

ORIGINAL ARTICLE

Quality of Life among Epileptic Patients after Vagus Nerve Stimulator Implantation: A Cross-Sectional Study

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Abstract:

Globally, epilepsy affects people of all ages, races, social groups, and both sexes. Over 70 million individuals worldwide suffer from epilepsy, one of the most prevalent and dangerous brain disorders. In cases where resective surgery is not feasible or the patient rejects it, vagus nerve stimulation is a well-researched and efficacious technique for treating refractory epilepsy in addition to antiseizure medication. This study aims to assess the quality of life for epileptic patients with vagus nerve stimulator implantation. A quantitative cross-sectional design was conducted in outpatient clinics at Dr. Saad Al-Watari for Neurological Sciences Teaching Hospital and Neurosurgery Teaching Hospital at Baghdad Governorate. The study period extended from December 2023 to January 2024. Nonprobability purposive sampling was used which included 1,000 patients visiting the outpatient clinics (epilepsy consultation). Data were collected using a questionnaire from January to March 2024. The study instruments consisted of two parts. First, the demographic sheet comprised sociodemographic information about the participants. The second part contained the evaluation of the standard of living for epileptic patients. The collected data were examined using SPSS version 26. The study comprised 100 patients with an average age of 32 ± 10 years. The mean (QOL-SF-36) score was $2.20 \pm .739$. One hundred (54.8%) of participants had a moderate quality of life. The study's sample of epileptic patients had a moderate mean quality of life. Improved quality of life (QOL) is linked to VNS treatment for drug-resistant epilepsy.

Keywords: Quality of Life, Epileptic patient, and Vagus nerve stimulator

Introduction:

Quality of life (QoL) is a multifaceted notion described by the World Health Organization (WHO) as "A state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity" (World Health Organization, 1997). Many authors have addressed the quality of life related with epilepsy in recent years. Unprovoked seizures are a recurring brain disorder known as epilepsy. Epilepsy affects both sexes and all ages, races, and social classes with worldwide distribution (Fiest *et al.*, 2017). Epilepsy is one of the most common serious brain conditions, affecting over 70 million people worldwide. Its occurrence is bimodally distributed, with older age groups and babies having the largest risk. Novel insights into the intricate genetic makeup of common forms of epilepsy are being revealed by advances in genomic technology, which is propelling a paradigm change. Epileptic seizures can take many different forms. Determining the cause, the most effective course of

therapy, and the overall prognosis are significantly impacted by the categorization of seizure types (Thijs *et al.*, 2019). Based on how a seizure manifests and the areas of the cerebral cortex that are affected, seizures are categorized (Milligan, 2021). Every brain has the potential to experience seizures, which happen when a brain region or regions experience excessive excitability. A variety of diverse neurological diseases collectively referred to as epilepsies occur when an underlying brain illness lowers the intrinsic seizure threshold, hence raising the risk of spontaneous recurring seizures (Balestrini *et al.*, 2021). Neural disorders like epilepsy are commonplace. It significantly lowers the patients' QoL and causes them extreme burden. Individuals who have epilepsy (PWE) have several challenges in their QoL, including concomitant conditions like depression and seizure characteristics like frequency or age of onset (Baker, Eccles and Caswell, 2018; Tedrus, Limongi and Zuntini, 2020). When it came to the complete absence of remission or recurring seizures following periods of remission, almost one-third of PWE had a bad prognosis. Undoubtedly, epilepsy, being a chronic condition, has a significant detrimental effect on individuals' daily functioning due to sundry challenges. Seizures may negatively impact the cognitive function in addition to causing panic and a loss of autonomy when they start suddenly and without warning (Tombini *et al.*, 2021). In cases when resective surgery is not feasible or the patient rejects it, vagus nerve stimulation (VNS) is a well-researched and efficacious method for treating refractory epilepsy in addition to antiseizure medication (ASM)

