

# Knowledge, Attitude and Practice on Dental Issues in Persons with Epilepsy

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## ABSTRACT

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**Background and Objective:** Epilepsy is a common neurological disorder with significant disabilities. Persons with epilepsy is considered to have poor dental hygiene. It is due to multifactorial causations. Studies regarding the attitude of neurologists and dentists and knowledge of patients is limited.

**Methods:** This is a questionnaire based cross sectional study of patients diagnosed with epilepsy treated in Sree Chitra Tirunal Institute of Medical Sciences and Technology. Attitude and practice of neurologists and dentists towards the dental health issues in persons with epilepsy were studied via an online questionnaire.

**Results:** A total of 111 dentists, 106 neurologists and 82 patients were enrolled in the study. Out of the 106 neurologists, 73 (68.9%) opined that a person with epilepsy has increased risk of dental health issues, while 22.6% opined same risk compared to normal population. The opinion of neurologists regarding fitness for dental procedures: 57.1 % gives fitness only in controlled epilepsy while 33.3 % opined that they give fitness for all cases regardless of control of epilepsy. 40.6% opined that refractory epilepsy has a link to periodontal diseases. Among dentists, 17.6 % dentists refer to alternate higher centre, if patient had seizures in the past. 80.9 % ask for history of seizures, in their dental patient in their consulting room, while 19.1 % does not ask. 46.8% of dentists ask for history of antiseizure medications when they see an oral pathology, while 13.8% does not ask for such history, and 39.4% ask only if he has history of seizures. Most dentists (34.9%) opined that anxiety was the most common issue faced during the procedure in persons with epilepsy and 24.8% opined gum bleeding as the major issue. Out of 82 persons with epilepsy, 78 believes in keeping the mouth clean is essential while 4 were unaware. 24 people opined they experience nervousness while on dental chair, and 10 people fear being there and 46 have no such difficulties. 27 people takes preventive measures if they notice a dental caries to prevent further decay, 18 will wait and watch, 34 will consult dentist at the earliest, while a single person answered that he would ask the neurologist for his/her opinion.

**Conclusion:** The neurologists should give importance in enquiring the dental health problems and should advise for routine dental health check-ups for persons with epilepsy. In addition, dentists should be educated in doing emergency measures during a seizure episode and should not defer patients from doing dental procedures due to history of seizures.

**Keywords:** Epilepsy, Dental issues, Knowledge, Attitude, Practice

\*See End Note for complete author details

## INTRODUCTION

Epilepsy is the second most neurological disorder with significant disabilities. Around 70 million persons with epilepsy (PWE) are there worldwide. Out of this, 12 million PWE are from India.<sup>1</sup> Epilepsy patients are generally considered to have poor dental hygiene. It leads to an increase in the periodontal illness, dental caries and various other complications.<sup>2</sup> It is under recognised and studies in this field are limited.

Oral health is an important aspect of general health and well-being of an individual.<sup>3</sup> Even though, oral diseases affect all the age groups, it is more common among children and elderly.<sup>4</sup> Persons with epilepsy have multiple dental health issues, which may be due to anti seizure medications, trauma due to seizures, mental sub-normality, poor socioeconomic status etc. Among the dental diseases; dental plaques, caries, fracture due to seizures etc are the most common.<sup>5,6</sup>

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Table 1. Neurologists' questionnaire	
1	Do you feel dental health issues are more in Persons with Epilepsy (PWE)?
	a. Increased
	b. Same as normal individual
	c. Reduced
	d. Not sure
2	Do you recommend routine dental health check-up for PWE?
	a. Yes
	b. No
	c. Not sure
3	If so, frequency
	a. Yearly once
	b. Once every 6 months
	c. Once every 3 months
	d. I am not sure of it
4	What are the commonest dental diseases in PWE
	a. Dental caries
	b. Gingivitis
	c. Gum hypertrophy
	d. Others
5	Do you ask in consultation regarding any dental health issues, if patient didn't report on their own?
	a. Yes
	b. No
	c. Not sure
6	If patient reports to have a dental issue, what will be your response?
	a. Giving symptomatic medication
	b. Advise dentist consultation
	c. Not a matter of great concern, hence shall counsel the patient
	d. Not sure as to what is the right choice
7	If a dentist asks for fitness for a dental procedure, what will be your response?
	a. Will give only if epilepsy is controlled
	b. Will give for all cases
	c. Will ask to take only symptomatic conservative management
	d. Not quite sure as to how to proceed
8	Do you prefer to change anti seizure medications, prior to dental procedures?
	a. Yes
	b. No
	c. Not sure
9	If so, which drugs you prefer to change?
	a. Shall keep the same drug(s)
	b. Not sure if I should change
	c. Any older or newer drug used in epilepsy
	d. None
10	Which group of anti seizure medication has more chance of dental health issues?
	a. Not sure
	b. Old generation
	c. Both old and new are unsafe

