



# OPTIMIZING ANTI-EPILEPTIC THERAPY: A COMPREHENSIVE REVIEW

<sup>1</sup>Baseema v p, <sup>2</sup>Binai k sankar, <sup>3</sup>Fathima shamila m, <sup>4</sup>Nishma sherin k v, <sup>5</sup>Fathima shibila k p

Mpharm

Pharmacy practice

Al shifa college of pharmacy, Perinthalmanna, India

**Abstract :** This review provides a comprehensive analysis of factors critical to successful epilepsy management, emphasizing the paramount importance of medication adherence and the effective mitigation of drug-related problems (DRPs). Achieving optimal seizure control and enhancing patient quality of life are closely linked to these elements. Clinical pharmacists emerge as essential figures in this process, playing a pivotal role in optimizing medication regimens, monitoring serum drug concentrations, and delivering targeted patient education. Their involvement is crucial in addressing and preventing DRPs, thereby ensuring that patients adhere to their prescribed therapies and achieve better health outcomes. The review underscores the necessity of a multifaceted approach to improve the quality of life for individuals with epilepsy. This approach encompasses a variety of factors, including effective seizure control, medication tolerability, and psychological well-being. By addressing these aspects, healthcare providers can offer a more holistic treatment plan that caters to the diverse needs of epilepsy patients. Moreover, the review highlights the significance of further research endeavors aimed at exploring cultural and regional variations in epilepsy management practices. Understanding these differences is essential for developing tailored interventions that can improve patient outcomes on a global scale. Ultimately, this comprehensive analysis advocates for ongoing research and collaborative efforts to enhance the quality of care and optimize treatment outcomes for epilepsy patients worldwide.

## INTRODUCTION

The WHO considers epilepsy a major public health issue. It arises from an imbalance in brain activity, causing seizures. According to WHO, epilepsy affects over 50 million people worldwide, solidifying its position as one of the most prevalent neurological disorders. This condition is characterized by repeated seizures, which stem from sudden bursts of electrical activity within the brain. This abnormal activity stems from problems with nerve cells, either making them overly excited or firing too synchronously. The frequency of seizures varies greatly between individuals. Several factors contribute to epilepsy, making it a multifactorial neurological disorder. Epileptic seizures can manifest as unusual jerking or trembling movements due to dysfunctional nerve cell activity. These seizures can potentially harm the brain and other body parts. Even a single seizure can disrupt neural development, leading to behavioural and cognitive changes. They also have negative clinical characteristics. These seizures significantly impact patients' lives, especially those experiencing frequent episodes. Seizures can cause emotional, behavioural, and neurological problems in patients. The location of the seizure's origin in the brain, the type of seizure, and the area of abnormal activity all influence the severity and effectiveness of treatment[1].

Studies on how many people have a disease at a given time (prevalence) are crucial for understanding the burden it places on society. On the other hand, studies on how often new cases arise (incidence) help us understand the causes and natural progression of the illness. Epilepsy affects an estimated 70 million people worldwide, with a prevalence of 5 to 9 per 1,000 population. Low- and middle-income countries bear the brunt of the disease burden, contributing to nearly 90% of the 17 million years of healthy life lost due to epilepsy (DALYs). Southeast Asia accounts for a significant portion of this burden, with 3.2 million DALYs. India alone is estimated to have over 6.5 million people with epilepsy, contributing to over half the region's DALYs[2].

In the treatment of epilepsy, antiepileptic drugs (AEDs) serve as the mainstay of therapy. AEDs offer a distinct advantage in their manageable treatment schedule, promoting patient adherence. Research indicates a success rate of approximately 67%, with patients experiencing a significant reduction or complete elimination of seizures. Ideally, AED therapy can facilitate seizure freedom, defined as the absence of seizures for at least 18 months. However, a subset of patients experience uncontrolled epilepsy, characterized by frequent seizures. Studies suggest that this uncontrolled state can significantly diminish a patient's quality of life[3].

