IJMA

International Journal of Medical Arts

Volume 3, Issue 3 [Summer (July-September) 2021]

http://ijma.journals.ekb.eg/

Print ISSN: 2636-4174

Online ISSN: 2682-3780

About IJMA [last updated July, 1st, 2021]

- ✓ International Journal of Medical Arts is the Official Journal of the Damietta Faculty of Medicine, Al-Azhar University, Egypt
- ✓ It is an International, Open Access, Double-blind, Peer-reviewed Journal
- ✓ Published four times a year
- ✓ The First Issue was published in July 2019
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International Journal of Medical Arts 2021; 3 [3] July-September: 1657-1663

Available online at Journal Website
https://ijma.journals.ekb.eg/
Main subject [Neurology; Community Medicine] *

Original Article

A community-Based Epidemiological Study of Epilepsy among Students of Primary and Preparatory School Stages in New Damietta City

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Submission date: March 08, 2021; Acceptance date: July 23, 2021
DOI: 10.21608/ijma.2021.64734.1278

ABSTRACT

Background: Even though Epilepsy is a common neurological disorder globally, developing countries still have insufficient epidemiological data regarding epilepsy.

Aim of the Work: We aimed to estimate the prevalence of epilepsy in primary and preparatory school students in New Damietta city, Damietta governorate, Egypt.

Patients and Methods: A cross-sectional community-based study that was conducted over a period of six months from February to July 2020. All students from conventional schools were screened using a special validated Arabic translated questionnaire. Students with positive questionnaire findings were subjected to a detailed history, neurological examination, Electroencephalography [EEG], and Magnetic resonance imaging [MRI] whenever possible. Data were coded and analyzed.

Result: Lifetime prevalence was 7.5/1000 in conventional schools. Male: Female ratio was 2:1 with statistical significance [95% Confidence Interval= 0.276 to 0.963]. Low socioeconomic class students had a statistically significant higher prevalence of epilepsy. Prenatal and neonatal insults, history of febrile convulsions, and family history of epilepsy were the risk factors with statistical significance. Generalized seizures were more frequent than focal and 62.2% of children were receiving treatment. EEG detected epileptiform discharges in 33.3% of students.

Conclusion: The prevalence of overall epilepsy among primary and preparatory school students was similar to that of other Egyptian districts within the same age group. Being male and low socioeconomic status was associated with a high prevalence of epilepsy. The reported prevalence is similar to the prevalence of epilepsy in other Egyptian Governorates and other Arab countries, but lower than the prevalence in Upper Egypt and most developing countries.

Keywords: Epilepsy; School; Children; Cross-sectional study; Egypt

Citation: Ali MM, Hassan AM, Mahmoud AA, Ali HA. A community-Based Epidemiological Study of Epilepsy among Students of Primary and Preparatory School Stages in New Damietta City. IJMA 2020; 3[3]: July-September: 1657-1663. [DOI: 10.21608/ijma.2021.64734.1278].

* Main subject and any subcategories have been classified according to the research topic.

INTRODUCTION

Epilepsy is considered to be one of the most prevalent diseases worldwide affecting all ages, races, and all geographical areas all over the world [1].

Epilepsy has a tremendous burden physically, socially, financially, and economically and faces some difficulties to diagnose and treat it [2].

Data coming from all over the world show conflicting results regarding its epidemiology. The importance of epidemiology is to provide data about prevalence, incidence, potential risk factors, precipitating factors, and the actual history of the disease, including the course of the disease and the difference between its figure in the past and present [3].

Prevalence can be defined as the percentage of the population with an index disease at a determined time [4].

Epidemiological data regarding epilepsy is more consistent in developed countries than in developing ones. Many studies estimated the point prevalence of epilepsy to lie between 4–10 per 1000 individuals with higher prevalence in the developing countries [5, 6].

Risk factors for the development of epilepsy vary significantly according to age. For instance, brain malformations are mostly present before adulthood in epileptic patients. Some tropical infections vary according to the geographic location and raise susceptibility toward the development of epilepsy e.g., neurocysticercosis [7]. Positive family history, gender, head trauma, low education febrile, and abnormal perinatal history also has a significant association with epilepsy [8].