11	You prefer which form of anti seizure medication?
	a. Syrup
	b. Tablet form
	c. Both are safe
	d. Both are unsafe
	e. Not sure
12	If patient has dental issues due to anti seizure medication, will you change anti seizure medication?
	a. Yes
	b. No
	c. Not sure
13	Do you feel refractory epilepsy has a link to periodontal diseases?
	a. Yes
	b. No
	c. Not sure
14	After a seizure, do you examine the oral cavity as a routine?
	a. Yes
	b. No
	c. Not sure
	d. Don't think it is mandatory
15	If patient had tongue bite after seizure, what will be your advice?
	a. Yourself prescribe symptomatic medication
	b. Doesn't give importance for it.
	c. Refer to Dentist/ENT specialist
	d. Not sure what is the right choice

The other side of the spectrum is the dilemma a dentist faces in the dental treatment of PWE. Persons with epilepsy are prone to develop seizures due to local anaesthetics/antibiotics used.<sup>7</sup> In addition, there is chance of gum bleeding also due to certain antiseizure drugs (ASDs).<sup>8</sup> Dentists prefer to avoid procedures on PWE as much as possible fearing that a seizure can be triggered at any time and any untoward complications of ASDs can happen any time during or after the procedure. This adds to the burden of poor dental health in persons with epilepsy.

## OBJECTIVES

To find out the dental hygiene practices and dental health knowledge in persons with epilepsy

To find out the knowledge, attitude and practice of neurologists and dentists towards the dental health issues in persons with epilepsy

## MATERIALS AND METHODS

### Study setting

This is a questionnaire based cross sectional study of persons diagnosed with epilepsy treated at the R.

Table 2. Patients' Perspective	
1	Do you believe in keeping your mouth clean?
	a. Yes
	b. Sometimes
	c. No
2	Teeth should be cleaned or not?
	a. Twice a day
	b. Once a day
	c. When I can
3	How long do you brush your teeth?
	a. 1-2 minutes
	b. 2-3 minutes
	c. More than 3 minutes
4	Do you use other aids for cleaning your mouth?
	a. Mouthwash
	b. Floss
	c. Toothpick
	d. Others
5	What do you do when you notice a tooth with caries in your mouth?
	a. Take preventive measures
	b. Wait and watch
	c. Visit a dentist as soon as possible
6	Have you had difficulty doing your usual jobs because of problems with your teeth or mouth?
	a. Yes
	b. Sometimes
	c. No
7	How do you feel when you are waiting for treatment in a dental chair?
	a. Nervous
	b. Calm
	c. Scared
8	How many dental treatments have you undergone in the past year?
	a. More than one
	b. More than three
	c. More than six
9	Do you feel unusually stressed during treatment?
	a. Yes
	b. Sometimes
	c. Always
	d. No
10	Do you take your medicine before going for any dental treatments?
	a. Yes
	b. Sometimes
	c. No
11	How do you feel after your dental appointment?
	a. Relieved it's over
	b. Satisfied with the treatment
	c. Disappointed with the service
12	Oral health is as important as overall health?
	a. Yes
	b. No

13	Do you go for routine dental check-ups?
	a. Yes
	b. No
14	According to you, what is the ideal time to visit a dentist?
	a. Once every 3 months
	b. Once every 6 months
	c. Once a year
	d. Only when I have pain
15	You prefer tablet or syrup form of medications?
	a. Tablet
	b. Syrup

Madhavan Nayar Centre for Comprehensive Epilepsy Care, Sree Chitra Tirunal Institute for Medical Sciences and Technology. The Knowledge, Attitude and Practice(KAP) of neurologists and dentists on the dental health issues of PWE were analysed. Patients coming to epilepsy clinic and those admitted in epilepsy ward was given a questionnaire regarding the dental hygiene and dental health issues they have. Attitude and practice of neurologists and dentists towards the dental health issues in persons with epilepsy was studied via online questionnaires. The Institute Ethics Committee approved the study.

### Sample size

A total of 111 dentists, 105 neurologists and 82 patients were enrolled in the study. All patients with epilepsy, coming to epilepsy clinic and those admitted in epilepsy ward were included. Neurologists and Dentists from India were enrolled via google form online questionnaire.

