

Prevalence of Epilepsy and Other Associated Diseases among Children: A Cross-Sectional Study

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Abstract: Objective: This research aims to determine the prevalence of epilepsy and other associated diseases among children.

Methods: The research will employ a cross-sectional study design to assess the prevalence of epilepsy and its association with other diseases. Cross-sectional studies allow for the simultaneous collection of data from a diverse sample of individuals within a specific population, providing a snapshot of disease prevalence and comorbidity patterns at a given point in time.

Results: The study included 550 participants. The most frequent age among them was 1-5 years (n= 206, 37.5%), followed by 6-9 years (n= 147, 26.7%), then 10-14 years (n=142, 25.8%). Figure 1 shows the age distribution among study participants. The most frequent gender among study participants was male (n= 318, 57.8%), followed by female (n= 232, 42.1%). Figure 2 shows the gender distribution among study participants. Participants were asked if the child suffered from epilepsy or seizures. The most frequent answers were yes (n=378, 68.7%) and no (n=172, 31.2%). The most frequent type of epilepsy was generalized epilepsy (n=282, 74.6%), followed by focal epilepsy (n=96, 25.4%). Figure 4 shows the type of epilepsy distribution among study participants.

Conclusion:

This study revealed a high prevalence of epilepsy among children, with generalized epilepsy being the most common subtype. Significant associations were identified between epilepsy and comorbidities such as stress, anxiety, and depression, highlighting the multifaceted impact of this condition on affected individuals and their families. The findings underscore the necessity of

comprehensive diagnostic approaches and tailored management strategies to address not only epilepsy but also its associated physical and psychological burdens.

1. Introduction

The significance of investigating the prevalence of epilepsy and its association with other diseases through a cross-sectional study lies in its potential to offer crucial insights into public health management strategies. Epilepsy is a neurological disorder characterized by recurrent seizures, affecting millions worldwide. Understanding its prevalence within a specific population and its correlation with other medical conditions can inform healthcare policies, resource allocation, and intervention programs to improve the quality of life for those affected. Moreover, identifying comorbidities associated with epilepsy is essential for comprehensive patient care, as it can influence treatment decisions and prognosis. By conducting a cross-sectional study, researchers can gather valuable data on the prevalence of epilepsy and its concurrent diseases, laying the groundwork for targeted interventions and healthcare planning tailored to the needs of affected individuals.

The rationale behind undertaking a cross-sectional study to explore the prevalence of epilepsy and its associated diseases stems from its efficiency in providing a snapshot of the population at a given time. Unlike longitudinal studies which observe subjects over an extended period, cross-sectional studies allow for the simultaneous examination of various factors within a population, making them ideal for assessing disease prevalence and comorbidity patterns. By surveying a diverse sample of individuals, researchers can analyze the prevalence rates of epilepsy and other associated conditions across different demographic groups, such as age, gender, and socioeconomic status. This approach facilitates the identification of potential risk factors and disparities in disease burden, enabling targeted interventions and healthcare strategies to mitigate the impact of epilepsy and its comorbidities on public health.

2. METHODS

Study design

The research will employ a cross-sectional study design to assess the prevalence of epilepsy and its association with other diseases. Cross-sectional studies allow for the simultaneous collection of data from a diverse sample of individuals within a specific population, providing a snapshot of disease prevalence and comorbidity patterns at a given point in time.

Study approach

The study will be conducted in various healthcare facilities, including hospitals, clinics, and community health centers, within the chosen geographic area. These settings will ensure access to a diverse range of individuals from different demographic backgrounds and enable comprehensive data collection.

Study population

The population of interest will include children residing within the selected geographic area who seek healthcare services from the participating facilities. This may encompass children of both genders, reflecting the broader demographic composition of the target population.

Study sample

A representative sample of individuals will be selected using probability sampling techniques, such as stratified random sampling or cluster sampling, depending on the characteristics of the population and available resources. Sample size calculation will be based

on estimated prevalence rates and desired levels of precision to ensure adequate statistical power.

Study tool

The questionnaire was adopted for data collection for the current study, which was also categorized as a study tool.

Data collection

Data will be collected through structured interviews, medical records review, and diagnostic assessments conducted by trained healthcare professionals. Information pertaining to epilepsy diagnosis, comorbidities, demographic characteristics, and relevant medical history will be obtained from participants using standardized data collection tools.