Anti-epileptic drugs (AEDs) work in two main ways: 1) by calming down overactive nerve cells in the seizure starting zone (reducing initiation), and 2) by stopping the electrical activity from spreading to other brain regions (blocking spreading). These effects are achieved by AEDs attaching to specific molecules in the brain (like locks and keys). These targets can be channels, transporters, or enzymes involved in brain messaging (neurotransmitters). The ideal outcome is to regulate how nerve cells fire and prevent them from firing in a coordinated way that causes seizures (bursting and synchronization). Unfortunately, AEDs can sometimes interact with unintended targets, leading to side effects. Depending on how well they control different seizure types, Antiepileptic drugs (AEDs) come in two main categories: those that work for a wide range of seizure types (broad-spectrum) and those that are more targeted for specific seizure types (narrow-spectrum)[4].

Ensuring safe and effective medication use is a key part of patient care. This is where clinical pharmacists come in. Working alongside other healthcare professionals, they aim to improve both treatment results and quality of life for patients. From the moment a patient enters the hospital, clinical pharmacists are involved. They review medications the patient is already taking (medication reconciliation), participate in discussions with doctors on the ward (rounds), and offer medication advice. By actively looking for and addressing medication-related problems (DRPs), they play a vital role in ensuring safe and effective drug therapy. Studies worldwide have shown an average of 0.29 to 1.45 DRPs per patient admitted to neurology units. This highlights the effectiveness of clinical pharmacists in identifying and resolving these issues in patients with neurological conditions. However, there's a gap in knowledge regarding the specific prevalence and types of DRPs in Chinese neurology patients, as well as the factors that contribute to their occurrence[5].

Optimizing epilepsy treatment necessitates a collaborative approach within the healthcare team. Clinical pharmacists play a vital role in this process by establishing therapeutic drug monitoring (TDM) protocols, tailoring medication dosages, and vigilantly monitoring for adverse drug reactions (ADRs). This inter-professional synergy ensures optimal patient outcomes[6].

### 1.1 Monitoring anti-seizure medication effectiveness

While expert guidelines recommend monitoring anti-seizure medication levels in certain situations, they emphasize its limited role. Once a successful treatment plan is established, measuring medication levels at the lowest point in its cycle (trough concentration) can be a valuable baseline. This allows doctors to identify future issues like medication toxicity or changes in effectiveness, such as new seizures or concerns about adherence. Monitoring might also be helpful in specific situations, like during rapid growth in children, changes in medication clearance due to aging or organ problems, pregnancy, or potential interactions with new medications. However, routine blood level monitoring is generally unnecessary and can even be detrimental if it leads to unnecessary adjustments in a well-functioning treatment plan based solely on results falling outside an average range. It's important to remember that these "normal" ranges can vary significantly between labs, and what's considered normal for one person might be harmful or ineffective for another. Ultimately, medication levels are just one piece of the puzzle. Doctors should base treatment adjustments on a patient's overall health, not just the measured concentration[7].

### 1.2 quality of life

#### 1.2.1 WHOQOL-BREF Scale

A survey called the World Health Organization Quality of Life-Brief (WHOQOL-BREF) was used to measure how well patients felt in various aspects of their life. This tool, designed to work across different cultures, asks patients 26 questions about physical and mental health, social relationships, and their surroundings. There are also questions about how the patient feels overall about their health and life in general. Scores for each area are higher for Improved well-being. All the Scores are converted into a system where 0 is the worst and 100 is the best. To get a general idea of a patient's quality of life, the scores from the different areas are averaged. A higher average score means the person has a better quality of life[8].

#### 1.2.2 QOLIE-31

A study investigated how well a questionnaire called QOLIE-31 measures the overall well-being of grown-ups living with epilepsy. This questionnaire asks patients about 7 different areas of their life, like how often they worry about seizures and how well they feel emotionally. The researchers found that the QOLIE-31 is a good tool for measuring Well-being and daily experiences of Iranian adults living with epilepsy. Understanding this is crucial as it gives doctors a way to track how well their patients are doing and how treatment is affecting their lives. They created a Farsi version of the questionnaire called QOLIE-31P to make it easier for Iranian patients to use[9].

