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A Systematic Review On Effectiveness Of Pharmacist Intervention In Quality Of Life Of Epilepsy Patients In A Tertiary Care Hospital

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ABSTRACT:

IMPORTANCE: Epilepsy is a chronic neurological condition that profoundly affects patient's quality of life (QOL) due to recurrent seizures, cognitive deficits, psychosocial stigma, and adverse effects of antiepileptic medications. Pharmacists, as accessible healthcare providers, are increasingly involved in patient education, medication management, and adherence support, which may positively influence QOL outcomes. **OBJECTIVE:** This systematic review aims to examine the effectiveness of pharmacist interventions in improving the quality of life of individuals living with epilepsy. **METHODS:** A thorough literature search was conducted in PubMed, Scopus, Google Scholar, PsycINFO, MEDLINE, and Web of Science for studies published between July 2015 and July 2025. Eligible studies assessed pharmacist interventions such as patient counselling, educational programs, adherence monitoring, and pharmaceutical care and their impact on QOL in epilepsy patients. Data were extracted on study characteristics, intervention strategies, outcome measures, and key results. **RESULTS:** Evidence from multiple studies demonstrates that pharmacist interventions enhance medication adherence, reduce treatment-related adverse effects, and improve health-related quality of life (HRQOL) in epilepsy patients. Structured counselling, educational support, and adherence-focused programs were consistently associated with better QOL outcomes across diverse populations and clinical settings. **CONCLUSION:** Pharmacist interventions are effective in improving the quality of life of patients with epilepsy. Incorporating pharmacists into multidisciplinary care teams is recommended to optimize clinical outcomes and patient wellbeing.

Key-words: Pharmacist interventions, Epilepsy, Quality of life, Anti-epilepsy medications and Health-related quality of life

INTRODUCTION:

The International League Against Epilepsy (ILAE) characterizes an epileptic seizure as a brief episode of neurological dysfunction resulting from excessive, abnormal, or synchronized neuronal activity in the brain [1]. Epilepsy is recognized as one of the most common neurological conditions worldwide. The global median incidence is estimated at 50.4 new cases per 100,000 people each year. In wealthier nations, the incidence is lower, around 45.0 per 100,000 annually, while in low- and middle-income countries, it is notably higher at 81.7 per 100,000 annually. The global population is not only expanding but also aging at an unprecedented rate [2]. Based on a general prevalence of about 1%, India alone accounts for more than 12 million individuals with epilepsy, representing nearly one-sixth of the worldwide burden [3]. With older adults representing the most rapidly expanding segment of the population, the prevalence of epilepsy in this age group is projected to rise steadily. In later life, epilepsy often develops secondary to cumulative brain pathology, most commonly due to cerebrovascular disease, intracranial tumors, traumatic brain injury, or neurodegenerative conditions

such as dementia [4-5]. Notably, individuals with Alzheimer's disease face nearly a tenfold greater risk of developing epilepsy compared to those without the disorder. This growing burden is anticipated to significantly increase healthcare resource use and associated costs [6]. In 2014, the ILAE revised the definition of epilepsy to include any of the following situations:

Two or more unprovoked (or reflex) seizures occurring at least 24 hours apart.

- A single unprovoked (or reflex) seizure with a predicted recurrence risk of 60% or higher within the next decade, supported by clinical assessment, electroencephalographic findings, or neuroimaging abnormalities
- A confirmed diagnosis of an epilepsy syndrome [1]

Figure 1 presents the expanded 2017 ILAE classification of seizure types [7]. In this systematic review, we aim to evaluate the impact of pharmacist interventions on the quality of life of patients living with epilepsy.