### Study variables

Questionnaire for Neurologists is given in **Table 1**, while **Table 2** contains Questionnaire for patients and **Table 3** contains questionnaire for dentists

### Statistical analysis

Informed written consent was obtained from all patients enrolled in the study. Data was analysed using SPSS version 27 and Microsoft excel softwares. Frequency of the variables were studied and tables and charts were made from the available data.

## RESULTS

A total of 111 dentists, 106 neurologists and 82 patients were enrolled in the study.

Out of the 106 neurologists, (**Table 4**) 73 (68.9%) opined that persons with epilepsy have increased risk

**Table 3. Dentists' Perspective**

1	Do you ask for history of seizures routinely in your history taking?
	a. Yes
	b. No
2	Do you ask for the antiepileptic medication history, when you see an oral pathology, as a routine?
	a. Yes
	b. No
	c. Only if patient tells history of seizures
3	If patient had a history of seizure(s) which is controlled on anti seizure medication, how do you grade them?
	a. High risk
	b. Moderate risk
	c. Low risk
	d. Not sure
4	Do you ask for fitness from neurologist prior to dental procedures?
	a. Only for refractory epilepsy cases
	b. Only for some cases
	c. Doesn't take for all
	d. I do not know what is to be done
5	Have you referred PWE to alternate center, just because they had history of epilepsy?
	a. Yes
	b. Not always, but at times
	c. No
6	Do you ask to change anti seizure medication prior to dental procedures?
	a. Yes
	b. No
	c. Not aware of it
	d. Not sure of the real answer of it
7	If yes, which all drugs?
	a. ....
8	You prefer brushing of teeth how frequently for PWE?
	a. Daily once
	b. Daily twice
	c. After each meal
	d. Not sure of the real answer of it
9	You ask neurologist's opinion for change of anti seizure medications, if the epilepsy is well controlled and have dental issues?
	a. Yes
	b. No
	c. Not sure
10	You prefer routine health check up for PWE how frequently?
	a. Yearly once
	b. Once in 6 months
	c. Once in 3 months
	d. Only if symptomatic
11	Most common issue you faced during a dental procedure in a PWE?
	a. Seizure
	b. Anxiety

	c. Gum bleeding
	d. Others
	e. I have no experience
12	What is the most common dental health issue in PWE according to you?
	a. Dental caries
	b. Gingival hyperplasia
	c. Periodontal infections
	d. Others
	e. No increased risk
13	What is the common cause of increase in dental issues in PWE?
	a. Poor dental hygiene
	b. ASD
	c. Epilepsy as such can cause
	d. Mental subnormality
14	If your patient got an infection sensitive only to antibiotics that reduces seizure threshold like Quinolones, will you use it?
	a. Yes
	b. No
	c. Am not aware of any such interaction
15	Mode of anesthesia you prefer in PWE?
	a. No anesthesia
	b. Local anesthesia
	c. Intravenous
	d. General anesthesia
	e. No definite consensus as far as I know

of dental health issues, while 22.6% opined same risk compared to normal population. 50 neurologists (47.2%) recommend routine dental health check-up for Persons with PWE, while 47 responded against and 9 were not sure of the answer. Out of those who suggest routine dental check-up, 35(44.3%) opined for yearly once check-up. 63(59.4%) neurologists opined they did not ask for history of dental issues in routine follow-up, while 37 (34.9%) opined that they ask for dental health issues routinely. Among the commonly reported problems, most opted for dental caries and gingival diseases. 92.5% of neurologists advises consultation of dentist, if patient reports to have dental issues, while 2.8% gives symptomatic treatment by self, and 1.9% just give counselling that it is not a matter of great concern.

The opinion of neurologists regarding fitness for dental procedures were also studied. 57.1 % gives fitness only in controlled epilepsy while 33.3 % opined that they gives fitness for all cases regardless of control of epilepsy.

97.2 % opined against changing the antiseizure medication prior to dental procedures while 1.9% prefers to change. 94 neurologists opined that old generation

