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RESEARCH ARTICLE

SEIZURE PRECIPITANT FACTORS AMONG PERSONS WITH EPILEPSY WITH A VIEW TO DEVELOP A TEACHING MODULE

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ABSTRACT

Purpose: The study focused on identifying the precipitant factors related to the onset of seizure attack in person with epilepsy (PWE) and to develop a teaching module on preventable precipitating factors (PF).

Materials and Methods: A semi structured interview schedule was used to assess the seizure PF among 100 patients with epilepsy in the last and past seizure attack attending the epilepsy clinic of Amrita Institute of Medical Sciences, Kochi. (AIMS) Descriptive and inferential biostatistics was used to analyse the data.

Results: 72% of the participants identified at least one PF. The first three PF reported in the last seizure attack and past attack were sleep deprivation 58(58%), missing anti epileptic drug 34(34%) emotional stress 21(21%), and sleep deprivation 45(45%), missing anti epileptic drug 21(21%), emotional stress 17(17%) respectively.

Conclusion: Prompt recognition and management of seizure precipitants has practical implications for treating patients with refractory epilepsy. Such patients can be counselled to avoid the specific seizure precipitants.

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INTRODUCTION

Epilepsy is one of the most common serious disorders of the brain. According to the International League Against Epilepsy (ILAE) and the International Bureau for Epilepsy (IBE) "epilepsy is a disorder of the brain characterized by an enduring predisposition to generate epileptic seizure and by the neurobiological, cognitive, psychological and social consequences of the condition." Thus epilepsy is a medical syndrome of recurrent, unprovoked seizure. There are 50 million people living with epilepsy worldwide, and most of them reside in developing countries. About 10 million persons with epilepsy (PWE) are there in India (Fisher *et al.*, 2005). Most people do not know exactly what causes their seizures on a given day, although many do suspect that certain things increase the likelihood of seizures. In PWE, it is helpful to know those things that might cause a breakthrough in seizures so that provocative situations can be avoided and seizure risk can be reduced. "Seizure precipitants are those circumstances that precede the onset of an epileptic attack and are considered by both patient and neurologist to be a possible explanation for

why the seizure happened, when it did and not earlier or later". (Santhosh *et al.*, 2014) These precipitants include both seizure-inducing (environmental or endogenous origin) and seizure-triggering factors (chemical or physiologic origin). Identifying PF is both academically intriguing and of practical value as avoiding the stimulus may be a more effective treatment than anticonvulsant medication. (Puskarich *et al.*, 1992) Hence the investigator designed this study to identify various precipitating factors (PF) among PWE in the South Indian Population.

MATERIALS AND METHODS

The study was carried out in the epilepsy clinic of Amrita Institute of medical Sciences (AIMS), Kochi after getting ethical clearance from institute ethics committee. Data was collected over a period of four months from November 2011 to March 2012. After establishing rapport with the patients, explained the importance of the study and procedures involved in the data collection. Those patients who gave consent and fulfilled the following inclusion criteria were enrolled in the study; able to read and write English/Malayalam, Epilepsy diagnosed as per ILAE criteria and age ≥ 20 years. To maintain

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the precisiveness of PF those patients with psychiatric disorders, co-morbid neurological disorders and children were excluded from the study.

Description of tool

The tool was developed by the researcher after an extensive literature review. It had three sections. Section I was demographic and epileptic profile which was retrieved from the electronic medical record of the epilepsy clinic and by direct interview with the patients. This was followed by section II-Precipitant Assessment Schedule (PAS) to assess the PF in the last attack which had three subsections a) Common PF b) Specific stimuli that precipitate seizures c) modulating factors of seizure carrying 19, 12 and 5 yes or no type questions. Section III consisted of a checklist to assess the seizure PF in the past seizure attack carrying 36 yes or no type questions. This helped in minimizing the coincidence that may happen purely because of patient perception. The entire data collection for a single patient took 20 minutes. A teaching module on preventable PF was developed by the researcher based on study results and provided to the epilepsy clinic.

Content validity

The content validity of the prepared tool was obtained from seven experts in the field of medical surgical nursing and neurology. Minor modifications were made as per the experts suggestions and led to a content validity index of 0.86.

Tool translation

The tool was translated to Malayalam and back translated to English with the help of experts in the respective field.

Reliability

Reliability of the tool was established using test re-test method. This was done by introducing the tool to four patients who got admitted in the neurology ward of AIMS. The reliability coefficient was 0.86.

Tool try out: The tools were administered for 10 PWE and they were found feasible for the study. The time taken for data collection was 20 minutes.

Statistical measures

The data was analysed using SPSS 17 version. Descriptive statistics-frequency, percentage and mean were used to represent demographic and epileptic profile of the patient. Mc nemar's test was used to compare the PF in the last and past seizure attack and chi square test to associate the PF in the last seizure attack with selected demographic variables. Level of significance was set at $p < 0.05$.

RESULTS

The results were obtained from analyzing data from 100 PWE. The mean age of patients was 30 years (20-55) and the mean age of onset of illness was 19 years (24-40). More than half

(51%) of patients were having generalized seizure followed by partial seizure (49%). Majority (97%) of the patients had active epilepsy followed by epilepsy on remission (3%) (Table 1).