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(Shlobin *et al.*, 2022). Response-based stimulation and deep brain stimulation are two more neurostimulation techniques. It is commonly known that VNS has an antidepressant effect and that certain ASM drugs have an impact on mood and health-related quality of life (HRQoL) in individuals with epilepsy (Skrehot, Englot and Haneef, 2023). Patients receiving polytherapy had a 20% worse HRQoL than those receiving monotherapy. Using VNS lessens the chance of developing a drug load (Sauer *et al.*, 2024). VNS Therapy is a commonly utilized neurostimulation option for individuals with drug-resistant epilepsy (DRE) who have specific preferences or circumstances. It offers an alternative to cranial surgery or laser interstitial thermal ablation. This treatment is particularly suitable for those who have experienced unsuccessful surgery or are not eligible for surgical interventions. This includes individuals with intellectual impairment who may face challenges in understanding and consenting to a nonreversible procedure (Englot, Birk and Chang, 2016; Liu, Slater and Perkins, 2017). With the use of a minimally invasive extracranial device called a vagus nerve stimulator (VNS), seizures can be prevented by somewhat intermittent electrical pulses being delivered to the vagus nerve. As a result, the frequency of seizures decreases. Clinical applications of VNS Therapy® date back to 1994 in Europe and 1997 in the USA (Batson *et al.*, 2022) have had unsuccessful surgery or are unsuitable for surgery. A systematic review and meta-analysis were conducted to determine the treatment effects of VNS Therapy as an adjunct to anti-seizure medications (ASMs). Every VNS patient additionally receives ASM because VNS is only authorized as a supplementary therapy for the treatment of epilepsy. Uncertainty surrounds which ASMs complement VNS in a synergistic way as the number of epileptic patients benefiting from it rises. A prior study aimed to combine various ASMs logically; however, it did not address the advantageous outcomes of combining ASM with VNS (Verrotti *et al.*, 2019). It is critical to identify ASMs that work in concert with VNS. This discovery might raise the quality of life for epilepsy patients, lessen side effects, and enhance treatment response (Winter *et al.*, 2018; Panebianco, Rigby and Marson, 2022) characterized by recurring, unprovoked seizures. Vagus nerve stimulation (VNS). Furthermore, because of its ability to elevate mood, VNS may lessen the negative behavioral effects of ASM. By understanding how ASM's particular mode of action interacts with VNS, it is possible to minimize adverse effects from epilepsy treatment while simultaneously improving therapeutic response (Winter *et al.*, 2023) non-pharmacological therapy for epileptic seizures. Until now, favorable combinations of different groups of antiseizure medication (ASM).

Materials And Methods

The present study aimed to assess the effects of vagus nerve stimulator implantation on the standard of living of epileptic patients. To this end, a comprehensive cross-sectional design study paper was employed. The study was carried out after

obtaining official permission from the hospitals from which samples were collected. The sample was chosen using particular criteria, such as adult patients with epilepsy who were 18 years of age or older and those who had undergone vagus nerve stimulator implantation. Patients with epilepsy, both male and female, of varying ages were selected. Patients who rejected taking part in the trial were excluded. Additionally, individuals with epilepsy who had not undergone vagus nerve stimulator implantation were not included in the study. Data were collected using a questionnaire, the data was collected 13th January 2024 to 16th March 2024. The study instruments consisted of two parts. The first was composed of age, sex, educational level, residence, marital status, monthly income, occupational status, family history of epilepsy, the patient's age at the start of epilepsy, and age of a vagus nerve stimulator implantation. The second involved the quality of life scale entailing 36 items divided into eleven axes as follows: (1) general health condition, (1) health status compared to the previous year, (10) items related to daily activities, (4) items concerning physical problems that hinder daily activities, (3) items addressing psychological problems that hinder daily activities, (1) item covering physical and psychological issues affecting social activities, (1) item measuring the intensity of physical pain in the past month, (1) item assessing the impact of physical pain on daily tasks, (9) items capturing feelings about medical progress due to the health condition in the past month, (1) item evaluating the interference of physical and mental health with social activity, and (4) items examining an individual's perception of their health condition. Each question was scored on a scale of 1 to 3, with higher scores indicating better QoL, while lower scores represented lower quality of life. The estimated completion time for the questionnaire was 10 to 20 minutes. This scale employed three response options: Always, Sometimes, and Never, which were assigned scores of 3, 2, and 1, respectively. These scores were then categorized into four levels: low level (1.00-1.66) denoted by 1, moderate level (1.67-2.33) signified by 2, and high level (2.34-3.00) represented by 3. Ethical permission was attained from the relevant University of Baghdad/College of Nursing, Clinical Research Ethics Committee, as well as institutional permission from the College of Nursing and ethical boards of the selected hospitals before data collection. Participation in the study was voluntary, and epilepsy patients who had undergone vagus nerve stimulator implantation provided informed written consent with the assurance of confidentiality for their answers. The collected data was examined by Statistical Package for Social Science (SPSS) version 26. Descriptive statistics, such as mean, standard deviation, frequency, and percentage, were used. The chi-square test was adopted to explore the association between patients' quality of life and sociodemographic characteristics for quantitative data. A p-value of 0.05 or less was considered statistically significant.