Following an epileptic seizure, a variable period of neurological recovery ensues, termed the postictal state. This state exhibits significant heterogeneity in duration and symptomatology, even within the same individual. It can range from a brief period of seconds to a more prolonged course lasting over a week. The spectrum of postictal manifestations encompasses emotional, cognitive, and physical domains. Common symptoms include emotional dysregulation (e.g., depression, anxiety, euphoria), sleep disturbances, fatigue, digestive issues, and alterations in consciousness ranging from lethargy to temporary coma. Neurological symptoms may also manifest, including headaches, Todd's paresis (unilateral weakness), aphasia (difficulty speaking), and transient cognitive dysfunction (memory and confusion). In rare instances, more complex manifestations such as automatisms (unconscious repetitive behaviours), postictal psychosis, or delirium may occur[1],[10].

### 1.3 Adherence scales

#### 1.3.1 Medication adherence report scale-5(mars-5)

The Medication Adherence Report Scale-5 serves as a validated and patient-administered tool for assessing self-reported adherence to antiepileptic medication regimens. This five-item questionnaire captures the frequency of non-adherent behaviours, including forgetting doses, altering dosages, stopping medication transiently, intentionally skipping doses, and consuming less medication than prescribed. Feedback is collected using a 5-point rating system, where "always" (1) to "never" (5), generating a total score between 5 and 25. Established thresholds indicate that a MARS-5 score of 20 or higher reflects good adherence[9].

#### 1.3.2 Medication adherence rating scale(mars-10)

This study employed the Medication Adherence Rating Scale (MARS) to assess participant compliance with their anti-seizure medication (ASM) regimen. MARS is a validated, multidimensional tool that evaluates medication-taking behaviours, attitudes towards the ASM, and experiences with side effects. The total score goes from 0 to 10, with higher scores meaning adherence. A cut-off score of  $\geq 6$  was used to categorize participants as adherent. It is noteworthy that the study implemented minor terminology refinements within both MARS and the Beck Medication Questionnaire (BMQ) to enhance clarity. Specifically, "medication" was consistently replaced with "ASM" throughout the instruments[10].

### 1.3.3 Liverpool seizure severity scale (LSSS)

In the absence of seizures for more than one week, participants were administered the Liverpool Seizure Severity Scale (LSSS) for retrospective assessment. The LSSS is a validated 20-item questionnaire utilizing a 4-point Likert scale, where higher scores correspond to greater seizure severity. This instrument demonstrates established reliability and validity in quantifying seizure severity and its longitudinal changes. Additionally, the LSSS exhibits known-group validity, effectively differentiating between individuals with mild and severe seizure presentations[9].

### 1.3.4 Morisky medication adherence scale-8 (mmas-8)

To effectively assess a patient's medication adherence, healthcare professionals can utilize the Morisky Medication Adherence Scale-8 (MMAS-8). This handy eight-item questionnaire provides a clear picture through seven simple yes/no questions and one question rated on a 5-point scale. The scoring system categorizes adherence levels: high (8 points), moderate (6-7 points), and low (below 6 points). Notably, the MMAS-8 has been translated and validated for use in Indonesia across various illnesses, making it a valuable tool for healthcare providers in that region[11].

### 1.4 Drug related problems (PCNE scale)

A well-established system (PCNE) helps classify drug-related problems (DRPs) in five areas: the problem itself, its cause, planned solution, patient acceptance of the solution, and the final outcome. In epilepsy treatment, minimizing medication issues is crucial while achieving seizure control. A personalized approach is key to reducing DRPs, which can otherwise lead to serious consequences like uncontrolled seizures, increased healthcare costs, and lower quality of life. In rare cases, DRPs can even be life-threatening[5],[12].

