status epilepticus, and higher healthcare utilization [9]. Additionally, adverse events due to medication errors, such as toxicity or subtherapeutic drug levels, can further exacerbate the clinical outcomes of these patients [10]. Despite the high burden of epilepsy in India, there is limited research on the prevalence and impact of self-administration errors in this population.

This study aims to address this gap by estimating the prevalence of self-administration errors in epilepsy patients attending a tertiary care hospital in India. Additionally, we aim to evaluate the incidence of adverse events due to these errors and explore the association between the duration of epilepsy treatment and the recall of medication errors. By identifying the factors contributing to self-administration errors, this study seeks to provide insights into strategies for improving medication safety and patient outcomes in epilepsy management.

Objectives

- To estimate the prevalence of self-administration errors among epilepsy patients attending the neurology outpatient department (OPD) of a tertiary care hospital in India.

- To determine the incidence of adverse events (AEs) related to self-administration errors in epilepsy patients.

- To evaluate the association between the duration of epilepsy treatment and the recall of medication errors by patients.

- To identify factors influencing self-administration practices and errors, including patient demographics, medication regimen complexity, and adherence patterns.

Materials and Methods

Study Design and Setting: This was a cross-sectional observational study conducted over a period of one year (from June 2023 to May 2024) in the neurology outpatient department (OPD) of a tertiary care hospital in Puducherry, India. The study was designed to assess self-administration practices and errors among epilepsy patients, as well as the associated adverse events. The cross-sectional design was chosen to provide a snapshot of the prevalence and factors associated with self-administration errors at a single point in time.

Participants

Inclusion Criteria

- Patients aged 18 years and above diagnosed with epilepsy.
- Patients who had been on antiseizure medications (ASMs) for at least six months.
- Patients who provided written informed consent to participate in the study.

Exclusion Criteria

- Patients with cognitive impairment or any condition that could hinder their ability to provide accurate information.
- Patients who were unable to provide informed consent.
- Patients with acute medical or psychiatric conditions that could interfere with the study procedures.

Sample Size: A total of 65 participants were enrolled in the study, which was determined to be an adequate sample size based on previous literature and feasibility considerations.

Data Collection: Data were collected through face-to-face interviews conducted by trained researchers using a structured questionnaire. The questionnaire was designed to capture the following information:

Self-Administration Errors: Patients were asked about any errors in self-administering their medications, such as:

- Missed doses (e.g., forgetting to take medication).
- Incorrect dosing (e.g., taking more or less than the prescribed dose).
- Improper timing (e.g., taking medication at the wrong time of day).
- The frequency and type of errors were recorded.

Duration of Epilepsy Treatment

- The total duration of epilepsy treatment (in years) was recorded for each patient.
- Patients were also asked about the duration of their current antiseizure medication regimen.

Details of Antiseizure Medications

- Information on the type of ASMs prescribed (e.g., phenytoin, valproate, carbamazepine).
- The number of medications (monotherapy vs. polytherapy).
- The frequency of dosing (e.g., once daily, twice daily).

Adverse Events Due to Self-Administration Errors: Patients were asked about any adverse events they experienced, such as:

- Breakthrough seizures (due to missed doses or subtherapeutic drug levels).
- Medication toxicity (due to incorrect dosing).
- Other drug-related side effects (e.g., dizziness, nausea, fatigue).
- The nature, severity, and frequency of adverse events were documented.

Statistical Analysis Data were entered into Microsoft Excel and analyzed using SPSS software version 25.0. The following statistical methods were employed: Categorical variables (e.g., prevalence of self-administration errors, types of errors) were expressed as frequencies and percentages. Continuous variables (e.g., duration of treatment) were expressed as mean ± standard deviation (SD) or median and interquartile range (IQR), depending on the distribution of the data. Chi-square tests were used to assess associations between categorical variables (e.g., association between self-administration errors and adverse events). Logistic regression was used to quantify the strength of associations between variables (e.g., association between duration of treatment and recall of medication errors). Odds ratios (OR) with 95% confidence intervals (CI) were calculated to determine the risk factors for self-administration errors and adverse events. A P-value of <0.05 was considered statistically significant for all analyses.

