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Perceived trigger factors of seizures in persons with epilepsy

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ABSTRACT

Purpose: Little is known about the triggering factors (TFs) of seizures in persons with epilepsy (PWE). This study aimed to document the perception of PWE of factors that precipitated their seizures.
Materials and methods: Data was obtained from 405 patients attending the Epilepsy Clinic at the All India Institute of Medical Sciences (AIIMS). This was analyzed using appropriate descriptive and inferential biostatistical methods. A Trigger Assessment Tool (TAT) was designed for this study.
Results: 89% of the participants reported at least one TF. Between one and ten TFs were endorsed. The most common TFs reported by the patients (in descending order) were found to be: Missing medication (40.9%), emotional stress (31.3%), sleep deprivation (19.7%), fatigue (15.3%), missing meals (9.1%), fever (6.4%), and smoking (6.4%). A significant association was seen among some of the commonly reported TFs (missing medication, sleep deprivation, emotional stress, and fatigue).
Conclusion: TFs should be evaluated during the management of PWE. However, self perceived TF should be interpreted with caution and differentiated from actual TF. Future studies may consider empowering patients with avoidance strategies and self-control techniques done.

1. Introduction

Epilepsy is a chronic neurological condition characterized by an enduring propensity to generate seizures and requires prolonged regular medication.[1] According to a World Health Organization (WHO) survey, India alone has approximately eight to ten million people suffering from epilepsy. The risk of developing epilepsy over one's life time is 1.4–3.3%.[2] It is generally accepted that even though most seizures appear to occur spontaneously, they may be precipitated by a variety of endogenous or exogenous factors.[3]

According to Aird and Gordon,[4] precipitating factors are classified into seizure-inducing and seizure-triggering factors. The inducing factors may be environmental or endogenous in origin and cause a transient lowering of the seizure threshold, while the TFs refer to chemical or physiological stimuli that are capable of precipitating a seizure. These triggering factors (TFs), which precede the onset of a seizure, are usually considered by the patient, to precipitate or initiate an episode.[5a,b]

There is limited data available on the triggering factors (TF)[6] and about 1% of the 30,000 epilepsy-related articles refer to this issue. Identification and avoidance of such factors, as an adjuvant to the Antiepileptic Drugs (AED) therapy, may prove beneficial.[7] Recognizing the precipitants may be of interest, as avoidance of stimuli is vital in the management of seizures.[8] This study was designed with an objective of identifying the TFs of seizures in PWE, in the North Indian population.

2. Materials and methods

This study was conducted in the Outpatient Facility of AIIMS, New Delhi, after obtaining due clearance from the Ethics Committee of the Institution. About 100–150 PWE attend this clinic on any given day. Patients were explained the details of the study at length, those who gave consent and met the following inclusion criteria were included in the study: (a) age $\geq$ 9 years, (b) unequivocal diagnosis of epilepsy and its type based on the *International League Against Epilepsy* (ILAE) criteria,[9] and was a clinical diagnosis and (c) literate patients (being able to read and write Hindi or English).

Patients with psychiatric and emotional disturbances were excluded (unreliable responses). A history of other neurological disorders was also taken into consideration, with respect to the common neurological disorders, such as, stroke, dementia, headache disorders, multiple sclerosis, neurological disorders associated with malnutrition, or Parkinson's disease these patients were excluded from the study. To ensure the reliability of the data obtained from children, primary caregivers were actively involved. Data was assembled over a period of seven months, from June to

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December 2010. Patients with psychogenic nonepileptic events were ruled out of the study there events had to be confirmed by a VEEG recording.

2.1. Development and description of the tool

Demographic and clinical data were collected from the patient's medical records. A list of TFs was presented to the patients who were asked to indicate details pertinent to them. In many previous studies, a list of TFs was presented to the patients who were asked to report the factors that precipitated seizures in them. Spatt et al.[8] suggested that the above-mentioned method had difficulty in proving a causal relationship between a potential trigger and a seizure. Also, ruling out mere coincidence between the two was not undertaken in many previous studies. To overcome this problem, a Trigger Assessment Tool (TAT) was developed. The TAT was designed to collect data relevant to the triggering factors in two different groups – the first being the most recent episode and the second included all the previous episodes, as a group. This would enable the patient to relate the events preceding the episodes, and correlate appropriately, reducing the scope for errors or coincidences.

The tool included 38 triggering factors including age and environment and culturally relevant factors which had been previously reported in literature (Table 1). To know the triggers that preceded their last seizure, the same 38 triggers were framed as close-ended questions (yes/no) in a retrospective manner, for example, Did you smoke before your last seizure? Did you consume alcohol before your last episode?

Content validity: Content validity of both tools was established by 4 experts in the field of Neurology. Modifications made as per the suggestions of experts led to a content validity index of 0.97.