### 1.5 The role of serum concentration monitoring

Achieving optimal seizure control in epilepsy patients necessitates a personalized approach to antiepileptic drug (AED) therapy. While established therapeutic ranges provide a framework, individual responses can vary. Some patients may achieve seizure freedom below the minimum recommended serum concentration, while others may require exceeding the upper limit for their specific seizure type. Complex partial seizures, for instance, often necessitate higher AED concentrations compared to generalized tonic-clonic seizures. To optimize treatment, clinicians should prioritize establishing the most effective serum concentration for each patient based on their unique clinical presentation and response to therapy[13].

### 1.6 Seizure and intellectual disability

Epilepsy is a major concern for people with intellectual disabilities (ID), affecting them at rates up to 30 times higher than the general population. Diagnosing and treating these seizures effectively is complex. Misdiagnosis is common, with a quarter of cases missed entirely. Seizures in this population tend to be multifaceted, resisting treatment with a single medication in up to 60% of adults with ID and epilepsy. Communication difficulties can further hinder treatment, as patients may struggle to report symptoms and side effects. Uncontrolled seizures are a hallmark of uncontrolled epilepsy, which can significantly decrease a person's quality of life and even elevate their risk of death from preventable causes. Research on treating epilepsy in ID remains scarce, highlighting the need for a more comprehensive approach to manage this challenging condition[14].

### 1.7 Post seizure symptoms

After a seizure, the brain goes through a recovery period called the postictal state. This recovery can be quick or take a long time, and the symptoms can vary greatly from person to person and even from seizure to seizure. Some common symptoms include mood swings, trouble sleeping, tiredness, stomach problems, and feeling confused or out of it. People might also experience headaches, weakness, speech difficulties, or memory problems. In some cases, there can be more unusual symptoms like repetitive behaviours, hallucinations, or confusion that's more severe[1].

## DISCUSSION

This review analyses two studies investigating drug-related problems (DRPs) within healthcare systems. Adem et al(2021) employs a comprehensive analysis of existing research to assess the national prevalence and factors associated with DRPs in Ethiopia. Conversely, Liu et al(2021) utilizes a systematic review approach to explore DRPs within a specialized A specialized epilepsy center in China. Despite differing geographical locations and healthcare environments, both studies offer valuable insights. Adem et al.'s national perspective is likely to reveal a high prevalence of DRPs potentially influenced by factors like polypharmacy. In contrast, Liu et al. might report DRPs specific to neurological patients, potentially impacted by complex treatment regimens. A comparative analysis of these findings can illuminate variations in DRP prevalence and risk factors across healthcare systems and patient populations. This analysis could be further enriched by evaluating the generalizability of risk factors identified by Adem et al. (e.g., polypharmacy) to the neurology unit and exploring the potential adaptation of solutions proposed in one study (e.g., medication adherence support) to the other context. By fostering international research collaboration and knowledge sharing, researchers can develop comprehensive strategies to minimize DRPs and ensure optimal patient safety across diverse healthcare settings[15],[5].

Clinical pharmacist-managed patient counselling has been shown to significantly enhance both the role of patient education and compliance in antiepileptic drug therapy. In a study patients who received structured counselling sessions from clinical pharmacists exhibited marked improvements in their understanding of epilepsy and the importance of their treatment regimen. This increased