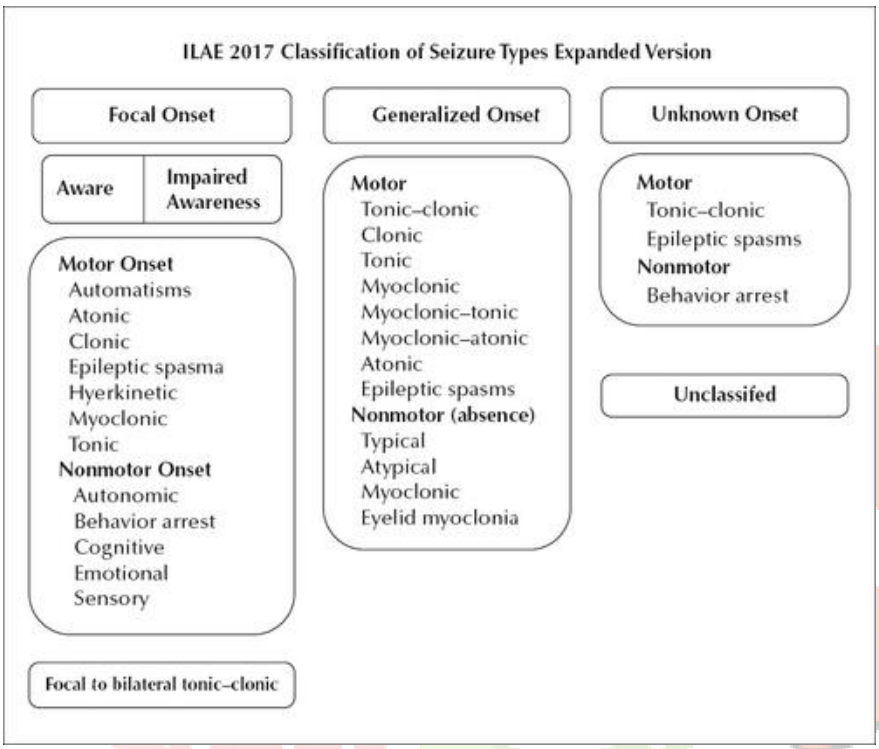

Figure 1: ILAE 2017 Classification of seizure

METHODOLOGY:

Literature Search: A comprehensive and highly sensitive electronic search of the literature was conducted across multiple databases, including PubMed, Scopus, Google Scholar, PsycINFO, MEDLINE, and Web of Science. The search was restricted to studies published in English over the past ten years (July 2015 – July 2025) to ensure inclusion of the most recent and clinically relevant evidence. Keywords employed in the search included "Anti-Epileptic Drugs," "Quality of Life," "Epilepsy," and "Pharmacist Intervention," combined using appropriate Boolean operators ("AND", "OR") to optimize retrieval of relevant studies.

Study Selection: The selection of studies was conducted in a two-stage process. Initially, two reviewers independently screened titles and abstracts of all retrieved articles to assess their relevance to the review topic. Studies deemed potentially eligible proceeded to full-text review in the second stage, where inclusion was determined based on predefined criteria. Discrepancies between reviewers were resolved through discussion or consultation with a third reviewer.

Data Extraction: Data extraction was performed independently by two reviewers using a standardized extraction form. Key information collected included study patient interventions and findings related to Quality of life.

Data Synthesis: Extracted data were synthesized to evaluate the pharmacist intervention in improving quality of life in epilepsy patients. The synthesis focused on identifying patterns of patient intervention and their

impact on patient's quality of life, with attention to the role of pharmacist interventions in mitigating these outcomes.

Pathophysiological Mechanisms Involved in the Development and Evolution of Epilepsy:

Patients with epilepsy experience recurrent seizures caused by abnormal, excessive, and synchronized neuronal firing in the brain. Seizures that originate from a specific brain region are referred to as focal or localized, whereas generalized seizures involve both cerebral hemispheres simultaneously. These abnormal neuronal networks may result from structural, infectious, or metabolic disturbances [8-9]. It is important to distinguish between seizures and epilepsy: a single seizure does not necessarily indicate epilepsy, as it may be triggered but not recurrent. Seizure onset can be classified as focal, generalized, unknown, or unclassifiable. The process of epileptogenesis describes the sequence of events by which a normal brain transforms into one that is predisposed to seizures. This involves hyperexcitability of neuronal networks, which become more likely to discharge abnormally [10]. Epileptogenesis leads to the development and expansion of brain tissue capable of generating spontaneous seizures, thereby contributing to the establishment and progression of epilepsy. It is often accompanied by neuronal damage, gliosis, microgliosis, and a proinflammatory environment within neural tissue. Inflammation may originate within the central nervous system or result from systemic factors due to a compromised blood–brain barrier. Astrocytes play a critical role in regulating neuronal activity. Their processes form extensive networks connected by low-resistance gap junctions, creating functional syncytia that coordinate neuronal activity. These junctions primarily consist of connexin proteins, whose expression varies across brain regions and developmental stages [11].