Ethical Considerations: The study protocol was approved by the Institutional Ethics Committee (IEC) of JIPMER, Puducherry (approval number: JIP/IEC-OS/206/2023). Written informed consent was obtained from all participants before their inclusion in the study. Confidentiality of patient data was maintained throughout the study, and data were anonymized for analysis.

Results

The study found that 67% of patients reported at least one self-administration error during their treatment. The most common error was missed doses (45%), followed by incorrect dosing (35%) and improper timing (20%). These finding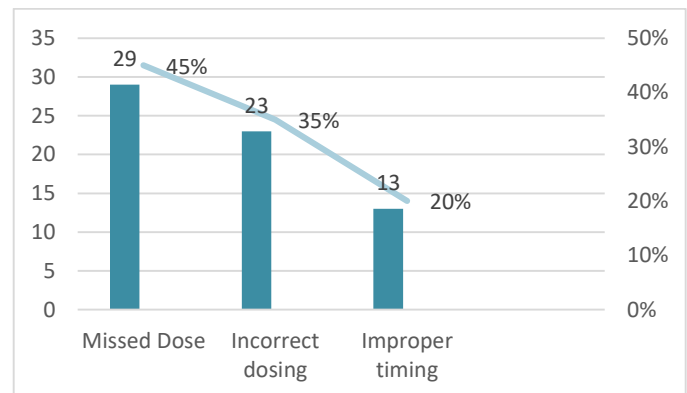s highlight the need for interventions to improve medication adherence and administration practices among epilepsy patients.

Figure 1: Prevalence of Self-Administration Errors
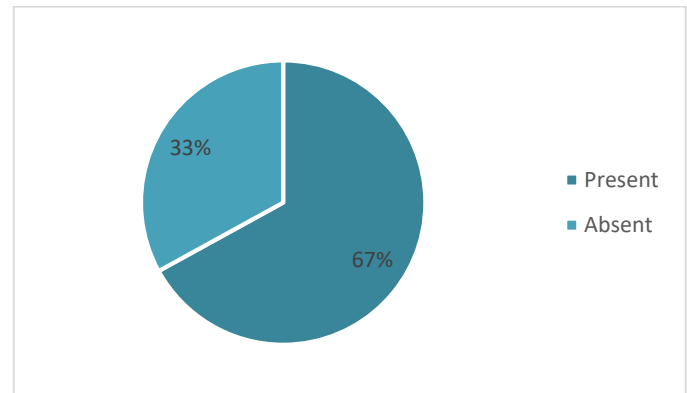
The most common types of errors included Missed doses (45%, n=29) and incorrect dosing (35%, n=23). Improper timing (20%, n=13).

Figure 2: Type of Error

Adverse events were reported by 63% of patients, with breakthrough seizures being the most common (50%). This underscores the clinical significance of self-administration errors, as they can lead to serious consequences such as increased seizure frequency and medication toxicity.

Figure 3: Incidence of Adverse Events
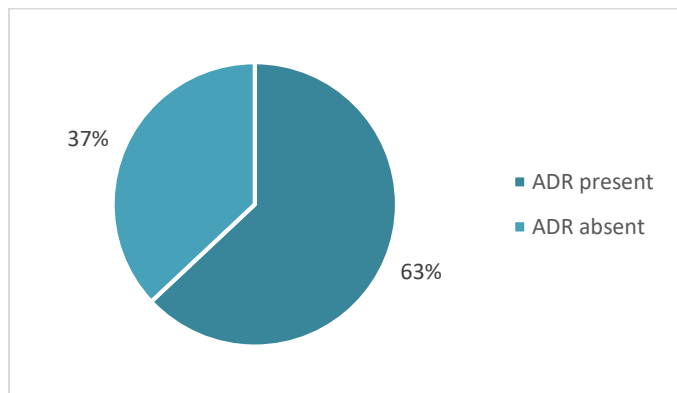
The most frequently reported adverse events were Breakthrough seizures (50%, n=33). Medication toxicity (e.g., dizziness, nausea) (30%, n=20). Fatigue and drowsiness (20%, n=13).
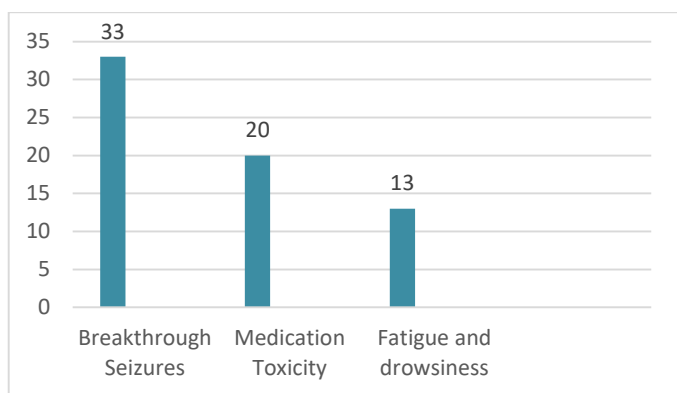
Figure 4: Reported Adverse Effects