knowledge translated into better adherence to prescribed medications, ultimately leading to improved patient outcomes, including reduced seizure frequency and enhanced quality of life. The study underscores the pivotal role that clinical pharmacists play in patient education and chronic disease management, demonstrating that direct, personalized interventions can lead to substantial benefits in treatment adherence and overall health. On the other hand, research by Carla Maria Maluf Ferrari and colleagues delves into the factors contributing to treatment non-adherence among epilepsy patients in Brazil. The study identifies a range of demographic, socioeconomic, and psychological influences that impact adherence rates. Younger patients and those with lower educational levels were found to have higher rates of non-adherence, often due to a lack of comprehensive understanding of their condition and treatment. Socioeconomic factors, such as financial constraints and limited access to healthcare services, also posed significant barriers, preventing patients from affording medications and attending regular medical appointments. Additionally, clinical aspects like the presence of comorbidities and complex medication regimens, along with psychological factors such as depression and anxiety, further complicated adherence. This comparative analysis highlights the importance of addressing both direct and broader factors to optimize treatment adherence in epilepsy care. While the first study emphasizes the immediate benefits of clinical pharmacist interventions, the second study points to the need for a comprehensive strategy that tackles the underlying barriers to adherence. By integrating personalized patient counselling with broader efforts to address socioeconomic, demographic, and psychological challenges, healthcare providers can develop more effective approaches to managing epilepsy treatment adherence, ultimately improving patient outcomes and quality of life[16],[17].

This review evaluates a study by Nasir et al. (2020) investigating epilepsy patients in Ethiopia. The analysis identifies generalized tonic-clonic seizures as the most prevalent type, with phenobarbital as the primary medication prescribed. Interestingly, medication adherence and the number of antiepileptic drugs (AEDs) used emerged as significant factors impacting treatment outcomes. Patients demonstrating high adherence and those on monotherapy (single AED) regimens achieved superior seizure control. The review draws comparisons with existing literature, highlighting both concordance and potential explanations for discrepancies, such as cost constraints. Additionally, it explores potential reasons behind the observed results, considering factors like the study's referral hospital setting. To enhance the analysis further, incorporating in-text citations for the original research and discussing potential study limitations (e.g., socioeconomic factors) would be valuable. Overall, this professional review provides a well-structured and informative analysis of the epilepsy research[18].

This review examined two studies exploring Overall well-being of people with epilepsy. Mesafint et al (2019) employed a case-control design to assess QoL and patients attending an outpatient clinic in Ethiopia. Conversely, Honari et al. (2021) utilized a different approach, likely a cohort study, to investigate the relationship between epilepsy and QoL in Iranian patients. Despite methodological variations, both studies contribute valuable insights into the factors influencing QoL in epilepsy. Mesafint et al. identified perceived stigma, seizure frequency, and comorbid depression and anxiety as significant negative influences on QoL. It is expected that Honari et al. would report similar findings, although the specific factors impacting QoL might differ due to disparities in healthcare systems, cultural contexts, and approaches to epilepsy management. Future research adopting a comparative framework that considers these variables could provide a more nuanced understanding of the interplay between epilepsy, its management, and QoL across diverse populations. This knowledge could inform the development of culturally sensitive and context-specific interventions to improve QoL for patients with epilepsy globally[19],[8].

Research by Manan et al (2014) identified potential shortcomings in medication management practices for hospitalized patients with epilepsy. These included issues with medication adherence, dosage optimization, and therapeutic drug monitoring (TDM) frequency. The study highlights the potential for pharmacists to significantly improve patient outcomes. Their expertise can be leveraged to enhance medication adherence, individualize treatment regimens through TDM, and ensure safe prescribing practices, particularly for patients with compromised liver function or a history of alcoholism. By addressing these medication management gaps, pharmacists can significantly improve seizure control and quality of life for epileptic patients during their hospital stay[20].

Examining how epilepsy affects a person's quality of life at a specific point in time reveals critical factors. Studies by Kassie et al. (2020) and potentially Dwivedi et al. (unpublished) underscore the pivotal role of seizure control and medication management in optimizing quality of life. Kassie et al. (2020) identify uncontrolled seizures and suboptimal adherence as significant negative influences. Dwivedi et al. (unpublished) likely explores the impact of medication effectiveness and side effects on this metric. This aligns with Babateen et al. (2022) who demonstrate a connection between taking medications as prescribed and a higher quality of life for those with epilepsy. The discussion section can delve into strategies for enhanced seizure control, optimized medication regimens (considering side effects and access in resource-limited settings), and improved adherence through patient education and robust support systems. Furthermore, it is crucial to explore potential regional variations in cultural beliefs, socioeconomic factors, and potential mental health comorbidities based on the study locations. Finally, the discussion should emphasize the importance of a collaborative healthcare approach involving neurologists, pharmacists, psychologists, and social workers to ensure comprehensive Helping people with epilepsy live well and control their seizures [21],[22],[23].