Epileptogenesis is characterized by neuroinflammation and structural and molecular brain changes, which increase neuronal hyperexcitability and promote recurrent spontaneous seizures. Microglia contribute to this process by modulating neuroinflammation, axonal sprouting, and neurogenesis. Following seizures, microglia rapidly respond as resident immune cells, releasing cytokines such as IL-1β, IL-6, and TNF-α, which influence synaptic plasticity, neurotransmission, and neuronal excitability. Inhibition of specific cytokines has been shown to reduce seizure frequency in experimental models [12]. Prostaglandins, through EP3 receptor activation on astrocytes, can enhance glutamate release, leading to hyperexcitability and neuronal damage, whereas EP3 inhibition may delay seizure onset. A central mechanism in both epileptogenesis and ictogenesis is the imbalance between neuronal excitation and inhibition. Elevated extracellular glutamate and/or reduced GABA levels lead to excitotoxicity, convulsions, and neuronal cell death. Glutamate, the principal excitatory neurotransmitter in the brain, is essential for learning, memory, cognition, and emotion. It is released by glutamatergic neurons into the extracellular space, where its activity is tightly regulated by neuronal and astrocytic transporters [13].

Astrocytes convert glutamate to glutamine, which is recycled to neurons for continued neurotransmitter release [13]. Disruptions in this glutamate–glutamine cycle or in synaptic transmission can shift the balance toward hyperexcitation, increasing seizure susceptibility. Astrocytes further influence epilepsy by releasing gliotransmitters such as glutamate, ATP, and D-serine, modulating synaptic activity and maintaining homeostasis. They also provide glutamine to GABAergic neurons, which is converted to glutamate and then to GABA, the main inhibitory neurotransmitter. An imbalance between excessive glutamate and insufficient GABA contributes to central nervous system hyperexcitability and seizure generation [15-16].

Dysregulation of glutamatergic signaling in epilepsy may involve abnormal receptor function, transporter expression, or enzymatic activity in neurons and astrocytes. Genetic mutations in NMDA and AMPA receptors can exacerbate excitatory-inhibitory imbalances, leading to synaptic remodeling, network hyperexcitability, excitotoxicity, and neuronal death [17-18].

TREATMENT FOR EPILEPSY:

Antiepileptic drugs (AEDs) remain the primary treatment strategy for controlling seizures in patients with epilepsy. Interventions targeting these factors through education, counselling, and patient-centred care that can improve adherence and overall treatment outcomes. Currently, over 20 AEDs are available, encompassing both newer and older agents. Traditional AEDs such as phenytoin, carbamazepine, and valproic acid continue to be widely prescribed. However, these drugs often have nonlinear and variable pharmacokinetics, narrow therapeutic indices, and a higher risk of adverse effects and drug–drug interactions.

Such side effects ranging from cognitive impairment, mood disturbances, and sedation to systemic effects like hepatotoxicity or hematologic abnormalities that have a direct impact on the quality of life (QOL) of patients.

Newer AEDs including levetiracetam, lamotrigine, and lacosamide, generally exhibit improved pharmacokinetic profiles, fewer interactions, and better tolerability, which can enhance adherence and patient-reported QOL. Moreover, comprehensive management strategies including therapeutic drug monitoring, individualized dose adjustments, and patient education programs play a critical role in optimizing seizure control and improving overall wellbeing. The adverse effects of antiepileptic drugs are a major determinant of the overall quality of life in patients with epilepsy. While seizure control remains the primary goal of therapy, the tolerability and side effect profile of AEDs significantly influence patient's daily functioning, emotional wellbeing, and social participation.