Data analysis

Descriptive statistics, including frequencies, proportions, and measures of central tendency, will be used to summarize the prevalence of epilepsy and associated diseases within the study population. Inferential statistical analyses, such as chi-square tests or logistic regression models, may examine the relationship between epilepsy and comorbidities while controlling for potential confounders.

Ethical considerations

The study will adhere to ethical principles outlined in relevant guidelines and regulations, including informed consent, confidentiality, and voluntary participation. Ethical approval will be obtained from the institutional review board or ethics committee before the commencement of data collection, ensuring that participant rights and welfare are protected throughout the research process.

3. RESULTS

The study included 550 participants. The most frequent age among them was 1-5 years ($n=206$, 37.5%), followed by 6-9 years ($n=147$, 26.7%), then 10-14 years ($n=142$, 25.8%). Figure 1 shows the age distribution among study participants. The most frequent gender among study participants was male ($n=318$, 57.8%), followed by female ($n=232$, 42.1%). Figure 2 shows the gender distribution among study participants.

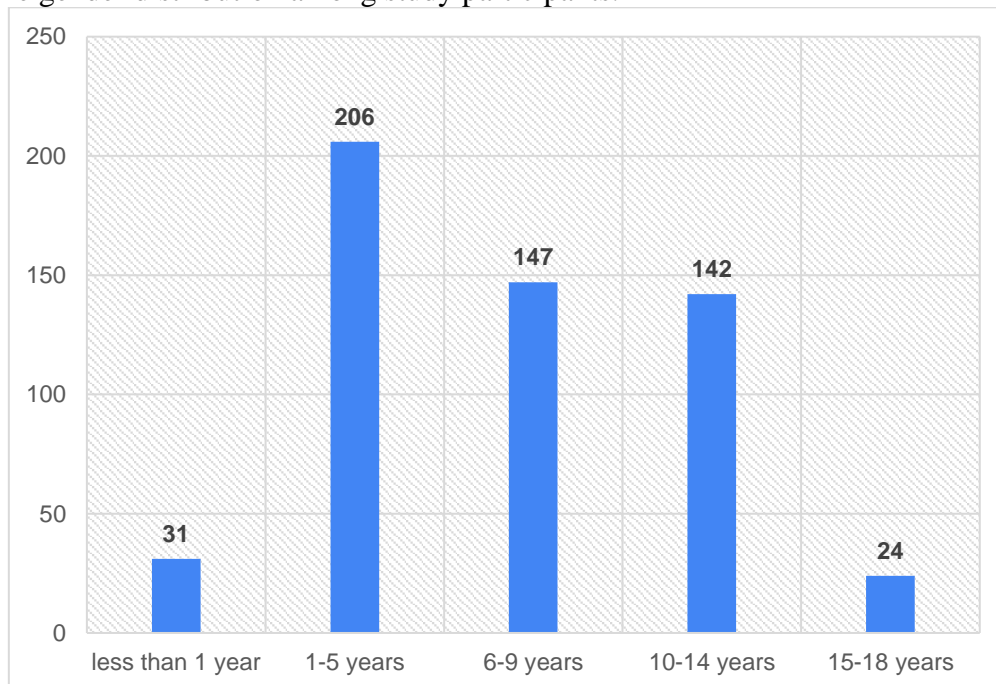


Figure 1: Age distribution among study participants

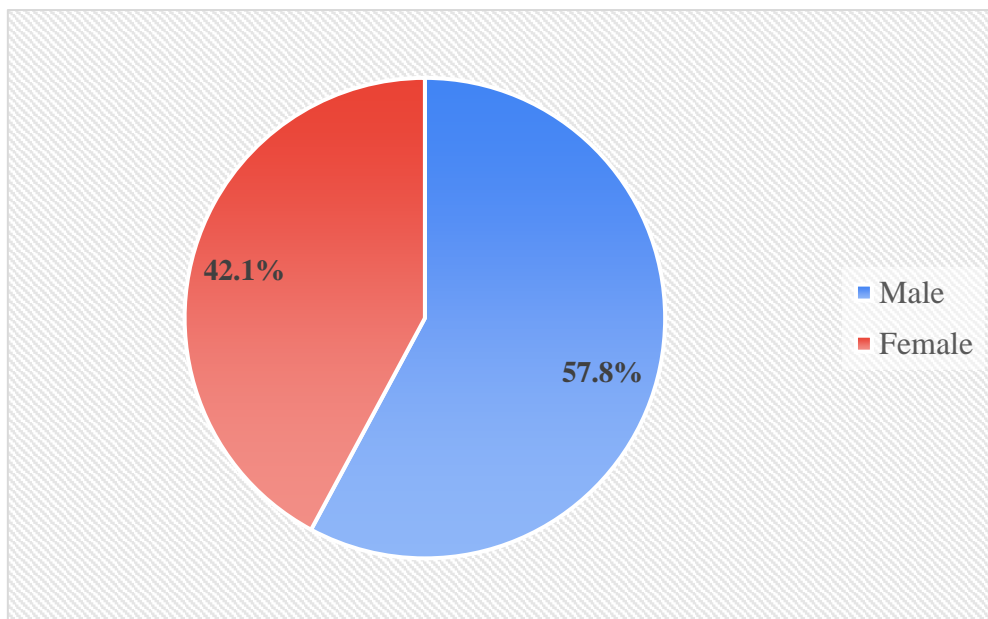


Figure 2: Gender distribution among study participants

Participants were asked if the child suffered from epilepsy or seizures. The most frequent answers were yes (n=378, 68.7%) and no (n=172, 31.2%). Figure 3 shows the suffered from epilepsy or seizures distribution among study participants.

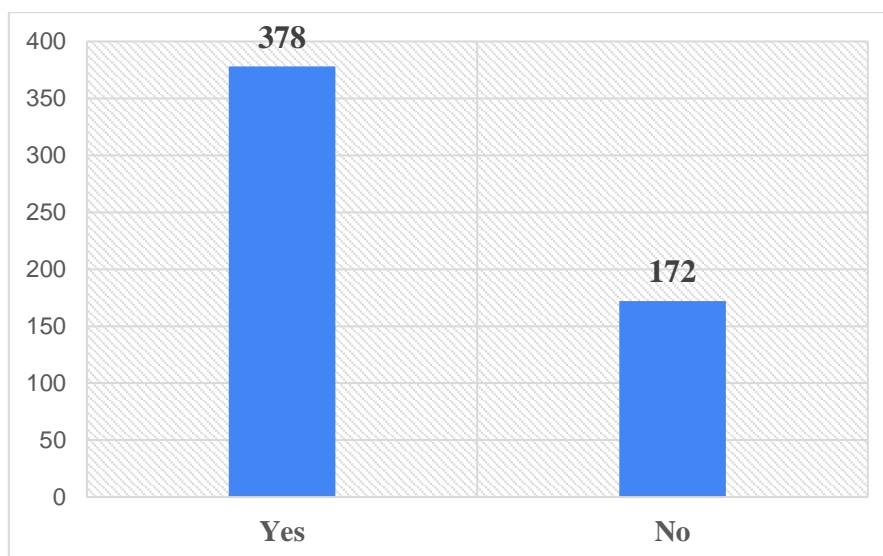


Figure 3: Suffered from epilepsy or seizures distribution among study participants

The most frequent type of epilepsy was generalized epilepsy (n=282, 74.6%), followed by focal epilepsy (n=96, 25.4%). Figure 4 shows the type of epilepsy distribution among study participants.

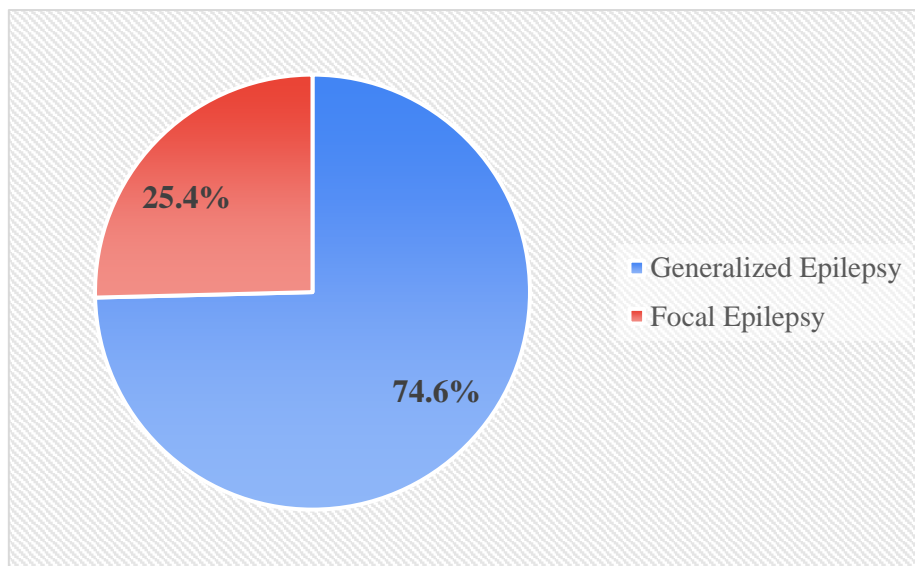


Figure 4: Type of epilepsy distribution among study participants

Participants were asked to assess their Investigations. Their responses and results are presented in Table 1.