Epidemiological data of epilepsy in Egypt are scarce.

THE AIM OF THE WORK

The aim of our study was to estimate the prevalence of epilepsy among primary and preparatory school students in New Damietta city, Damietta governorate, Egypt.

Moreover, we aimed to estimate the prevalence of various types of epilepsy within the community and to identify the potential risk factors.

These data can be pooled with data gathered from other studies in Egypt to get a more concise and broad estimation of epilepsy in Egypt, which will clarify the way for dealing with epilepsy.

SUBJECTS AND METHODS

This was a descriptive, cross-sectional, community-based study that was conducted in primary and preparatory schools in New Damietta city, Damietta governorate, Egypt over a period of six months from February to July 2020. Ethical approval was obtained from the local Institutional Research Board [IRB: 00012367-20-01-011] of the Al-Azhar University Hospital. Moreover, we got permission from the ministry of education to perform this study.

Inclusion criteria: to be eligible for the study, participants had to satisfy the following criteria: Primary or preparatory [6-15 years] school students in New Damietta city; both genders and from all socioeconomic levels.

Exclusion criteria: Special schools for intellectually disabled students were excluded.

Sample size calculation: The sample was calculated using [EPI-INFO] software [9]. The sample size was calculated based on the following criteria: The expected prevalence rate of epilepsy in children ranges from [32 to 55\1000] in developed countries and [36-44\1000] in developing countries with an average [0.4], and margin of error [5%]. Therefore, after the application of the simple size equation, the minimum sample size required was [780] [10].

Data Collection: We conducted the study in all conventional school in New Damietta city and screened all students present these days, so it is well representing for all socioeconomic classes. Each child in the study sample was asked to return it after being answered by his/her parents. The screening was carried out using a validated and simplified Arabic translated questionnaire with all possible and potential manifestations [11]. Those with positive answers were then interviewed with their parents to include or exclude epilepsy diagnosis. Then we performed a retrospective part with healthcare visitors, insurance system personnel and school doctors. We classified a student to be epileptic if he had at least two unprovoked seizures.

All epileptic children then underwent full history including prenatal, natal, postnatal, family, febrile seizures, and developmental histories; full neurological examination; EEG recording [20-channel EEG system - Medicom MTD, using international 10-20 system]; and magnetic resonance imaging [MRI, GE Signa HDxt 1.5T MRI Scanner] of the brain whenever required.

To estimate the potential risk factors, we assigned 53 normal students in the control group; they were of the same age and gender like case group to control confounding. Then, we gathered a detailed history from their parents.

Statistical Analysis: Statistical Package for Social Science [SPSS] version 23 computer program for Windows was used to perform all statistical analyses. The first stage of data analysis was done by describing seizures with its clinical characteristics via simple descriptive statistical tests. Continuous data were presented as mean and standard deviation. Unadjusted univariate odds ratios [ORs] with their 95% confidence intervals [CI] were done to evaluate associations between potential risk factors and epilepsy.

RESULTS

We included 6411 primary and preparatory school students, 3573 of them were males and 2838 were females. Epilepsy lifetime prevalence was 7.5 per 1000 students. Total epileptic patients out of the screened students were 48 students. Prevalence was significantly higher in males with a male to female ratio of 2:1 [95% confidence interval = 0.276 to 0.963].

Prevalence was higher in low socioeconomic class with statistical significance [p value= 0.011] [Table1]. After the study on the potential risk factors, only four risk factors had statistical significance including prenatal [like prolonged labor, anoxia, and low birth weight] and neonatal illnesses [like infections, the presence of positive family history for seizures, and past history of febrile convulsions] [Table 2].

Prenatal factors were the most significant one. We found febrile convulsions history in 36.2% of epileptic children and it was statistically significant. Natal and consanguinity were of no significance. Age-specific prevalence of epilepsy is shown in table 3. After seizure types analysis, the most common type was generalized seizures present in 28 students [58.3%], with generalized tonic-clonic convulsions the most common form present in 12 students [25%] [Table 4]. Only 10 epileptic patients had only nocturnal seizures, 15 patients had only diurnal seizures and 23 patients had both nocturnal and diurnal seizures.