Reliability: Reliability of the tool was established by the researcher using test re-test method. The reliability coefficient was found to be, $r = 0.89$. The reliability coefficient for the individual items ranged from $r = 0.88–0.90$.

Tool translation: Both tools were translated into Hindi by experts in Hindi department AIIMS and back translation was done to English and needed correction was made in the Hindi Version.

Tools try out: Both the tools were tried out on 10 subjects prior to use and they were found to be appropriate for the population under study. Time taken for data collection was 30–40 min.

2.2. Statistical analysis

Data from the patient data sheet was analyzed using the SPSS for windows version 13.5 (SPSS Inc., Chicago, IL, USA). The demographic and clinical data were expressed as mean and standard deviation (SD). Wilcoxon signed rank test, the McNemar chi square value was computed to identify the triggering factors reported consistently in the past and last episode. Step-wise forward logistic regression analysis was performed to identify the factors that significantly influenced each trigger. Finally, the Phi coefficient was computed to find out the degree of association between each triggering factor. Level of significance (alpha) was set as <0.05.

3. Results

The questionnaire was applied to 405 PWE. The mean age of the patients at the time of interview was 27.56 years (9–60 years) and the mean age of onset of epilepsy was at 23.12 years (5–50 years). Generalized seizures based on clinical history with or without EEG findings of generalized discharges were seen in 61% of PWE (Table 2).

3.1. Frequency and number of TF

Of the 405 patients who were interviewed, 352 (86.9%) reported at least one identified TF in their past episodes that coincided with the most recent episode. Each patient could identify anywhere between a minimum of one and a maximum of 10 TFs. The TF reported by the patients in the past episodes and the most recent one were not same for all patients. For example, factors like moon cycle variation, heavy meal, and a loud noise, which preceded the most recent episode were not reported by patients as TFs in the past episodes (Table 1). Seven TFs were reported consistently in both (recent and past episodes). These were, missing medication (40.98%), emotional stress (31.35%), sleep deprivation (19.75%), fatigue (15.30%), missing meals (9.13%), fever (6.41%), and smoking (6.41%).

3.2. Logistic regression

Each of the above listed triggers was studied using the logistic regression model with regard to the clinical factors, age group, gender, educational status, seizure type, seizure frequency, duration of illness, and seizure control. Variables like duration of illness, seizure control, and family history of epilepsy significantly correlated with the missed medication.

Table 1
Seizure trigger factors observed in PWE ($n = 405$).

S. No.	Trigger factor	Last seizure, *n* (%)	Previous seizures, *n* (%)
1	AED dose reduction	41 (10.12)	19 (4.69)
2	Alcohol intake	21 (1.76)	9 (2.22)
3	Arithmetic work	0 (0)	0 (0)
4	Caffeine foods	8 (1.97)	9 (2.22)
5	Changing AED	10 (2.46)	12 (2.96)
6	Constipation	9 (2.22)	7 (1.72)
7	Decision-making	12 (1.00)	10 (2.46)
8	Deep thinking	15 (1.26)	36 (8.88)
9	Electronic screen	30 (7.40)	8 (1.97)
10	Emotional stress	181 (44.69)	166 (40.9)
11	Excitement or shock	28 (2.35)	16 (3.95)
12	Fatigue	94 (23.20)	102 (25.18)
13	Fever	39 (9.62)	43 (10.61)
14	Flickering lights	0 (0)	0 (0)
15	Heavy meal	9 (2.22)	0 (0)
16	Heavy physical activity	33 (8.14)	29 (7.16)
17	Hot water bath	0 (0)	0 (0)
18	High Humidity	8 (1.97)	4 (0.98)
19	Hyperventilation	26 (2.18)	24 (5.96)
20	Intense reading	0 (0)	0 (0)
21	Listening to music	0 (0)	0 (0)
22	Loud Noise	6 (1.48)	0 (0)
23	Menstruation	16 (8.83)	24 (13.25)
24	Missing meals	81 (20)	77 (17.28)
25	Missing medication	192 (47.40)	185 (45.6)
26	Moon cycle variation	8 (1.97)	0 (0)
27	Over-the-counter drugs	13 (1.09)	22 (5.43)
28	Pain	32 (7.90)	27 (6.66)
29	Prescribed drug apart from AED	25 (2.10)	0 (0)
30	Quarrel	12 (1.00)	16 (3.95)
31	Sexual activity	13 (1.09)	0 (0)
32	Sleep	70 (17.28)	28 (6.91)
33	Sleep deprivation	120 (29.62)	133 (32.8)
34	Smoking	26 (6.41)	26 (6.41)
35	Specific unusual diet	0 (0)	0 (0)
36	Strobe lights	0 (0)	0 (0)
37	Vomiting/diarrhea/sweating	8 (1.97)	18 (4.4)
38	Weather change	19 (1.59)	185 (45.6)

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