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## **DEVELOPMENT AND TESTING THE PSYCHOMETRIC PROPERTIES OF SEIZURE TRIGGER ASSESSMENT TOOL (STAT)**

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### **ABSTRACT**

Seizure triggers, as being an important preventable factors of seizure is less studied in the past. Identifying the factors which trigger seizure is very difficult as there no such standardized tool available globally. We developed and tested the psychometric property of the Seizure Trigger Assessment Tool (STAT). Validity and reliability of the tool was tested with 150 epilepsy subjects. A total 25 experts validated the face and content validity of tool. The face validity of the tool was found to be good. The content validity of the tool was established by content validity ratio and content validity index. The reliability of the tool was tested by test re test method by employing kappa coefficient and it was found to be good. A simple paper and pencil tool STAT was useful in identifying seizure triggers in people with epilepsy.

**Keywords:** *Trigger, Seizure, Epilepsy, Validity, Reliability*

### **INTRODUCTION**

Epilepsy is a chronic neurologic condition characterized by recurrent, unprovoked seizures requiring continuous medication for long-term management (Berg and Kelly, 2006). According to World Health Organization survey, India alone has approximately 8-10 million people suffering from Epilepsy, the risk of developing Epilepsy over a life time is 1.4 to 3.3% (Satishchandra *et al.*, 2005). Although epilepsy is characterized by recurrent, unprovoked seizures, it is generally accepted that even though most seizures appear to occur spontaneously, they may be precipitated /triggered by a variety of endogenous or exogenous factors (Burdette and Feldman, 1992). Triggering factors (TFs) can be defined as 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 (Nakken *et al.*, 2005). According to Aird and Gordon (1993), seizure precipitants/trigger includes both seizure-inducing and seizure- triggering factors. Inducing factors are of environmental or endogenous origin and cause a transient lowering of the seizure threshold, while triggering factors involve chemical or physiological stimulation capable of precipitating a seizure. The research done related to seizure precipitant is relatively un common with only a small number of studies published over the past 20 years (Jaya and Joanne, 2009) .i.e. Less than 1% of 30,000 epilepsy- related articles have dealt with seizure precipitants, despite the fact that the identification and avoidance of such factors and the development of specific countermeasures constitute an important and underestimated supplement to more traditional epilepsy therapies (Aird, 1983).

Therefore finding such precipitants is both academically intriguing and of practical value as avoiding the stimulus may be a more effective treatment than anticonvulsant medication (Porter, 1984). The major constraint in identifying the seizure precipitant is the methodology. Many previous studies conducted in the past used questionnaire with list of triggering factors which the patients has to choose one, which they perceive to trigger seizure for them. Some researchers used a seizure diary o record triggering factors preceding their seizure. None of the questionnaires done in the past tried to established validity and reliability of these tools. Hence it becomes very difficult for clinician across world to follow a standard tool and methodology to identify these triggering factors in a reliable manner. Hence the current study tried to develop a tool, establish a methodology to identify seizure triggers and to test the psychometric properties of the developed tool.

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### **MATERIALS AND METHODS**

The current study was conducted in an outpatient facility tertiary care hospital of Karaikal, Puducherry Union territory. It is a super specialty hospital which runs epilepsy clinic for people with epilepsy. Each day approximately 50 patients attend the clinic.

We recruited 150 patients who fulfilled the following inclusion criteria (a) age  $\geq 18$  years (b) unequivocal diagnosis of epilepsy based on criteria of ILAE (c) being able to read and write Tamil or English. Patients with intellectual, psychiatric and emotional disturbances that could affect the reliability of their responses were excluded from the study.

#### ***Development of the Tool***

For collecting information on TFs of seizure an extensive literature review was performed, in those literatures, the method used to collect the data about triggers were as follows, a list of triggering factors were given to the patients and they were asked to report the factors that precipitated seizures for them in their past attacks.

According to the Spatt *et al.*, the above method has difficulty in proving a casual relationship between a potential trigger and a seizure and to rule out mere coincidence.

To overcome this problem to some extent, in the present study a 'Seizure Trigger assessment tool' (STAT) was designed to collect data about the triggers in two different episodes in a single point of time i.e. in last seizure attack (seizure which was experienced by the patient during his last episode) and in all past seizure attacks (seizures experienced by the patient in all their past excluding the last episode).