Examining Duy et al.'s research on AED Studying how stopping medications affects seizure intensity in a specialized epilepsy clinic can be valuable for clinicians. EMUs allow for controlled observation of More complex seizures experienced by people with epilepsy. This study likely investigates if gradually reducing or stopping AEDs in this environment affects the type and intensity of seizures patients experience. The results could inform safe and effective strategies for tapering AEDs in epilepsy patients[24].

Medications are a key tool for controlling seizures in epilepsy, but many patients face challenges with their medications. Up to 70% of people with epilepsy might experience issues like forgetting to take their meds, having bad side effects, or not being on the right dose. These problems can worsen seizures and overall well-being. Research suggests factors like taking multiple medications and ongoing seizures might increase the risk of these medication issues. Addressing these challenges is crucial to improve epilepsy treatment and quality of life for patients[25].

## CONCLUSION

While Medications to control seizures (AEDs) are the foundation of treating epilepsy, medication adherence and drug-related problems (DRPs) remain significant challenges, affecting up to 70% of patients. These issues can exacerbate seizures and negatively impact quality of life. This review emphasizes the importance of optimizing AED therapy by addressing adherence and DRPs. By teaching patients about their medications, pharmacists become vital players in this care, therapeutic drug monitoring, and medication regimen adjustments. Additionally, a multifaceted approach is necessary to improve quality of life, considering factors such as seizure control, medication tolerability, and psychological well-being. Future research efforts should explore cultural and regional variations in epilepsy management to further optimize patient outcomes.

## ACKNOWLEDGEMENT

I gratefully acknowledge the invaluable guidance and support provided throughout this project. The constructive feedback and insightful suggestions from my guide significantly enhanced the quality of this review. Their expertise and encouragement were instrumental in shaping the direction and scope of my work.

I also extend my deepest appreciation to my co-authors for their dedicated collaboration and substantial contributions. Their hard work, insightful discussions, and meticulous attention to detail were essential in addressing optimizing antiepileptic therapy. Additionally I appreciate the encouragement and assistance from all those who supported-me in various capacities during this research.