Precipitating factors were positive in 29 students [60.4%], and emotional stress was the most common one present in 9 [18.75%] students [Table 5].

Postictal manifestations [Table 6] were present in 25 students [58.4%], and the postictal unresponsiveness was the most common one present in 11 patients [23%], followed by postictal sleepiness presenting in 5 patients [10%], and postictal unresponsiveness and sleepiness presenting in 3 patients [6%]. We also found that 30 students [62.5%] were on antiepileptic medications. Of those taking antiepileptic drugs; 83.3% were considered compliant on AED, while only 17.4% were non-compliant, with statistical significance. All epileptic students had a normal neurological examination. Most students had epileptiform discharges on their interictal EEG [Table 7]. Those with suspected secondary epilepsy [n=23] were offered to have MRI brain; 16 of them agreed to have it. MRI [1.5 Tesla] revealed no abnormalities in 75% of patients [Table 8]. Seizure frequency was variable; however, the highest frequency was once per week and the lowest frequency was once every 6 months [Table 9].

Table [1]: Socioeconomic Status of Epileptic Children

Status	Epileptic students	P-value
High	4 [8.3%]	0.011
Middle	15 [31.2%]	
Low	29 [60.4%]	

Table [2]. Risk Factors for epilepsy

Risk factor	Epileptic	Control	OR	P	95%CI
Family history	12	4	4.000	0.018	1.191 - 13.431
Febrile convulsions	11	3	4.856	0.014	1.264 - 18.658
Prenatal insult	16	4	8.167	0.001	2.201 - 30.301
Neonatal insult	14	5	3.871	0.012	1.273 - 11.773
Natal insult	2	1	2.217	0.470	0.195 - 25.271
Consanguinity	7	6	1.309	0.438	0.407 - 4.213

Table [3]. Age-specific Prevalence Rate

Age group	Cases/ Students at risk]	%	95%CI
6-9 years	18/2750	0.65%	0.30% - 1.0%
10-12 years	16/2178	0.73%	0.40% - 1.10%
13-15 years	14/1483	0.94%	0.05% - 0.95%
Total	48/6411	0.74%	0.73% - 0.75%

Table 4. Clinical Classifications of Seizures

Classification	Statistics
Generalized	28 [58.3%]
GTCS	12 [25%]
Tonic	2 [4%]
Absence	8 [17%]
Myoclonic	3 [6%]
Atonic	1 [2%]
Mixed	2 [4%]
Focal	16 [33%]
Motor	9 [20%]
Sensory	1 [2%]
Autonomic	1 [2 %]
Psychic	1 [2%]
Complex	4 [8.3%]
Focal and generalized	4 [8.3%]

Table [5]: Precipitating Factors for Seizure

Precipitating factor	Frequency	Percent
None	19	39.6
Emotional stress	9	18.8
Fatigue	7	14.6
Fever	1	2.1
Sleep deprivation	6	12.5
Menstrual cycle	1	2.1
Pain	1	2.1
Visual stimuli	1	2.1
Emotions	2	4.2
Olfactory stimuli	1	2.1

Table [6]. Postictal Manifestations for Epileptic Seizures

Postictal manifestation	Number	Percent
Absent	23	48%
Postictal unresponsiveness	11	23%
Sleep	5	10%
Headache	1	2%
Hemiparesis	1	2%
Drowsiness	1	2%
Amnesia	1	2%
Autonomic	1	2%
Unresponsiveness and sleep	3	6%
Unresponsive and amnesia	1	2%

Table [7]. EEG Abnormalities According to Seizure Type

EEG abnormalities	Generalized	Focal	Focal and generalized	Total
Normal	20	4	2	26
Epileptiform	8	11	0	19
Nonspecific	0	1	2	4
Total	28	16	4	48

Table [8]. MRI Findings

	Number	Percent
Normal	12	75%
Focal cortical dysplasia	1	6.2%
Left frontal encephalomalacia	1	6.2%
Infarction	1	6.2%
Hydrocephalus	1	6.2%

Table [9]: frequency of seizures among epileptic students

Frequency rate of seizures	
Highest frequency rate	Once per week [5 students]
Lowest frequency	Once per 6 months [3 students]

DISCUSSION

Nationally in Egypt, there is no study estimating the prevalence of epilepsy all over the country; however, few studies estimated the prevalence in specific regions.