Results

The study was composed of a total of 100 epileptic patients, with a mean age of 32 years (\pm SD=10) and an age range between 18 and 60 years. Among the participants, 55% were male. In terms of marital status, 48% of the respondents were unmarried. Additionally, 55% of the participants resided in urban areas. As for educational background, 40% of the respondents had completed primary school. Concerning monthly income, 73% of the participants reported earning between 300,000 and 600,000 Iraqi Dinars. Regarding occupation, 36 (36%) of the participants were students, and 25% were working as governmental employees (Table 1). Regarding quality of life as seen among 42% of them; the patients have moderate quality of life related to general health (47%), physical functioning (44%), physical health (39%), psychological health (41%), energy/fatigue (55%), and role functioning (50%), while have high quality of life related to health change (57%), social functioning (57%), and pain severity (67%) (Table 2).

Discussion

Our research indicated that while occupation and level of education were QOL-related factors in Iraq, there was no significant correlation between the quality of life QOL score and demographic characteristics such as age, sex, residency, marital status, and monthly income. According to this study's findings, PWEs' quality of life was substantially correlated with their educational status. This result was consistent with research conducted at the Amanuel Mental Specialty Clinic in Ethiopia, Kenya, India, and the USA (Singh and Pandey, 2017; Abid, Majeed and Mohammed, 2018; H. Majeed *et al.*, 2023; H. M. Majeed *et al.*, 2023; Majeed, Hassan and Mousa, 2024). A lower educational position may have contributed to a more conventional mindset and lower self-esteem, which makes a person more mentally unstable about their illness than someone with a higher education. This study attempted to evaluate quality of life and related aspects among epileptic patients. Based on this result, the average quality of life score among participants reached 42% (2.20 ± 0.739). This result was in line with a study executed in Kenya (mean score of 49.90), Bhutan (mean score of 48.9), and Poland (mean score of 55.18) (Staniszewska, Kurkowska-Jastrzebska and Tarchalska-Kryńska, 2015; Saadi *et al.*, 2016). In the present study, when compared to studies conducted in India, where the mean score was 61.49, and Ugandan studies, where the mean score was 58, we found that the quality of life score among epileptic patients was lower on average (Rakesh *et al.*, 2012; Nabukenya *et al.*, 2014) social and psychological consequences and it has an impact on a person's quality of life. We assessed the quality of life and factors associated with a poor quality of life, among adults with epilepsy in a rural block of Tamil Nadu.