Table 4. Neurologists' Perspective			
No	Question	N	%
1	Do you feel dental health issues are more in Persons with Epilepsy (PWE)?		
	a. Increased	a. 73	a. 69.5%
	b. Same as normal individual	b. 23	b. 21.9%
	c. Reduced	c. 1	c. 1%
	d. Not sure	d. 8	d. 7.6%
2	Do you recommend routine dental health checkup for PWE?		
	a. Yes	a. 50	a. 47.6%
	b. No	b. 46	b. 43.8%
	c. Not sure	c. 9	c. 8.6%
3	If so, frequency		
	a. Yearly once	a. 35	a. 33.3%
	b. Once every 6 months	b. 17	b. 16.2%
	c. Once every 3 months	c. 1	c. 1%
	d. I am not sure of it	d. 26	d. 24.8%
4	What are the commonest dental diseases in PWE		
	a. Dental caries	a. 31	a. 29.5%
	b. Gingivitis	b. 12	b. 11.42%
	c. Gum hypertrophy	c. 17	c. 16.19%
	d. Others	d. 5	d. 4.761%
5	Do you ask in consultation regarding any dental health issues, if patient does not report themselves??		
	a. Yes	a. 37	a. 35.2%
	b. No	b. 62	b. 59%
	c. Not sure	c. 6	c. 5.7%
6	If patient reports to have dental issues, your response?		
	a. Giving symptomatic medication	a. 3	a. 2.9%
	b. Advise dentist consultation	b. 97	b. 92.4%
	c. Not a matter of great concern, hence shall counsel the patient	c. 2	c. 1.9%
	d. Not sure as to what is the right choice	d. 3	d. 2.9%
7	If dentist ask for fitness for procedure, your response?		
	a. Will give only if epilepsy is controlled	a. 59	a. 56.2%
	b. Will give for all cases	b. 2	b. 1.9%
	c. Will ask to take only symptomatic conservative management	c. 6	c. 5.7%
	d. Not quite sure as to how to proceed	d. 2	d. 1.9%
8	Do you prefer to change ASD, prior to dental procedures?		
	a. Yes	a. 2	a. 1.9%
	b. No	b. 102	b. 97.1%
	c. Not sure	c. 1	c. 1%
9	If so, which drugs you prefer to change?		
	a. Shall keep the same drug(s)	a. 68	a. 64.8%
	b. Not sure if I should change	b. 16	b. 15.2%
	c. Any older or newer drug used in epilepsy	c. 3	c. 2.9%
	d. None	d. 2	d. 2%
10	Which group of ASD has more chance of dental health issues?		
	a. Not sure	a. 11	a. 10.5%
	b. Old generation	b. 93	b. 88.6%
	c. Both old and new are unsafe	c. 1	c. 1%

11	You prefer which form of ASD?		
	a. Syrup	a. 1	a. 1%
	b. Tablet form	b. 69	b. 65.7%
	c. Both are safe	c. 33	c. 31.4%
	d. Both are unsafe	d. 1	d. 1%
12	If patient has dental issues due to ASD, will you change ASD ?		
	a. Yes	a. 82	a. 78.1%
	b. No	b. 11	b. 10.5%
13	Do you go for routine dental check-ups?		
	a. Yes	a. 43	a. 41%
	b. No	b. 14	b. 13.3%
14	After a seizure, you used to examine for oral cavity as a routine?		
	a. Yes	a. 69	a. 65.7%
	b. No	b. 23	b. 21.9%
	c. Not sure	c. 2	c. 1.9%
15	If patient had tongue bite after seizure, what will be your advise?		
	a. Yourself prescribe symptomatic medication	a. 84	a. 80%
	b. Doesn't give importance for it.	b. 1	b. 1%
	c. Refer to Dentist/ENT specialist	c. 17	c. 16.2%
	d. Not sure what is the right choice	d. 3	d. 2.9%

antiseizure medications are more associated with dental health issues while a single person reported that both new and old generation as unsafe and 11 were not sure of the answer.

70 neurologists opined that they prefer tablet form of antiseizure medications, while 33 prefer both tablet and syrup form. 83 neurologists opined in favour of changing antiseizure medication, if patient has dental issues due to the medication, while 11 would continue the same medications and 11 were not sure of the decision. 49 neurologists were not sure of the relationship of periodontal diseases with epilepsy, while 43 opined that there is relationship, while 14 opined against.

40.6% neurologists opined refractory epilepsy has a link to periodontal diseases while 13.2% opined against and 46.2% were unsure about their opinion.

70 neurologists used to examine the oral cavity routinely after a seizure, while 23 never did so and 11 opined it is not mandatory. 84 neurologists gives self treatment for tongue bite after seizure, while 18 refer to dentist/ENT specialist for the same.