Our study revealed lifetime prevalence of 7.5/1000 individuals. This was consistent with results from El-Motayam *et al*. study, which revealed point prevalence to be 7-10 per 1000 below the age of 15 [12].

This result is also like a study conducted by Farghaly *et al*. [13] who sampled 8750 primary school students aging 6-12 years in El-Minia City, Egypt. They screened both conventional and special schools for children with intellectual disabilities. Their results revealed point prevalence to be 7.2 per 1000 primary school students, with a higher prevalence in intellectually disabled students.

This suggests the presence of an association between risk of seizure and intellectual disability. Our results approximate the results from the study conducted on individuals younger than 18 years of age in two areas, Qena governorate and Al Qusier district in Red Sea governorate. They revealed a higher prevalence of epilepsy in children younger than 12 years of age [10.8 /1000 children] than that of adolescents [7.2/1000 adolescents] [14].

On the other hand, our results was higher than that from the study, which revealed prevalence of 6.7 per 1000 individuals. However they screened all age groups and found a higher prevalence in children [15]. Our estimated prevalence was much lower than the prevalence in Assiut governorate, which had the highest recorded prevalence rate of epilepsy in Egypt [12.5 per 1000 individuals] [16]. However, they found that the highest prevalence occurs in childhood.

The difference in the prevalence rate of epilepsy between different regions in Egypt may be explained by the difference in the screened age group and the environmental factors related to the geographic location. Some studies screened people of all age groups; however, other studies including ours screened only children and adolescents, who are proved to have a higher prevalence of epilepsy. Geographic location can be an important factor as both Damietta and Red sea are coast governorates, while Qena, Assiut and El-Minia are Nile governorates and New Valley is a desert area. More studies are needed to explore such potential geographic risk factors related to epilepsy. We cannot ignore that the prevalence is significantly different among Countries. This depends on the number of seizures at the time of diagnosis, local distribution of etiologic and risk factors, and if considering just active epilepsy [active prevalence] or also including cases in remission [lifetime prevalence].

The incidence and prevalence of the condition are notably higher in the youngest, especially less than one year, and in the elderly. It is 86 per 100,000 per during the first year of life, decrease to about 23–31 per 100,000 in people aged 30–59 years, and increase up again to 180 per 100,000 in individuals over 85 years of age [15].

Regarding global situation, there is a significant difference in reporting the incidence and prevalence of epilepsy with this variability becomes more obvious in Eastern Mediterranean regions. Studies in these regions are incomplete and non-consistent [Atlas: epilepsy care in the world, 2005]. After the response of only nine countries to the atlas, the survey covered about 70% of the population with a reported prevalence of 8.16 per 1000, with a total of 3,483,000 epileptic individuals. Reported prevalence in Arab countries ranged from the lowest in Sudan [0.9 per 1000 individuals], to the highest in Saudi Arabia [6.5 per 1000 individuals] [16].

Collected data regarding epilepsy prevalence is more consistent in industrialized countries with a report of 5.7 – 7 per 1000 [17, 18]. Studies reported a prevalence of 16 – 57 per 1000 in the South American countries [19].

The United Republic of Tanzania, Nigeria, and Liberia have the highest reported prevalence in Africa with 20, 37, and 26- 40 per 1000, respectively [20]. Like most epilepsy prevalence studies, our results revealed a higher prevalence among males. Regarding Egypt, our result was also supported by Farghaly *et al.* study conducted on primary school students and Khedr *et al.* study [13, 14].

It revealed a higher prevalence of epilepsy in males than females with a ratio of 2:1. This difference cannot be explained by the fact that the number of males is higher than females. However, both previously mentioned studies conducted by El-Tallawy *et al.* failed to detect a statistically significant difference in the prevalence of epilepsy in both genders [11].