Table 1

| Investigations | YES | NO | Don't Know |
|--|-------------|-------------|-------------|
| Electroencephalogram (EEG) | 312 (82.5%) | 32 (8.5%) | 34 (9%) |
| 12-lead ECG | 77 (20.4%) | 37 (9.8%) | 264 (69.8%) |
| Magnetic Resonance Imaging (MRI) | 145 (38.4%) | 41 (10.8%) | 192 (50.8%) |
| Complete Blood Count (CBC) | 128 (33.9%) | 39 (10.3%) | 211 (55.8%) |
| Glucose | 99 (26.2%) | 76 (20.1%) | 211 (53.7%) |
| CSF | 38 (10.1%) | 116 (30.7%) | 224 (59.3%) |
| Liver function/Liver enzymes | 132 (34%) | 81 (21.4%) | 165 (43.7%) |
| Vitamin D | 148 (39.2%) | 34 (9%) | 196 (51.9%) |
| Therapeutic drug monitoring (Drug Level) | 116 (30.7%) | 44 (11.6%) | 218 (57.7%) |

4. DISCUSSION

More than 50 million individuals throughout the globe are affected with epilepsy, which is a group of diverse syndromes defined by the presence of other symptoms in addition to seizures [12]. Comorbidities with cognition, emotion, and behavior are prevalent.

The two most common types of seizures are focal and generalized. Right from the start, both sides of the brain are involved in a generalized seizure. Seizures may be classified into four main types: generalized tonic-clonic, myoclonic, absence, and atonic, all of which cause a temporary or permanent loss of consciousness [13]. Patients with epilepsy most often have partial seizures, which impact a region inside one cerebral hemisphere [14]. Complex partial seizures are characterized by decreased or lost awareness, whereas simple partial seizures are characterized by preserved consciousness [14].

There is currently no gold standard anti-epileptic medicine (AED) for treating epilepsy, and every AED has reported some kind of negative effect. Factors including as side effects, usability, cost, and medical expertise are taken into account while choosing an AED. Standard, first-line AEDs such carbamazepine, phenytoin, valproic acid, or phenobarbital may be begun on patients with newly diagnosed epilepsy who need therapy. They may also employ AEDs that are more recent, such those that came out in the last ten years. These include the following: gabapentin, lamotrigine, oxcarbazepine, and topiramate [15]. The success rate of treating

seizures with one of these AEDs ranges from 70% to 80%, depending on the cause of the disease. Twenty percent to thirty percent of patients, on the other hand, have severe adverse drug reactions or intractable or uncontrolled seizures [15]. Every patient's unique set of symptoms and medical history should be considered when deciding which medication to use to treat refractory epilepsy, just as when deciding on a first-line treatment.

A low- to middle-income economy is considered to be an emerging market economy [16]. These nations account for almost 20% of global GDP, 80% of the world's population, and a lot of their population growth [16]. Although there is no universally accepted definition of an emerging market, a wide variety of nations, both large and small, are commonly included in this category due to development and reform initiatives aimed at expanding their markets internationally [16]. So, even though China is a global economic powerhouse, it is still classified as an emerging market, along with countries like Sudan and Bulgaria, which have far smaller economies and less resources. Hospitalized people in developing economies often suffer from epilepsy [17]. While there is a dearth of data from low-income regions, reports indicate that these areas have a different epilepsy epidemiology, economic burden, and result than high-income nations [17]. Unfortunately, patients in these regions often fail to provide sufficient evidence of the length of their seizures, making it difficult to use the International League Against Epilepsy definition of epilepsy [18].

Epidemiology of epilepsy

Epilepsy prevalence in developing markets differed among populations evaluated in the literature retrieved for this study. The incidence of epilepsy in Argentina was the subject of three separate research. Lifetime prevalence was estimated to be 3.2/1000 and active prevalence to be 2.6/1000 in a population of primary school students in one investigation, and 6.2/1000 and 3.8/1000, respectively, in another report [19–20]. A different study indicated that among the Buenos Aires special schools serving students with physical or mental diseases and learning disabilities, the lifetime prevalence was 71.9/1000 and the active prevalence was 64.8/1000 [21].