Table 1. Distribution of subjects based on clinical data and epileptic

Clinical data and epileptic profile	Profile (n=100) Frequency (%)
Type of seizure	
Partial	49(49)
Generalized	51(51)
Unclassified	0(0)
Family history of epilepsy	
Yes	10(10)
No	90(90)
Age of onset of illness	
Below 18	70(70)
Above 18	30(30)
Seizure control	
Active epilepsy ^a	97(97)
Epilepsy on remission ^b	3(3)
Type of antiepileptic drug therapy (A.E.D)	
Monotherapy	34(34)
Polytherapy	66(66)
History of neurological illness	
Yes	6(6)
No	94(94)

^aActive epilepsy-PWE who had at least one episode in the past two years and still on AED. ^bEpilepsy in remission -PWEs who are seizure-free from the past two years.

Awareness regarding seizure PF

More than half (63%) of PWE were aware regarding seizure PF and more than one fourth (37%) were not aware regarding seizure PF (Figure 1).

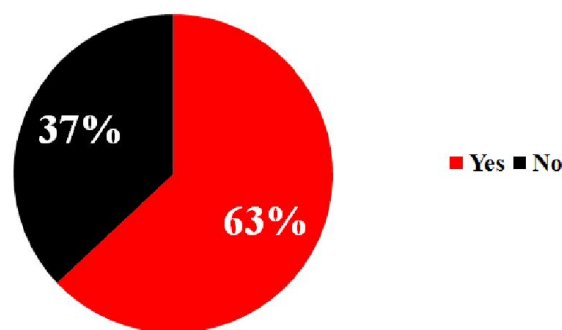


Figure 1. Distribution of subjects based on the awareness of seizure PF. (n=100)

Number of reported seizure PF

Approximately three fourth (74% & 72%) of PWE reported at least one PF in their last seizure attack and past seizure attack respectively however more than one fourth (26% & 28%) of PWE has not reported any PF for seizure. (Table 2)

Frequency and percentage of Seizure PF

Similar proportion of PWE (45% & 58%) reported sleep deprivation as a major PF for seizure in the last and past attack respectively followed by missed medication (21% & 34%) and emotional stress (17% & 21%).

Table 2. Distribution of PWE based on no. of PF reported (n=100)

No. of precipitant factors	Last Attack (%)	Past Attack (%)
0	26	28
1	52	23
2	20	35
3	2	12
4	0	2

Sleep deprivation and missing medication were the two factors reported without any significant difference in past and last seizure attack ($p \leq 0.01$). Hence it can be interpreted that the above factors were reported consistently in two time frames without any significant difference (Table 3).

Table 3. PF identified by PWE in the last and past seizure attack (n=100)

Precipitating factors	Frequency (%)		p value
	Last Attack	Past Attack	
Sleep deprivation†	45	58	0.007**
Missed medication†	21	34	0.007**
Emotional stress†	17	21	0.289
Fever	5	6	1
Fatigue	4	6	0.687
Quarrel	3	5	0.625
Alcohol	1	3	-
Painful experience	2	2	1
Sleep	1	1	1
Watching television	1	0	--
Hyperventilation	1	0	-

** $p < 0.01$, †Mc nemar test

Logistic regression

The reported PF were analysed using logistic regression model with respect to the clinical factors, age group, gender, educational status, seizure type, seizure frequency, and seizure control. Variable like age group significantly correlated with sleep deprivation.

DISCUSSION

The study identified PF in 100 PWE. Near to three-fourth; 74(74%) and 72(72%), reported at least one PF in the last and past seizure attack respectively. The estimated prevalence rate in this study is consistent with the findings in previous studies (Da silva Sousa *et al.*, 2005; Nakken *et al.*, 2005; Radhakrishnan *et al.*, 2000; Garcia *et al.*, 1994). Moreover the study focused on PF in the last attack and past attack hence the prevalence rate in the study is more reliable than the PF reported from only one episode. The number of PF reported by PWE in the present study ranges from a minimum of one to maximum of four while in other studies (Pinikahana and Dono 2009; Frucht *et al.*, 2000) PF ranging from one to twenty six and one to ten has been reported respectively. One explanation for some discrepancies in various studies about the frequencies of PF reported might be the presence of etiological factors and cultural heterogeneity among those studies and the sample size variance. The PAS had enlisted 36 PF against which the PWE was asked to report Yes or No, it is cumbersome for a PWE to decide which precipitant may have favored the way for seizure. Reporting of multiple PF can carry the risk of difficulty in interpreting a single factor for the causation of seizure. However the PWE in our study has identified PF with a

maximum range of four. Self administered questionnaires and cross sectional design always carries the possibility of bias and recall error, so this was tackled to some extent with a semi structured interview by reconfirming the PF with each individual sample after data collection. The other limitations of the study were, seizure activity monitoring was not possible and there was no control group to find a causal relationship.