This may be explained by traditions of concealment of epilepsy in women for socioeconomic causes in specific regions.

Our results showed a statistically significant higher prevalence in low socioeconomic classes [p = 0.011]. This is consistent with other studies searching this point in both developing and developed countries [11, 13].

Khedr *et al*. found that the crude prevalence rate [CPR] was greater in rural than urban people [17.7/1000 and 9.56/1000, respectively] and in the illiterate people than the literate ones [12.02/1000 and 9.94/1000, respectively] [14].

Studying the potential perinatal risk factors showed that prolonged labor, anoxia, and low birth weight were obvious in our patients, which are in line with previous literature. Khedr *et al.* results support our results regarding the significance of prenatal insults like tobacco smoking and maternal infections as risk factors for the future development of epilepsy [14].

Farghaly *et al.* study was conducted in primary schools reported results, which are consistent in some of our results while inconsistent with others. Like our results, they reported a statistically significant effect of the presence of the history of febrile convulsions and a family history of seizures as risk factors for the development of seizures later on in life. However, they reported that consanguinity marriage and neonatal insult like infections were statistically significant risk factors for the development of epilepsy, which is inconsistent with our results.

Fawi *et al.* reported no statistical significance for the presence of family history of seizures, consanguinity, or history for febrile convulsions as risk factors for seizures development [21].

As a result, we can see how the prenatal insults are important risk factors for epilepsy development as approved by our study. Preventive measures could significantly reduce the incidence and prevalence of epilepsy in developing countries in several ways, including enhancement of prenatal and perinatal care [for example by improving mothers' nutritional status and detection of high-risk pregnancies], reduction of the causes of brain injury [for example by promotion and enforcement of traffic regulations and speed limits and ensuring safety regulations at work], and providing specific protection [for example immunization against communicable diseases].

Regarding the form of epilepsy in our study groups, our results are consistent with studies from Ethiopia, central Oklahoma and New valley and Gharbia governorates in Egypt revealing that the most common form of epilepsy is GTC [14, 22].

Other study showed that the most common class of epilepsy is focal epilepsy. The most common focal seizures were focal impaired awareness seizures counting for about 36% of all documented seizures [15].

This difference may be explained by the lower level of awareness about focal seizures and the lack of diagnostic tools in some areas across the world. The highest seizure rate in our study was once per week, which is in accordance with Osman *et al*. who identified the highest seizure rate to occur at least one time each week [23, 24].

We could not identify a specific precipitant for seizure in about 37.5% of epileptic children in our sample size. However, we found that the most common precipitating factors for seizures were emotional stress presenting in 37.5 % followed by sleep deprivation, fatigue, fever, and TV watching, this congress with the reported in the literature that the most common precipitants for seizures are stress, sleep deprivation and fatigue [25–26].

A report from Iran found that food may mark as a precipitant for epilepsy in more than half of patients [27].This could be related to differences in cultural belief rather than to biological differences.

Ferlisi *et al.* found that there was a well identified precipitant of seizure preceding every single seizure in 28% of patients and 49% of patients reported a clear precipitant preceding more than half of their seizures episodes [28].

We found that sleep deprivation acted as a seizure precipitant more in patients with generalized seizures than those with focal ones, this is consistent with the literature, which reported the same result. They also found that women reported that the menstruation was the most common precipitant for focal seizures [29].

In our study, we found that postictal unresponsiveness was the most common postictal manifestations present in 52% of patients, followed by postictal sleepiness in 31.25%, headache in 8.3%, amnesia, drowsiness, hemiparesis, and automatism in order. This was consistent with reports of a meta-analysis of 45 studies finding that postictal un-responsive was the most common post-ictal manifestation; however, it was present in 96% of patients, higher than that reported in our study, this meta-analysis also reported that the most common manifestations after postictal un-responsiveness were postictal sleep and headache [30].

We reported postictal sleep in 31.25% of our study group patients, this is consistent with other studies in the literature that reported the postictal sleep in approximately 6% up to 45% of patients [30], and postictal sleep may also be a symptom related to the activation of cerebral inhibitory systems to terminate seizures [31].