It was designed in such a way due to the fact that patient can able to relate or perceive some factors which precede their seizures in the past attack as their triggers in a situation, but in fact it may be a mere coincidence, so data regarding factors that preceded their seizure in last seizure attack apart from all their past attack will help in minimizing the coincidence that may happen purely because of patient perception.

The triggering factors of seizure were assessed by two questionnaires.

The first tool contained a list of 38 triggering factors reported in literature to trigger seizure (Table 2, 3), using this tool subjects were asked to report their seizure triggers in their all past attack, which they perceive to trigger seizure.

The list of same 38 triggers were used to frame questions and posed to patients to elicit that they had experienced these triggers preceding seizure attack in their last episode.eg. Did you miss medication before your last seizure attack? Etc.

Finally the trigger factor reported by the subjects in both the past and last attack were compared and tested statistically for significant trigger factors reported in both the time (i.e) in both past and last attack. The trigger factor reported significantly both the time was taken as the trigger factors of seizure.

This methodology will prevent relying purely on patient report and also mere coincidence in patient relating specific triggers.

#### ***Statistical Analysis***

The demographic characteristics of the subjects were presented as frequency and percentage.

To determine the validity of the subjects content validity ratio and content validity index was computed. For determining reliability test re test was used by employing kappa coefficients.

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**RESULTS AND DISCUSSION**

**Results**

**Table 1: Epileptic profile of the patients with epilepsy n= 150**

<b>Epileptic profile</b>	<b>Frequency (%)</b>
Age of onset of illness (Mean ± SD), (Min-Max)	23.12 ± 13.92 (18-50)
Sex	
• Male	102(68)
• Female	48(32)
Seizure type	
• Focal	72 (48)
• Generalized	78 (52)
Frequency of seizure	
• ≤ 2 per month	56(37.3)
• > 2 per month	94 (62.7)
Duration of illness	
• ≤ 5 years	101 (67.3)
• >5 years	49 (32.7)
Duration of AED in years (Mean ± SD), (Min-Max)	4.55 ± 3.600 (1-11)
Family history of epilepsy	
• Yes	93 (60.2)
• No	57 (39.8)
History of Neurological illness	
• Yes	69 (46)
• No	81(54)
Type of AED	
• Monotherapy	81(54)
• Polytherapy	69(46)
Seizure control	
• Active epilepsy <sup>i</sup>	89(59.3)
• Epilepsy on remission <sup>ii</sup>	61 (40.7)

Of the total 150 subjects participated majority composed of male (68%), the mean age of the subjects were 23.12 with a range from 18-50 years. Almost focal and generalized seizure patients were equal in number 48% and 52 % respectively. More detail can be found in Table 1.

**Validity of the Seizure Trigger Assessment Tool (STAT)**

**Face Validity**

Face validity of the tool was done by giving the tool to 20 experts working in the field of epilepsy and asked about the appropriateness by seeing the tool. All experts (100%) accepted the tool to be appropriate to measure the concept it intended to measure.

**Content Validity of the Tool**

Content validity of the tool was assessed by giving the tool to 25 experts (5 epileptologist, 5 neurologists, 5 nursing faculty, 5 clinical nurse, and 5 physicians). Majority of the experts were male (18 out of 25), with mean professional experience of 10.2 years. The items in the tool were asked to rate by every expert in the following criteria used by Lawshe (1975) a) essential b) useful but not essential, c) not useful.

The above criteria were used to judge the content validity of each item of the tool.

Content validity was measured by computing content validity ratio and content validity index.

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Content validity ratio was computed by the following formula