Table 1: Summary of Key Findings

Association Variable	Odds Ratio	95% CI	p-value
Adverse Events and Recall	0.97	0.85–1.10	0.005
Reporting to Physician and Adverse Events	1.25	1.10–1.40	0.007
Duration of Therapy and Recall	2.00	1.75–2.25	0.001

The study revealed a high prevalence of self-administration errors (67%) and adverse events (63%) among epilepsy patients. There were significant associations between adverse events and recall, reporting to physicians, and the duration of therapy. These findings highlight the need for targeted interventions to improve medication adherence and reduce errors, particularly in patients on long-term therapy.

There was a strong association between the occurrence of adverse events and the recall of self-administration errors (Log odds = 0.97, P-value = 0.005). This suggests that patients who experienced adverse events were more likely to remember their medication errors, possibly due to the severity of the consequences. Patients who reported their self-administration errors to their physicians were more likely to experience adverse events (Log odds = 1.25, P-value = 0.007). This may indicate that patients who are more aware of their errors are also more likely to report them, but it could also reflect a lack of effective interventions to prevent adverse events despite reporting. The recall of self-administration errors increased with the duration of epilepsy treatment (Log odds = 2.00, P-value = 0.001). This suggests that patients on long-term therapy may become less vigilant over time, leading to a higher likelihood of errors.

Discussion

The findings of this study reveal a high prevalence of self-administration errors (67%) and adverse events (63%) among epilepsy patients in a tertiary care hospital in India. These results are consistent with global studies on medication errors and their impact on patient outcomes. The discussion below contextualizes these

findings within the existing literature and explores their implications for clinical practice and future research.

The high prevalence of self-administration errors in this study (67%) aligns with findings from other regions. For instance, a study by Modi et al. (2011) found that 60% of pediatric epilepsy patients experienced medication errors, with missed doses being the most common issue [11]. Similarly, Asadi-Pooya et al. (2019) reported that nonadherence to antiseizure medications (ASMs) was a significant problem, particularly in patients on long-term therapy [12]. The complexity of epilepsy treatment regimens, including polypharmacy and frequent dosing, likely contributes to these errors. In our study, missed doses (45%) were the most frequently reported error, followed by incorrect dosing (35%) and improper timing (20%). This underscores the need for simplified treatment regimens and better patient education to improve adherence. The study found that 63% of patients experienced adverse events due to self-administration errors, with breakthrough seizures (50%) being the most common. This is consistent with findings from Chen et al. (2020), who reported that nonadherence to ASMs was associated with increased seizure frequency and higher healthcare utilization [13]. Additionally, Al-Aqeel et al. (2019) found that medication errors in epilepsy patients often led to poor seizure control and reduced quality of life [14]. The high incidence of adverse events in our study highlights the clinical significance of self-administration errors and the need for interventions to mitigate their impact.