We reported postictal autonomic manifestation in one patient only, in the form of hypersalivation, this was reported in Janszky *et al.* study [32].

Other autonomic dysregulation manifestations reported in the literature include coughing and spitting which may occur after temporal lobe seizures, presumably reflecting ictal-induced autonomic dysfunction, or in some instances, aspiration during the seizure. In addition nose rubbing, cardiovascular dysfunction [arrhythmia, bradycardia, and tachycardia], myocardial infarction, neurogenic pulmonary edema, and transient systemic hypotension and hyper-tension have been reported [33].

Postictal hyper-thermia resulting from ictal muscle activity was found to be related to seizure duration in several patients [34].

We reported postictal headache in only 8.1% of patients in our study. This was far away from that well reported in the literature with postictal headache occurring in 66% of patients. It ranges from mild to severe and of migrainous in character lasting minutes to hours. It is more reported with generalized, prolonged and repetitive seizures [30].

EEG changes in the current study are in line with Farghaly *et al.* who reported that the majority of epileptic children had abnormal EEG records [75%]; of whom 46 [62.2%] showed epileptiform changes and the remaining had non-specific EEG changes, these epileptiform changes were higher among children with focal seizures with and without secondary generalization [13]. But, this difference didn't reach the conventional level of statistical significance.

Generally, EEG may show interictal epileptiform discharges [IEDs] in a very small minority of normal individuals; 0.5% of young adults and 1-2% of children [35].

Normal individuals with IED carry a chance of 2-3% of developing epilepsy later on in young adults and 8% in children. Individuals with neurological disorders other than epilepsy carry a chance of about 2% to show IEDs. Initial interictal EEG can detect IEDs in up to 50% of epileptic patients, this percent increases dramatically with repetition of interictal EEG and use of provocation techniques like sleep deprivation, hyperventilation, or flickering flashing lights [36].

There are some limitations in this study. Due to the high rate of absence among schoolchildren, we were unable to achieve 100% participation despite our best efforts. School-based surveys have several drawbacks when compared to door-to-door surveys due to school drop-out rate related to social and economic factors. Selection bias should be considered because children and parents who consented to participate in the study may be different from those who declined.

In conclusion, data gathered from this study can be pooled with other similar studies coming from different geographical regions in Egypt into a larger study to estimate how epilepsy is prevalent in Egypt.

Financial and Non-financial Relationships and Activities of Interest

None to be declared

REFERENCES

1. Beghi E. The Epidemiology of Epilepsy. Neuroepidemiol. 2020; 54 [2]: 185-191. [DOI: 10.1159/000503831].
2. Fisher RS, van Emde Boas W, Blume W, Elger C, Genton P, Lee P, Engel J Jr. Epileptic seizures and epilepsy: definitions proposed by the International League against Epilepsy [ILAE] and the International Bureau for Epilepsy [IBE]. Epilepsia. 2005 Apr; 46[4]:470-2. [DOI: 10.1111/j.0013-9580.2005.66104.x].
3. Beghi E. Addressing the burden of epilepsy: Many unmet needs. Pharmacol Res. 2016; 107:79-84. [DOI: 10.1016/j.phrs.2016.03.003].
4. Beghi E, Hesdorffer D. Prevalence of epilepsy--an unknown quantity. Epilepsia. 2014 Jul; 55[7]:963-7. [DOI: 10.1111/epi.12579].
5. Bell GS, Neligan A, Sander JW. An unknown quantity--the worldwide prevalence of epilepsy. Epilepsia. 2014 Jul; 55[7]:958-62. [DOI: 10.1111/epi.12605].

6. Cowan LD. The epidemiology of the epilepsies in children. Ment Retard Dev Disabil Res Rev. 2002; 8[3]:171-81. [DOI: 10.1002/mrdd.10035].

7. Chen Z, Brodie MJ, Liew D, Kwan P. Treatment Outcomes in Patients with Newly Diagnosed Epilepsy Treated With Established and New Antiepileptic Drugs: A 30-Year Longitudinal Cohort Study. JAMA Neurol. 2018; 75[3]:279-286. [DOI: 10.1001/jamaneurol.2017.3949].