Sleep deprivation was the first common factors reported as PF in the study and its estimated rate was 45(45%) which is consistent with previous study results (Frucht *et al.*, 2000). Evidence of its effect on seizure occurrence is limited. Where as in contrast to the findings of the present study Da silva souze *et al.* in 2005 reported that stress was the first common factor. However there seems to be a link between sleep deprivation and stress since sleep deprivation does not stand alone as it occurs along with stress which is evident from a strong significant positive correlation between stress and sleep deprivation in our study.

Missed medication 21 (21%) was the second common PF in our study. When PWE are taking antiepileptic medicines and are leading a normal life, it is casual to skip medicines which results in a breakthrough seizure. Medication noncompliance has been reported as a PF in other studies also. (Aird and Gordon, 1993) Emotional stress 17(17%) was the third common PF in our study. This result is very much similar to the findings of Pinikhana *et al.* (2009) where stress (55.9%), tiredness (37.1%) and sleep deprivation (37.6%) were identified as the common triggering factors. Stress management could be an important tool in these subjects because a study of progressive relaxation training showed that patient in the treatment arm had a 20% reduction in seizures compared with only a 3% reduction in the control group (Puskarich *et al.*, 1992). The notion that emotional stress lowers seizure threshold is also consistent with the results of psychopharmacologic and behavioral intervention studies in which a reduction in stress and anxiety levels results in decreased seizure frequency (Seneviratne, 2005).

The six PF reported by less than 10% of the total sample deserves further attention. Fever was reported as a PF by 5% of PWE which is consistent with previous study findings. (Nakken *et al.*, 2005) The erstwhile PF reported in the decreasing order of frequency were fatigue 4 (4%), quarrel 3(3%), painful experience 2(2%) sleep (1%), watching electronic screen (1%), hyperventilation (1%) and alcohol use (1%). The decreased percentage of PWE reporting alcohol use as a PF may be due to the usual reluctance to admit alcohol use.

The study sample identified three PF consistently in the two time frames, the last and past epileptic seizure attack that is sleep deprivation 45(45%), missed medication 21(21%) and emotional stress 17(17%). A prospective study by Tan *et al.* in 2004 to identify the frequency of provocative factors in epileptic patients admitted for seizure revealed that three quarters of admissions were associated with seizure recurrence due to PF and they were missing medication (71%) and sleep deprivation (9%). The study findings are inconsistent with a study by Fang *et al.* (2005) were PWE reported fever and menstruation as the common PF. However, the epilepsies are a

group of heterogeneous disorders with different pathophysiological mechanisms, the inter individual variability in seizure precipitants is not unexpected. The reproducibility and consistency of the above results indicated that many patients truly believe that some factors precipitated their seizures.

The age of PWE were significantly associated with the PF sleep deprivation in the past and last seizure attack ($p=0.05$). The patients who reported sleep deprivation were younger than those who did not (<40 versus >40 , $p=0.05$) and there was no effect on any other factors with demographic and epileptic profile variables. This finding is inconsistent with study by Frucht *et al.* in 2000 which found no effect of age ($p=0.22$) with any PF and patients who noted sleep deprivation were older than those who did not. Gender differences were not significant with regard to the PF ($p=0.15$) as it may be due to inter individual variability and heterogeneous nature of the disease condition.

The order of frequency in which the PF are reported varies in different studies (Da Silva Sousa *et al.*, 2005). As PF are subjective and the existence of these factors are in cluster one related to other so stress, tension, anxiety and many other factors may lead to sleep deprivation in some patients. So the prioritization needs less important than identifying the factors and its prevention. The study results can be generalized to the patients with epilepsy by minimizing inter individual variability through clear fixed definition of factors.

More than one-fourth 37(37%) of PWE are unaware about the PF of seizure. Tan *et al.* in 2005 conducted a similar study on identification of seizure PF and it revealed that non compliance to the anti epileptic drugs was the common factor. Twenty of the noncompliant patient (90.9%) was unaware that poor compliance was the cause of their seizures. Ignorance amongst PWE seems to reflect that a poor level of epilepsy education exist, which throws light on the clinicians and nurses for imparting knowledge regarding PF to the patients. Provision of knowledge will make awareness on PF and its prevention. Thus a teaching module will help the PWE to know regarding PF and its prevention.

Further studies within this largely neglected, but clinically important field of epileptology are clearly needed. Patients with epilepsy achieved surprisingly good results simply by promoting moderate lifestyle changes. These results are in fact better than those achieved by most new anti epileptic drug therapies. Seizure PF should therefore, be taken into account in patient management, including them both in discussions with patients and in tailoring of their treatment regimens. (Aird and Gordon, 1993)

Conclusion

Based on our study findings it can be concluded that PWE believe that their seizures are precipitated by one or another factor but it is difficult to isolate a single or few PF due to the complex interplay of multiple PF. Many PF are potentially preventable through simple education of patients and family members especially sleep hygiene and medication compliance which were reported as the significant PF in our study.

Teaching module may serve as an important means to empower PWE and to reduce the burden of their diseases. Prospective studies can be undertaken to ensure the validity of findings.

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