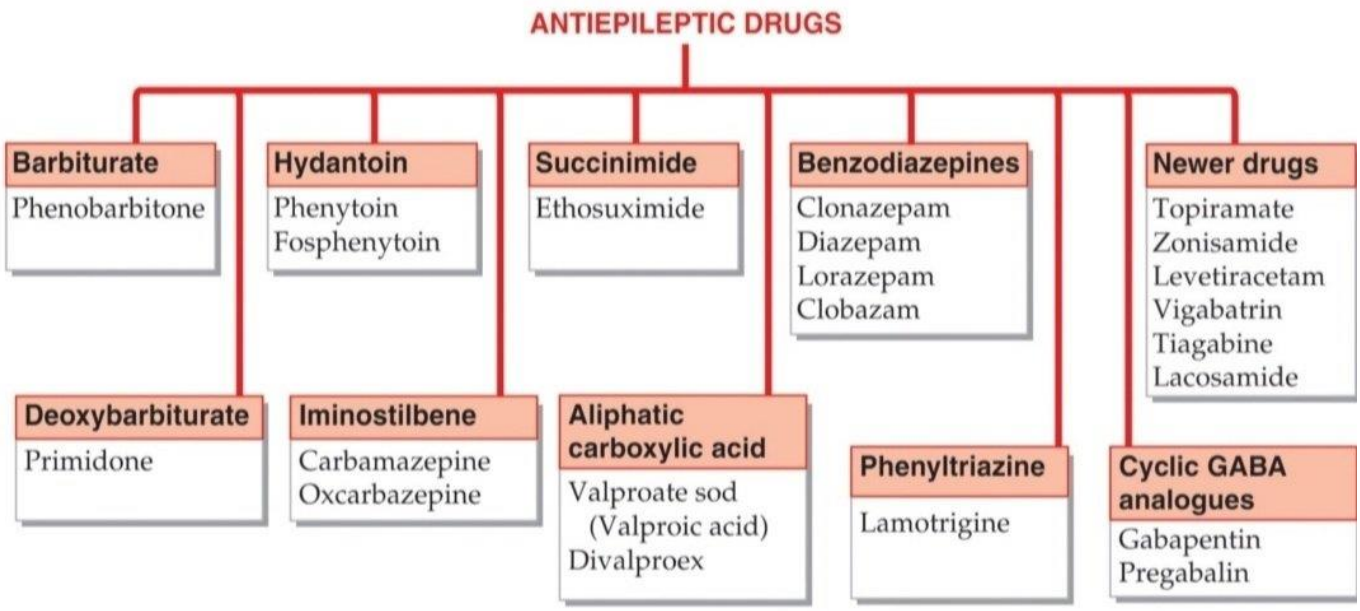

Figure 2: Classification of Anti-epileptic drugs

ROLE OF PHARMACIST IN EPILEPSY PATIENTS:

Over the past five decades, the role of pharmacists has evolved significantly, moving beyond traditional medicine dispensing toward broader advisory and patient-centred responsibilities. This shift, influenced by changes in pharmacy practice and education, has enabled pharmacists to participate more actively in health promotion, disease prevention, and patient education. Many pharmacists now provide direct patient care and engage in chronic disease management, utilizing their clinical knowledge to support health and wellness initiatives. Integrating pharmacists into multidisciplinary care teams has been shown to improve medication adherence in epilepsy patients and enhance their overall quality of life [19-20].

While the contribution of pharmacists to the management of chronic diseases such as diabetes, hypertension, and cardiovascular disorders is well-documented, their involvement in epilepsy care has been less explored. Pharmacists have multiple opportunities to support epilepsy patients beyond dispensing medications. These include educating patients about their condition, promoting adherence, identifying and managing potential drug interactions, and monitoring for adverse effects. Additionally, pharmacists can provide ongoing counselling, detect emerging health issues, and help prevent the progression of comorbidities in epilepsy patients [21].

QUALITY OF LIFE:

Quality of life is increasingly recognized as a critical outcome in the management of epilepsy. The QOL of patients with epilepsy (PWE) is often adversely affected by a range of factors, both directly and indirectly related to the condition. Limited understanding of epilepsy frequently leads to discrimination in schools, workplaces, and social settings. Common challenges impacting QOL include stigma, comorbidities, socioeconomic factors, seizure severity, and seizure frequency, all of which can significantly hinder daily functioning and overall wellbeing. QOL is a multidimensional concept encompassing an individual's perceptions of their physical, psychological, social, and overall wellbeing. Compared to other chronic conditions such as cancer, diabetes, and cardiovascular disease, research on QOL in epilepsy remains limited,

despite the potentially lifelong and far-reaching consequences of the disorder. Key domains affected include education, employment, independence, and social integration.

Children with epilepsy often experience interruptions in schooling, while unemployment rates among adults with epilepsy are two to three times higher than in the general population and exceed those seen in individuals with other disabilities. Limitations in independence can arise from physical disabilities, cognitive consequences of epilepsy and its treatment, fear of seizures, and inability to obtain or maintain a driver's license. Social isolation, reduced self-esteem, and feelings of helplessness and depression are also common, often exacerbated by patients concealing their condition. Patients with epilepsy face numerous challenges, including driving restrictions, social stigma, delayed marriage, fear of subsequent seizures, and adverse drug effects. These factors collectively contribute to impaired health-related QOL, which encompasses physical, emotional, social, occupational, economic, and disease-specific health dimensions. Strategies to improve QOL in epilepsy patients include patient education, correcting misperceptions about the disease and its treatment, effective communication, and addressing biases. Providing accurate information about the condition, potential risks such as seizure-related injuries or sudden unexpected death in epilepsy (SUDEP), safety measures, and avoidance of seizure triggers can reduce anxiety and improve coping. Adherence to antiepileptic therapy plays a pivotal role in enhancing QOL by reducing seizure frequency. Frequent counseling about the importance of adherence, potential adverse drug reactions, and lifestyle modifications can further improve treatment compliance and overall wellbeing. By addressing stigma, enhancing knowledge, and supporting patients and families, healthcare professionals including pharmacists can help mitigate the negative impact of epilepsy on daily life and promote a better quality of life for patients [22].