8. Al Habbal A, AlSharif A, Almubark A, Fattouh H, Hamzeh G, Kakaje A. Risk factors associated with epilepsy in children and adolescents: A case-control study from Syria. Epilepsy Behav. 2021 Jan; 114[Pt A]:107596. [DOI: 10.1016/j.yebeh.2020.107596].

9. Centre for disease control and prevention [CDC]. Epi Info™ | CDC [Internet]. 2020 [cited 2020 Nov 19]. Available from: https://www.cdc.gov/epiinfo/index.html

10. Sami W, Alrukban MO, Waqas T, Asad MR, Afzal K. Sample Size Determination In Health Research. J Ayub Med Coll Abbottabad. 2018 Apr-Jun; 30[2]:308-311. [PMID: 29938444].

11. El Tallawy HN, Farghaly WM, Rageh TA, Saleh AO, Mestekawy TA, Darwish MM, *et al*. Construction of standardized Arabic questionnaires for screening neurological disorders [dementia, stroke, epilepsy, movement disorders, muscle and neuromuscular junction disorders]. Neuropsychiatr Dis Treat. 2016 Aug 30; 12:2245-53. [DOI: 10.2147/NDT.S109328].

12. El-Motayam AS. Epidemiological study of neurological diseases in young age. Thesis submitted in partial fulfillment of the requirement of Msc in Neurology and Psychological medicine Faculty of Medicine, Zagazig University, 1992.

13. Farghaly WM, Abd Elhamed MA, Hassan EM, Soliman WT, Yhia MA, Hamdy NA. Prevalence of childhood and adolescence epilepsy in Upper Egypt [desert areas]. Egypt J Neurol Psychiatr Neurosurg. 2018; 54 [1]:34. [DOI: 10.1186/s41983-018-0032-0].

14. Khedr EM, Shawky OA, Ahmed MA, Elfetoh NA, Al Attar G, Ali AM, *et al*. A community based epidemiological study of epilepsy in Assiut Governorate/Egypt. Epilepsy Res [Internet]. 2013; 103[2–3]:294–302. [DOI: 10.1016/j.eplepsyres.2012.08.006].

15. Hauser WA, Annegers JF, Kurland LT. Incidence of epilepsy and unprovoked seizures in Rochester, Minnesota: 1935-1984. Epilepsia. 1993; 34[3]:453-68. [DOI: 10.1111/j.1528-1157.1993. tb02586.x].

16. Singh A, Trevick S. The Epidemiology of Global Epilepsy. Neurol Clin. 2016 Nov; 34[4]:837-847. [DOI: 10.1016/j.ncl.2016.06.015]. .

17. Forsgren L, Beghi E, Oun A, Sillanpää M. The epidemiology of epilepsy in Europe - a systematic review. Eur J Neurol. 2005 Apr; 12[4]:245-53. [DOI: 10.1111/j.1468-1331.2004.00992.x].

18. Gaitatzis A, Carroll K, Majeed A, W Sander J. The epidemiology of the comorbidity of epilepsy in the general population. Epilepsia. 2004 Dec; 45[12]:1613-22. [DOI: 10.1111/j.0013-9580.2004.17504.x].

19. Bruno E, Quattrocchi G, Crespo Gómes EB, Sofia V, Padilla S, et al. Prevalence and Incidence of Epilepsy Associated with Convulsive Seizures in Rural Bolivia. A Global Campaign against Epilepsy Project. PLoS One. 2015; 10[10]:e0139108. [DOI: 10.1371/journal.pone. 0139108].

20. Diop AG, Hesdorffer DC, Logroscino G, Hauser WA. Epilepsy and mortality in Africa: a review of the literature. Epilepsia. 2005; 46 Suppl 11:33-5. [DOI: 10.1111/j.1528-1167.2005.00405.x].

21. Fawi G, Khedr EM, El-Fetoh NA, Thabit MN, Abbass MA, Zaki AF. Community-based epidemiological study of epilepsy in the Qena governorate in Upper Egypt, a door-to-door survey. Epilepsy Res [Internet]. 2015; 113:68–75. [DOI:10.1016/j.eplepsyres.2015.03.010].