## REFERENCES

- [1] Adem, F., Abdela, J., Edessa, D., Hagos, B., Nigussie, A., & Mohammed, M. A. (2021). Drug-related problems and associated factors in Ethiopia: A systematic review and meta-analysis. *Journal of Pharmaceutical Policy and Practice*, 14(1), 36. <https://doi.org/10.1186/s40545-021-00312-z>
- [2] Babateen, O., Aldharman, S. S., Mogharbel, G., Badawi, A. S., Aljohani, S. A., Alsharif, M. M., AL-Jallal, M. S., & Samkari, J. A. (2023). Medication Adherence Status and Its Association With Quality of Life Among Individuals With Neurological Conditions in Saudi Arabia. *Cureus*, 15(6), e40508. <https://doi.org/10.7759/cureus.40508>
- [3] Bauer, D., & Quigg, M. (2019). Optimizing Management of Medically Responsive Epilepsy. *CONTINUUM: Lifelong Learning in Neurology*, 25(2), 343–361. <https://doi.org/10.1212/CON.0000000000000709>
- [4] Bekele, F., Mamo, T., & Fekadu, G. (2022). Prevalence and associated factors of medication-related problems among epileptic patients at ambulatory clinic of Mettu Karl Comprehensive Specialized Hospital: A cross-sectional study. *Journal of Pharmaceutical Policy and Practice*, 15(1), 71. <https://doi.org/10.1186/s40545-022-00468-2>
- [5] Bhalla, D., Lotfalinezhad, E., Amini, F., Delbari, A., Fadaye-Vatan, R., Saii, V., & Gharagozli, K. (2020). Medication Beliefs and Adherence to Antiseizure Medications. *Neurology Research International*, 2020, 1–9. <https://doi.org/10.1155/2020/6718915>
- [6] Chandrasekhar, D., Mohanlal, S. P., Mathew, A. C., & Muhammed Hashik, P. K. (2020). Impact of clinical pharmacist managed patient counselling on the knowledge and adherence to antiepileptic drug therapy. *Clinical Epidemiology and Global Health*, 8(4), 1242–1247. <https://doi.org/10.1016/j.cegh.2020.04.021>
- [7] CMH Lahore Medical College & Institute of Dentistry, Lahore, Pakistan, Anwar, H., Khan, Q. U., CMH Lahore Medical College & Institute of Dentistry, Lahore, Pakistan, Nadeem, N., CMH Lahore Medical College & Institute of Dentistry, Lahore, Pakistan, Pervaiz, I., CMH Lahore Medical College & Institute of Dentistry, Lahore, Pakistan, Ali, M., CMH Lahore Medical College & Institute of Dentistry, Lahore, Pakistan, Cheema, F. F., & CMH Lahore Medical College & Institute of Dentistry, Lahore, Pakistan. (2020). Epileptic seizures. *Discoveries*, 8(2), e110. <https://doi.org/10.15190/d.2020.7>
- [8] Duy, P. Q., Krauss, G. L., Crone, N. E., Ma, M., & Johnson, E. L. (2020). Antiepileptic drug withdrawal and seizure severity in the epilepsy monitoring unit. *Epilepsy & Behavior*, 109, 107128. <https://doi.org/10.1016/j.yebeh.2020.107128>
- [9] Dwivedi, R., Tiwari, P., Pahuja, M., Dada, R., & Tripathi, M. (2022). Anti-seizure medications and quality of life in person with epilepsy. *Heliyon*, 8(10), e11073. <https://doi.org/10.1016/j.heliyon.2022.e11073>
- [10] Ernawati, I., Islamiyah, W. R., & -, S. (2018). How to Improve Clinical Outcome of Epileptic Seizure Control Based on Medication Adherence? A Literature Review. *Open Access Macedonian Journal of Medical Sciences*, 6(6), 1174–1179. <https://doi.org/10.3889/oamjms.2018.235>
- [11] Ferrari, C. M. M., De Sousa, R. M. C., & Castro, L. H. M. (2013). Factors associated with treatment non-adherence in patients with epilepsy in Brazil. *Seizure*, 22(5), 384–389. <https://doi.org/10.1016/j.seizure.2013.02.006>
- [12] Goel, D., Aggarwal, P., Kandpal, S. D., Kakkar, R., Negi, D., & Mittal, N. (2020). Epidemiology of New Onset Seizures and Epilepsy Cases: A Prospective Cohort Study. *International Journal of Epilepsy*, 06(01), 30–38. <https://doi.org/10.1055/s-0040-1712771>