For many patients, the social stigma and impact on quality of life can be more challenging than the clinical severity of seizures. Research on QOL in epilepsy is limited compared to other chronic conditions such as cancer, diabetes, and cardiovascular disease. However, with appropriate treatment, over 75% of people with epilepsy can potentially lead seizure-free lives. Epilepsy can significantly affect education, employment, transportation, independence, and social participation, resulting in long-term consequences. Health-related quality of life (HRQOL) is a multidimensional construct reflecting patient's perceptions of the disease and its treatment on physical, psychological, and social well-being. HRQOL measures include global, generic, condition-specific, and utility-based tools, capturing both overall life satisfaction and the multidimensional effects of epilepsy [23].

REVIEW OF LITERATURE OF QOL IN EPILEPSY PATIENTS:

In a study from Tehran, Iran, Hamedi-Shahraki et al. emphasized that monitoring adherence to antiepileptic therapy is essential for improving QOL. Using the Medication Adherence Report Scale (MARS-5), the Liverpool Seizure Severity Scale (LSSS), and the QOL in Epilepsy (QOLIE-31) questionnaire in a longitudinal design, the researchers found that medication adherence was significantly associated with QOL, whereas seizure severity did not show a direct correlation with QOL [24]. Similarly, a study in Basrah, Iraq, by Shakir et al. confirmed that adherence monitoring positively influences QOL. Seizure severity and serum AED levels correlated strongly with medication adherence, but not directly with QOL, which was primarily linked to adherence levels [25].

In Boston, USA, Pavlova et al. explored the effects of clobazam therapy on sleep patterns in patients with epilepsy, given that fragmented sleep can adversely affect QOL. The prospective study showed that post-treatment, patients experienced fewer awakenings, reduced wake-after-sleep onset (WASO), and a decrease in seizure frequency, suggesting a potential improvement in QOL [26]. In Atlanta, USA, Ettinger et al. highlighted that depression is often underdiagnosed and undertreated in epilepsy patients, negatively impacting QOL. Their cross-sectional survey revealed that depressive symptoms and seizure severity were both associated with poorer QOL outcomes [27].

In India, Pimpalkhute et al. found that the type of pharmacological therapy significantly influences QOL. Patients on monotherapy reported higher QOL, largely due to fewer side effects, with the carbamazepine group showing better cognitive and medication-related outcomes compared to those on valproate [28]. Another Indian study by Nagabushana et al. identified polytherapy, poor adherence, AED side effects, hospitalization, and developmental delays as major factors reducing overall QOL in children with epilepsy (CWE). Children on multiple AEDs, long-term therapy, or experiencing side effects exhibited markedly lower QOL [29].

Research from Australia by Welton et al. indicated that psychiatric comorbidities and self-reported memory problems are prevalent and significantly impair QOL, as shown through cross-sectional surveys [30].

Additionally, a case–control study in Northwest Greece by Siarava et al. demonstrated that adult PWE had significantly poorer QOL compared to controls, with notable deficits in physical, psychological, and social domains [31].

A study by Losada-Camacho et al. evaluated the effect of a pharmaceutical care program on health-related quality of life in women with epilepsy. The findings demonstrated that participants in the intervention group experienced a notable improvement in QOL, indicating that pharmacist-led interventions can effectively enhance HRQOL in women living with epilepsy [32]. A 2021 randomized controlled trial by Eshiet reported that educational and counselling interventions led by pharmacists can significantly improve the quality of life in individuals with epilepsy [33].

A 2018 study by Thomas assessed the impact of pharmacist-assisted patient counselling on the quality of life in patients with epilepsy and concluded that such counselling interventions effectively enhance the quality of life in this population [22]. A study conducted by Bacci and colleagues evaluated the impact of pharmacist-led interventions for individuals living with epilepsy and found that such interventions significantly improve their quality of life [34].

CONCLUSION:

Pharmacist interventions have consistently shown effectiveness in enhancing the quality of life of individuals living with epilepsy. Pharmacists also contribute to improving psychosocial wellbeing by empowering patients through disease awareness, self-management strategies, and reducing the stigma associated with epilepsy. Evidence from various clinical and community-based studies highlights that structured counselling sessions and pharmaceutical care programs not only improve medication adherence but also reduce seizure severity, hospitalizations, and treatment burden. This, in turn, translates into better health-related quality of life, encompassing physical, psychological, and social domains of patient wellbeing.

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