METHODS: We interviewed 91 epilepsy patients from 20 randomly selected villages using a structured questionnaire including World Health Organization Quality of Life BREF

(WHOQOL-BREF. In comparison to studies performed in Taiwan (33.29%), Brazil (31.27%), and Colombia (30%), where the majority of respondents reported a moderate quality of life, the findings of this study were greater (Shakirullah *et al.*, 2014; Chen *et al.*, 2016; Espinosa Jovel *et al.*, 2016). This discrepancy could be caused by better living standards and holistic treatment than the traditional approach and by financial and economic constraints that prevent treatment from being accessible in developing nations and regional shifts in attitudes.

Still, this result was below the average for other nations, such as 74.9 in India, 70.64 in Serbia, 68.9 in Malaysia, 82 in Canada, and 66.0 in the UK. Standard medical care availability, the patient's lifestyle, and sociocultural beliefs may all contribute to this higher quality of life as compared to the study population (Norsa'adah, Zainab and Knight, 2013; Milovanović, Martinović and Tošković, 2014; George, Kulkarni and Sarma, 2015; Saadi, Patenaude and Mateen, 2016; Ridsdale *et al.*, 2017) a chronic disorder of brain characterised by a predisposition to generate epileptic seizures, has an effect on the psychosocial well-being of sufferers. Measuring the quality of life (QOL. In this paper, the physical domains (44%), psychological domain (41%), and social domain (57%) exhibit a moderate quality of life. In contrast, a study conducted in Brazil revealed lower levels of quality of life in the physical domain (27.6%), psychological domain (33.3%), and social domain (32.1%) (Siqueira *et al.*, 2014; Chen *et al.*, 2016). Social determinants of health are the primary social elements that impact an individual's health; they are the circumstances surrounding an individual's birth, upbringing, and housing. Social determinants of health are a major contributor to health inequalities and have an impact on both individual and societal outcomes through biological factors. Relationships between social standing and prospects for employment, income, and occupation are the main components of socioeconomic status (Honari *et al.*, 2021) emotional, and social consequences. Previous studies indicate that epilepsy symptoms can highly affect the epileptic patients' satisfaction in life. The aim of the present study is to investigate the QOL of People with Epilepsy (PWE. The stigma attached to epilepsy as a chronic condition has an impact on social functioning to some level. This stigma leads to discrimination in daily activities including going to school, driving, working, and getting insurance (Yogarajah and Mula, 2019). Deficits in social well-being might be caused by psychological issues such as stigmatization, fear of seizures, parental overprotectiveness during childhood, and diminished possibilities for life experiences that hinder the development of social skills. Social challenges can also be exacerbated by psychological symptoms like worry and sadness or by neurocognitive deficits in language, attention, memory, and processing speed, all of which are prevalent in epilepsy patients (Yogarajah and Mula, 2019). Moreover, a higher education level of patients with epilepsy seems to be linked with improved QoL, thus promoting the idea of continuing education and advanced

social functioning in epileptic patients (Ridsdale *et al.*, 2017) but there is little UK population evidence of QoL in epilepsy. In advance of evaluating an epilepsy self-management course we aimed to describe, among UK participants, what clinical and psycho-social characteristics are associated with QoL. We recruited 404 adults attending specialist clinics, with at least two seizures in the prior year and measured their self-reported seizure frequency, co-morbidity, psychological distress, social characteristics, including self-mastery and stigma, and epilepsy-specific QoL (QOLIE-31-P).

Conclusions

Compared to the general population, individuals with epilepsy PWE have a lower quality of life and a higher likelihood of experiencing mood problems. Multiple aspects are interrelated with reduced QoL in PWE. Epilepsy treatment aims to accomplish seizure freedom. In chronic diseases, it is also crucial to consider the patient's concomitant conditions to provide them with the highest possible QoL. Consequently, choices about therapy should always be made with the patient's involvement, taking into account their unique psychobehavioral needs as well as any unique elements of their particular ailment. This study has proved that VNS could boost not only seizure control in patients with DRE but also QOL. These results add to the body of research supporting the usefulness of VNS treatment as an adjuvant in the management of psychosocial comorbidities in DRE patients.

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Conflict of Interest

The authors declare that there are no conflicts of interests to be disclosed.

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