22. Alshahawy AK, Darwish AH, Elsaid Shalaby S, Mawlana W. Prevalence of idiopathic epilepsy among school children in Gharbia Governorate, Egypt. Brain Dev [Internet]. 2018; 40[4]:278–86. [DOI: 10.1016/j.braindev.2017.12.009].

23. Allers K, Essue BM, Hackett ML, Muhunthan J, Anderson CS, Pickles K, Scheibe F, Jan S. The economic impact of epilepsy: a systematic review. BMC Neurol. 2015 Nov 25; 15:245. [DOI: 10.1186/s12883-015-0494-y].

24. Fitch K, Pan X, Lau J, Engel T, Rajagopalan K. Prevalence and Economic Burden of Epilepsy in the Institutionalized Medicare Fee-for-Service Population. Am Health Drug Benefits. 2019 May; 12[3]:151-158. [PMID: 31346367].

25. Sperling MR, Schilling CA, Glosser D, Tracy JI, Asadi-Pooya AA. Self-perception of seizure precipitants and their relation to anxiety level, depression, and health locus of control in epilepsy. Seizure. 2008 Jun; 17[4]:302-7. [DOI: 10.1016/j.seizure.2007.09.003].

26. Lunardi Mdos S, Sukys-Claudino L, Guarnieri R, Walz R, Lin K. Seizure precipitants and inhibiting factors in mesial temporal lobe epilepsy. J Neurol Sci. 2011 Sep 15; 308[1-2]:21-4. [DOI: 10.1016/j. jns.2011.06.041].

27. Asadi-Pooya AA, Ghaffari A. Do patients with epilepsy believe they need specific dietary restrictions? Epilepsy Behav. 2004 Dec; 5[6]:945-8. [DOI: 10.1016/j.yebeh.2004.08.010].

28. Ferlisi M, Shorvon S. Seizure precipitants [triggering factors] in patients with epilepsy. Epilepsy Behav [Internet]. 2014; 33:101–5. [DOI: 10.1016/j.yebeh.2014.02.019].

29. Gibbon FM, Maccormac E, Gringras P. Sleep and epilepsy: unfortunate bedfellows. Arch Dis Child. 2019 Feb; 104[2]:189-192. [DOI: 10.1136/archdischild-2017-313421].

30. Subota A, Khan S, Josephson CB, Manji S, Lukmanji S, Roach P, *et al*. Signs and symptoms of the postictal period in epilepsy: A systematic review and meta-analysis. Epilepsy Behav. 2019 May; 94:243-251. [DOI: 10.1016/j.yebeh.2019.03.014].

31. Shorvon S, Trinka E. Nonconvulsive status epilepticus and the postictal state. Epilepsy Behav. 2010 Oct; 19[2]:172-5. [DOI: 10.1016/ j.yebeh.2010.06.016].

32. Janszky J, Fogarasi A, Toth V, Magalova V, Gyimesi C, Kovacs N, Schulz R, Ebner A. Peri-ictal vegetative symptoms in temporal lobe epilepsy. Epilepsy Behav. 2007 Aug; 11[1]:125-9. [DOI: 10.1016/ j.yebeh.2007.04.015].

33. Rémi J, Noachtar S. Clinical features of the postictal state: correlation with seizure variables. Epilepsy Behav. 2010 Oct; 19[2]:114-7. [DOI: 10. 1016/j.yebeh.2010.06.039].

34. Simon RP. Heart and lung in the postictal state. Epilepsy Behav. 2010 Oct; 19 [2]:167-71. [DOI: 10.1016/j.yebeh.2010.06.025].

35. Mari-Acevedo J, Yelvington K, Tatum WO. Normal EEG variants. Handb Clin Neurol. 2019; 160:143-160. [DOI: 10.1016/B978-0-444-64032-1.00009-6].

36. Amin U, Benbadis SR. The Role of EEG in the Erroneous Diagnosis of Epilepsy. J Clin Neurophysiol. 2019; 36[4]:294-297. [DOI: 10.1097/ WNP.0000000000000572].

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Print ISSN: 2636-4174
Online ISSN: 2682-3780