$$CVR = \frac{n_e - \frac{N}{2}}{\frac{N}{2}}$$

**Table 2: Content validity ratio of the STAT n=25 (Experts)**

S. no	Seizure precipitants asked about	STAT (Past Seizure )	STAT (Last Seizure)
1	Weather change	0.56	0.69
2	Smoking	1	1
3	Alcohol intake	0.84	0.85
4	Fever	0.96	0.92
5	Missing AED	0.76	0.70
6	Changing AED	1	0.98
7	AED dose reduction	0.81	0.83
8	Emotional stress	0.87	0.89
9	Missing meals	0.86	0.85
10	Heavy meal	0.93	0.97
11	Watching Electronic screen	0.72	0.76
12	Hyperventilation	1	1
13	Moon cycle	0.56	0.59
14	Heavy Noise	0.64	0.71
15	Heavy physical activity	0.76	0.68
16	Over the counter drug	0.61	0.65
17	Prescribed drug apart from AED	0.96	0.72
18	Caffeine foods	0.81	0.96
19	Constipation	0.89	0.9
20	Sleep	0.75	0.63
21	Sleep deprivation	1	1
22	Flickering lights	1	1
23	Strobe lights	0.65	0.56
24	Quarrel	0.61	0.64
25	Deep thinking	0.56	0.86
26	Decision making	0.85	0.94
27	Arithmetic work	0.53	0.63
28	Hearing music	0.56	0.65
29	Intense reading	0.86	0.65
30	Menses	0.95	0.96
31	Hot water bath	0.85	0.86
32	Painful stimuli	0.75	0.76
33	Fatigue	0.76	0.75
34	Vomiting/diarrhea/sweating	0.86	0.87
35	Excitement or shock	0.75	0.72
36	Specific unusual diet	0.82	0.83
37	Genderual activity	0.65	0.68
38	Humidity	0.65	0.73

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**Table 3: Reliability coefficient of the STAT n= 150**

S.no	Seizure precipitants asked about	STAT (Past Seizure )	STAT (Last Seizure)
1	Weather change	0.66	0.62
2	Smoking	0.99	0.99
3	Alcohol intake	0.81	0.83
4	Fever	0.92	0.96
5	Missing AED	0.86	0.80
6	Changing AED	1	0.95
7	AED dose reduction	0.71	0.83
8	Emotional stress	0.77	0.85
9	Missing meals	0.82	0.95
10	Heavy meal	0.91	0.95
11	Watching Electronic screen	0.82	0.76
12	Hyperventilation	0.86	0.91
13	Moon cycle	1	1
14	Heavy Noise	0.64	0.71
15	Heavy physical activity	0.76	0.68
16	Over the counter drug	0.61	0.65
17	Prescribed drug apart from AED	0.96	0.72
18	Caffeine foods	0.81	0.96
19	Constipation	0.89	0.9
20	Sleep	0.75	0.63
21	Sleep deprivation	1	1
22	Flickering lights	1	1
23	Strobe lights	0.75	0.76
24	Quarrel	0.71	0.74
25	Deep thinking	0.86	0.86
26	Decision making	0.82	0.91
27	Arithmetic work	0.76	0.75
28	Hearing music	0.71	0.65
29	Intense reading	0.85	0.85
30	Menses	0.78	0.79
31	Hot water bath	0.85	0.86
32	Painful stimuli	0.75	0.76
33	Fatigue	0.76	0.75
34	Vomiting/diarrhea/sweating	0.82	0.87
35	Excitement or shock	0.77	0.82
36	Specific unusual diet	0.85	0.93
37	Genderual activity	0.75	0.68
38	Humidity	0.85	0.83

Where in which the  $n_e$  is the number of panelists indicating "essential" and N is the total number of panelists. The minimum value of CVR to be significant with 25 experts is 0.37.

The content validity ratio for the Seizure Trigger Assessment Tool can found in the Table 2. The content validity ratio for all the items was found to be good with a minimum of 0.56 to a maximum of 1 for all items indicating a good content validity ratio. Finally the content validity index was calculated by taking

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the mean of all the content validity ratio of the tool and it was found to be good with mean of 0.79 and 0.81 for the two tools (Past seizure and last seizure).

#### **Reliability of Seizure Trigger Assessment Tool**

The reliability of the tool was assessed by test re test method. The STAT was administered on every subject while their visit to epilepsy clinic and the same STAT was again administered at one week interval. Kappa coefficient was calculated in identifying the level all of agreement among all items in two times. The kappa coefficient for the overall STAT was good with a minimum of 0.61 to a maximum of 1 for all the items.

#### **Discussion**

Triggering factors of seizure are an important area to be explored in every patient, since they are preventable factors of seizure in people with epilepsy. A simple paper and pencil tool was developed and tested for its psychometric properties, so that its use can be standardized and used globally by every clinician. In the present study we tried to standardize not only the tool but also the methodology of identifying the seizure triggers, which adds strength to the study. Though many previous studies used their own tool for identifying the seizure trigger, this is the first of its kind to be standardized statistically.

#### **Conclusion**

Most of the people with epilepsy believe that their seizures are triggered by one or another factor. Different factors may interplay together to produce seizure in people with epilepsy. A simple paper and pencil STAT could able to elicit seizure triggers in a reliable way. It may helpful for both the clinician as well as patients to identify the triggering factors of seizure and to prevent those factor to avoid seizures.

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