Two independent investigations found that active epilepsy was very common in Saudi Arabia. A frequency of 6.54 per 1000 people was discovered in the first [22]. Several Arab nations' prevalence rates were given in a second research. The research found a median frequency of 2.3 per 1000 people of Saudi Arabia, with a range of 0.9 per 1000 in Sudan and 6.5 per 1000 elsewhere [23].

5. CONCLUSION

This study revealed a high prevalence of epilepsy among children, with generalized epilepsy being the most common subtype. Significant associations were identified between epilepsy and comorbidities such as stress, anxiety, and depression, highlighting the multifaceted impact of this condition on affected individuals and their families. The findings underscore the necessity of comprehensive diagnostic approaches and tailored management strategies to address not only epilepsy but also its associated physical and psychological burdens.

References

1. World Health Organization. Epilepsy. World Health Organization. [Aug; 2022]. <https://www.who.int/news-room/fact-sheets/detail/epilepsy>.
2. Al Rajeh S, Awada A, Bademosi O, Ogunniyi A. The prevalence of epilepsy and other seizure disorders in an Arab population: a community-based study. *Seizure*. 2001 Sep 1;10(6):410-4.

3. Lu E, Pyatka N, Burant CJ, Sajatovic M. Systematic literature review of psychiatric comorbidities in adults with epilepsy. *Journal of clinical neurology (Seoul, Korea)*. 2021 Apr;17(2):176.
4. Asadi-Pooya AA, Kanemoto K, Kwon OY, Taniguchi G, Dong Z, Chinvarun Y, Yu HY, McGonigal A, Kanner AM, Park SP. Depression in people with epilepsy: How much do Asian colleagues acknowledge it?. *Seizure*. 2018 Apr 1;57:45-9.
5. Tegegne MT, Mossie TB, Awoke AA, Assaye AM, Gebrie BT, Eshetu DA. Depression and anxiety disorder among epileptic people at amanuel specialized mental hospital, Addis Ababa, Ethiopia. *BMC psychiatry*. 2015 Dec;15:1-7.
6. Sylla M, Vogel AC, Bah AK, Tassiou NR, Barry SD, Djibo BA, Toure ML, Foksona S, Konaté M, Cisse FA, Mateen FJ. Prevalence, severity, and associations of depression in people with epilepsy in Guinea: A single-center study. *Epilepsy & Behavior*. 2020 Dec 1;113:107475.
7. Madandola NO, Sale S, Adebisi AS, Obembe A, Salihu AS, Bakare AT, Danjuma IA. Sociodemographic and clinical variables of depression among patients with epilepsy in a neuropsychiatric hospital in Nigeria. *Depression research and treatment*. 2020 Feb 12;2020.
8. Weatherburn CJ, Heath CA, Mercer SW, Guthrie B. Physical and mental health comorbidities of epilepsy: population-based cross-sectional analysis of 1.5 million people in Scotland. *Seizure*. 2017 Feb 1;45:125-31.
9. Hecimovic H, Santos JM, Carter J, Attarian HP, Fessler AJ, Vahle V, Gilliam F. Depression but not seizure factors or quality of life predicts suicidality in epilepsy. *Epilepsy & Behavior*. 2012 Aug 1;24(4):426-9.
10. Mubarak AA, Sibyani AK, Alkhawtani RA, Alqahtani BG, Alaynayn FK. Prevalence of depression among epileptic patients in Taif City, Saudi Arabia. *Neurosciences Journal*. 2021 Oct 1;26(4):366-71.
11. Afifi T, Elessi K, Samaan M, Alaqad A, Abu Elhatal H, Abu-Lamzi A. Management of Epilepsy among Children in the Gaza Strip: A Multicenter Clinical Audit. *Dubai Medical Journal*. 2019 Sep 11;2(3):90-8.
12. World Health Organization; Jan, 2009. Epilepsy Fact Sheet No 999, 2009. Available at: <http://www.who.int/mediacentre/factsheets/fs999/en/index.html>. Accessed on April 2, 2024.
13. Proposal for revised classification of epilepsies and epileptic syndromes. Commission on Classification and Terminology of the International League Against Epilepsy. *Epilepsia*. 1989;30(4):389–399.
14. Schachter SC. Seizure disorders. *Med Clin North Am*. 2009;93(2):343–351.
15. French JA, Kanner AM, Bautista J, et al. Efficacy and tolerability of the new anti-epileptic drugs II: Treatment of refractory epilepsy. *Neurology*. 2004;62(8):1261–1273.
16. Heakal R. What Is An Emerging Market Economy? 2009. Available at: <http://www.investopedia.com/articles/03/073003.asp#axzz1Z4eUuEFk>. Accessed on April 2, 2024.
17. Newton CR. Status epilepticus in resource-poor countries. *Epilepsia*. 2009;50(12):54–55.
18. International League Against Epilepsy [homepage] Available at: www.ilae-epilepsy.org. Accessed on April 2, 2024.
19. Somoza MJ, Forlenza RH, Brussino M, Licciardi L. Epidemiological survey of epilepsy in the primary school population in Buenos Aires. *Neuroepidemiology*. 2005;25(2):62–68.
20. Melcon MO, Kochen S, Vergara RH. Prevalence and clinical features of epilepsy in Argentina. A community-based study. *Neuroepidemiology*. 2007;28(1):8–15.
21. Somoza MJ, Forlenza RH, Brussino M, Centurión E. Epidemiological survey of epilepsy in the special school population in the city of Buenos Aires. A comparison with mainstream schools. *Neuroepidemiology*. 2009;32(2):129–135.