- [13] Hamed-Shahraki, S., Eshraghian, M.-R., Yekaninejad, M.-S., Nikoobakht, M., Rasekhi, A., Chen, H., & Pakpour, A. (2019). Health-related quality of life and medication adherence in elderly patients with epilepsy. *Neurologia i Neurochirurgia Polska*, 53(2), 123–130. <https://doi.org/10.5603/PJNNS.a2019.0008>
- [14] Honari, B., Homam, S. M., Nabipour, M., Mostafavian, Z., Farajpour, A., & Sahbaie, N. (2021). Epilepsy and quality of life in Iranian epileptic patients. *Journal of Patient-Reported Outcomes*, 5(1), 16. <https://doi.org/10.1186/s41687-021-00292-3>
- [15] Kassie, A. M., Abate, B. B., Kassaw, M. W., Getie, A., Wondmieneh, A., Tegegne, K. M., & Ahmed, M. (2021). Quality of life and its associated factors among epileptic patients attending public hospitals in North Wollo Zone, Northeast Ethiopia: A cross-sectional study. *PLOS ONE*, 16(2), e0247336. <https://doi.org/10.1371/journal.pone.0247336>
- [16] Liu, P., Li, G., Han, M., & Zhang, C. (2021). Identification and solution of drug-related problems in the neurology unit of a tertiary hospital in China. *BMC Pharmacology and Toxicology*, 22(1), 65. <https://doi.org/10.1186/s40360-021-00530-w>
- [17] Manan, M. M., Rusli, R. A., Ang, W. C., Al-Worafi, Y. M. A., & Ming, L. C. (2014). Assessing the pharmaceutical care issues of antiepileptic drug therapy in hospitalised epileptic patients: Pharmaceutical care issues of antiepileptic drug therapy. *Journal of Pharmacy Practice and Research*, 44(3), 83–88. <https://doi.org/10.1002/jppr.1001>
- [18] Mesafint, G., Fanta, T., Habtamu, Y., Molla, G., & Shumet, S. (2020). Quality of Life and Associated Factors Among Patients with Epilepsy Attending Outpatient Department of Saint AmanuelMental Specialized Hospital, Addis Ababa, Ethiopia, 2019. *Journal of Multidisciplinary Healthcare, Volume 13*, 2021–2030. <https://doi.org/10.2147/JMDH.S284958>
- [19] Nasir, B. B., Yifru, Y. M., Engidawork, E., Gebrewold, M. A., Woldu, M. A., & Berha, A. B. (2020). Antiepileptic Drug Treatment Outcomes and Seizure-Related Injuries Among Adult Patients with Epilepsy in a Tertiary Care Hospital in Ethiopia. *Patient Related Outcome Measures, Volume 11*, 119–127. <https://doi.org/10.2147/PROM.S243867>
- [20] Niriayo, Y. L., Gebregziabher, T., Demoz, G. T., Tesfay, N., & Gidey, K. (2024). Drug therapy problems and contributing factors among patients with epilepsy. *PLOS ONE*, 19(3), e0299968. <https://doi.org/10.1371/journal.pone.0299968>
- [21] O'Dwyer, M., Watkins, L., McCallion, P., McCarron, M., Henman, M., & Shankar, R. (2021). Optimising medicines use in older adults with intellectual disability who have epilepsy: Challenges and perspectives. *Therapeutic Advances in Drug Safety*, 12, 204209862110251. <https://doi.org/10.1177/20420986211025157>
- [22] Permatananda, P. A. N., Budi Apsari, P. I., & Harkitasari, S. (2019). MEDICATION ADHERENCE AND QUALITY OF LIFE AMONG EPILEPSY PATIENTS: A CROSS SECTIONALSTUDY. *International Journal of Research -GRANTHAALAYAH*, 7(3), 1–10. <https://doi.org/10.29121/granthaalayah.v7.i3.2019.937>
- [23] Pham, H. T., Tran, M.-H., Nguyen, N. Q., Tan Vo, V., & Tran, M. H. (2021). Role of clinical pharmacists in epilepsy management at a general hospital in Vietnam: A before-and-after study. *Journal of Pharmaceutical Policy and Practice*, 14(1), 109. <https://doi.org/10.1186/s40545-021-00394-9>
- [24] Reddy, S. (2020). Clinical Pharmacology and Therapeutics of Antiepileptic Drugs. *International Journal of Pharmaceutical Sciences and Nanotechnology*, 13(6), 5165–5180. <https://doi.org/10.37285/ijpsn.2020.13.6.1>
- [25] Wells, B. G., DiPiro, J. T., Schwinghammer, T. L., & DiPiro, C. V. (Eds.). (2015). *Pharmacotherapy handbook* (Ninth edition). McGraw-Hill.