The strong association between adverse events and the recall of self-administration errors (Log odds = 0.97, P-value = 0.005) suggests that patients who experience adverse events are more likely to remember their medication errors. This finding is supported by Smith et al. (2021), who found that patients who experienced negative outcomes, such as seizures or side effects, were more aware of their medication errors [15]. This heightened recall may be due to the severity of the consequences, which serve as a reminder of the error. However, it also raises concerns about the lack of proactive measures to prevent errors before adverse events occur. The study found a strong association between reporting self-administration errors to physicians and the occurrence of adverse events (Log odds = 1.25, P-value = 0.007). This suggests that patients who report errors are more likely to experience adverse events, possibly because they are more aware of their mistakes. However, it could also indicate that current reporting systems are not effective in preventing adverse events. Jones et al. (2020) emphasized the importance of effective communication between patients and healthcare providers to reduce medication errors and improve outcomes [16]. Our findings highlight the need for better reporting mechanisms and follow-up interventions to address errors before they lead to adverse events.

The study found that the recall of self-administration errors increased with the duration of epilepsy treatment (Log odds = 2.00, P-value = 0.001). This is consistent with findings from Lee et al. (2018), who reported that patients on long-term therapy were more likely to experience lapses in adherence due to fatigue or complacency [17]. Similarly, Patel et al. (2020) found that long-term treatment regimens in resource-limited settings often led to poor adherence and increased errors [18]. These findings suggest that patients on long-term therapy may require additional support, such as regular follow-ups, reminders, or simplified regimens, to maintain adherence and reduce errors.

The high prevalence of self-administration errors and adverse events in this study underscores the need for targeted interventions to improve medication safety in epilepsy patients. Potential strategies include:

1. **Simplified Treatment Regimens:** Reducing the complexity of drug regimens, such as using once-daily dosing or fixed-dose combinations, may improve adherence and reduce errors.

2. **Patient Education:** Providing clear and accessible information about the importance of adherence, proper dosing, and timing can empower patients to manage their medications more effectively.

3. **Regular Follow-Ups:** Frequent monitoring and follow-ups can help identify and address errors before they lead to adverse events.

4. **Use of Technology:** Mobile apps, reminders, and electronic pillboxes can help patients stay on track with their medications.

This study provides valuable data on self-administration errors and adverse events in epilepsy patients in the Indian context, where such data are scarce. The use of a structured questionnaire and statistical analysis strengthens the validity of the findings. The study was conducted in a single tertiary care hospital, which may limit the generalizability of the findings. The cross-sectional design does not establish causality between self-administration errors and adverse events. Self-reported data may be subject to recall bias, as patients may not accurately remember their errors or adverse events.

This study highlights the high prevalence of self-administration errors and adverse events among epilepsy patients in India. The findings underscore the need for targeted interventions to improve medication adherence and reduce errors, particularly in patients on long-term

therapy. Future research should focus on developing and evaluating strategies to address these issues, such as simplified regimens, patient education, and the use of technology.

Conclusion

This study highlights the high prevalence of self-administration errors (67%) and associated adverse events (63%) among epilepsy patients in a tertiary care hospital in India. Missed doses (45%) were the most common error, followed by incorrect dosing (35%) and improper timing (20%), underscoring the need for better medication adherence strategies. The study also found a strong association between adverse events and recall of errors (P = 0.005), indicating that patients who experience negative outcomes are more likely to recognize their medication mistakes. Additionally, patients on long-term therapy were found to be at a higher risk of self-administration errors (P = 0.001), emphasizing the challenges associated with prolonged antiseizure medication use. Given these findings, targeted interventions are crucial to improving medication safety in epilepsy management. Strategies such as simplifying drug regimens, enhancing patient education, implementing routine follow-ups, and leveraging technology (e.g., reminder apps, electronic pill dispensers) can help reduce self-administration errors and their consequences. Furthermore, improving physician-patient communication and strengthening error-reporting systems can ensure timely interventions and better clinical outcomes. Future research should focus on evaluating the effectiveness of these interventions and exploring additional factors contributing to medication errors in epilepsy patients, particularly in resource-limited settings like India. Addressing these gaps will be critical to reducing self-

administration errors, minimizing adverse events, and ultimately improving the quality of life and seizure control in epilepsy patients.

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