22. Al Rajeh S, Awada A, Bademosi O, Ogunniyi A. The prevalence of epilepsy and other seizure disorders in an Arab population: a community-based study. *Seizure*. 2001;10(6):410–414.
23. Benamer HT, Grosset DG. A systematic review of the epidemiology of epilepsy in Arab countries. *Epilepsia*. 2009;50(10):2301–2304.
24. Kwong KL, Chak WK, Wong SN, So KT. Epidemiology of childhood epilepsy in a cohort of 309 Chinese children. *Pediatr Neurol*. 2001;24(4):276–282.
25. Fong GC, Mak W, Cheng TS, Chan KH, Fong JK, Ho SL. A prevalence study of epilepsy in Hong Kong. *Hong Kong Med J*. 2003;9(4):252–257.
26. Hui AC, Lam JM, Wong KS, Kay R, Poon WS. Vagus nerve stimulation for refractory epilepsy: long term efficacy and side-effects. *Chin Med J (Engl)* 2004;117(1):58–61.
27. Chen CC, Chen TF, Hwang YC, et al. Population-based survey on prevalence of adult patients with epilepsy in Taiwan (Keelung community-based integrated screening no.12) *Epilepsy Res*. 2006;72(1):67–74.
28. Velez A, Eslava-Cobos J. Epilepsy in Colombia: epidemiologic profile and classification of epileptic seizures and syndromes. *Epilepsia*. 2006;47(1):193–201.
29. Shah PA, Shapoo SF, Koul RK, Khan MA. Prevalence of epilepsy in school-going children (6–18 years) in Kashmir Valley of North-west India. *J Indian Med Assoc*. 2009;107(4):216–218.
30. Halász P, Cramer JA, Hodoba D, et al. BIA-2093-301 Study Group Long-term efficacy and safety of eslicarbazepine acetate: results of a 1-year open-label extension study in partial-onset seizures in adults with epilepsy. *Epilepsia*. 2010;51(10):1963–1969.
31. Onal AE, Tumerdem Y, Ozturk MK, et al. Epilepsy prevalence in a rural area in Istanbul. *Seizure*. 2002;11(6):397–401.
32. Serdaroğlu A, Ozkan S, Aydin K, Gücüyener K, Tezcan S, Aycan S. Prevalence of epilepsy in Turkish children between the ages of 0 and 16 years. *J Child Neurol*. 2004;19(4):271–274.
33. Calisir N, Bora I, Irgil E, Boz M. Prevalence of epilepsy in Bursa city center, an urban area of Turkey. *Epilepsia*. 2006;47(10):1691–1699.
34. Velioglu SK, Bakirdemir M, Can G, Topbas M. Prevalence of epilepsy in northeast Turkey. *Epileptic Disord*. 2010;12(1):22–37.
35. Cowling BJ, Shaw JE, Hutton JL, Marson AG. New statistical method for analyzing time to first seizure: example using data comparing carbamazepine and valproate monotherapy. *Epilepsia*. 2007;48(6):1173–1178.
36. Kochen S, Giagante B, Oddo S. Spike-and-wave complexes and seizure exacerbation caused by carbamazepine. *Eur J Neurol*. 2002;9(1):41–47.
37. Anand K, Jain S, Paul E, Srivastava A, Sahariah SA, Kapoor SK. Development of a validated clinical case definition of generalized tonic-clonic seizures for use by community-based health care providers. *Epilepsia*. 2005;46(5):743–750.