A total of 111 dentists were included in the study, (Table 5) 80.9 % ask for history of seizures, while

Table 5. Dentists' Perspective			
No	Question	N	%
1	Do you ask for history of seizures routinely in your history taking?		
	a. Yes	a. 89	a. 18.9%
	b. No	b. 21	b. 80.2%
2	Do you ask for the Antiepileptic medication history, when you see an oral pathology, as a routine?		
	a. No	a. 15	a. 13.5%
	b. Only if patient tell h/o seizures	b. 43	b. 38.7%
	c. Yes	c. 51	c. 45.9%
3	If patient had h/o seizures which is controlled on ASD, you grade them as ?		
	a. High risk	a. 25	a. 22.5%
	b. Moderate risk	b. 10	b. 9%
	c. Low risk	c. 67	c. 60.4%
	d. Not sure	d. 6	d. 5.4%
4	Do you ask for fitness from neurologist prior to dental procedures?		
	a. Only for refractory epilepsy cases	a. 54	a. 48.6%
	b. For all cases with epilepsy	b. 42	b. 37.8%
	c. Doesn't take for all	c. 13	c. 11.7 %
	d. I do not know what is to be done	d. 1	d. 0.9%
5	Have you referred PWE to alternate center, just because they had history of epilepsy ?		
	a. Yes	a. 19	a. 17.1%
	b. Not always, but at times	b. 19	b. 17.1%
	c. No	c. 70	c. 63.1%
6	Do you ask to change ASD prior to dental procedures?		
	a. Yes	a. 20	a. 18%
	b. No	b. 20	b. 18%
	c. Not aware of it	c. 66	c. 59.5%
7	If yes, which all ASDs?		
	a. Phenytoin	a. 12	a. 10.8%
	b. Carbamazepine	b. 5	b. 4.5%
	c. Not answered	c. 76	c. 68.5%
8	You prefer brushing of teeth how frequently for PWE?		
	a. Daily once	a. 8	a. 7.2%
	b. Daily twice	b. 67	b. 60.4%
	c. After each meal	c. 18	c. 16.2%
	d. Not sure of the real answer of it	d. 16	d. 14.4%
9	Do you ask a Neurologist's opinion for change of ASD, if they have well controlled epilepsy and has dental issues?		
	a. Yes	a. 52	a. 46.8%
	b. No	b. 43	b. 38.7 %
	c. Not sure	c. 14	c. 12.6%
10	You prefer routine health check up for PWE, if so how frequently?		
	a. Yearly once	a. 15	a. 13.5%
	b. Once in 6 months	b. 55	b. 49.5%
	c. Once in 3 months	c. 31	c. 27.9%
	d. Only if symptomatic	d. 4	d. 3.6%
11	Most common issue you faced during a dental procedure in a PWE?		
	a. Seizure	a. 10	a. 9%
	b. Anxiety	b. 38	b. 34.2%

	c. Gum bleeding	c. 27	c. 24.3%
	d. Others	d. 8	d. 7.4%
	e. I have no experience PWE	e. 26	e. 23.4%
12	Whether Persons with epilepsy has increased risk of dental health issue. Yes or No. If yes mention the most common one		
	a. Dental caries	a. 6	a. 5.4%
	b. Gingival hyperplasia	b. 39	b. 35.1%
	c. Periodontal infections	c. 11	c. 9.9%
	d. Others	d. 47	d. 42.4%
	e. No increased risk	e. 8	e. 7.2%
13	What is the common cause of increase in dental issues in PWE?		
	a. Poor dental hygiene	a. 31	a. 27.9%
	b. ASD	b. 64	b. 57.7%
	c. Epilepsy as such can cause	c. 5	c. 4.5%
	d. I do not know the real reason	d. 7	d. 6.3%
14	If your patient got an infection sensitive only to antibiotics that reduces seizure threshold like Quinolones, will you use it?		
	a. Yes	a. 12	a. 10.8%
	b. No	b. 52	b. 46.8%
	c. Am not aware of any such interaction	c. 38	c. 34.2%
15	Mode of anesthesia you prefer in PWE?		
	a. No anesthesia	a. 4	a. 3.6 %
	b. Local anesthesia	b. 61	b. 55%
	c. Intravenous sedation	c. 12	c. 10.8%
	d. General anesthesia	d. 18	d. 16.2%
	e. No definite consensus as far as I know	e. 11	e. 9.9%

19.1 % does not enquire about the history of seizures. 46.8% of dentists ask for history of antiseizure medications when they see an oral pathology, while 13.8% does not ask for such history, and 39.4% ask only if he/she has had history of seizures.. 49.1% dentists ask for neurologist fitness for refractory cases only, while 38.2% ask fitness for all persons with epilepsy, while 11.8% does not take neurologist fitness for any cases with epilepsy.

If patient had h/o seizures which is controlled with antiseizure medications, then 23.1% dentists grade them as high risk, 62% graded as moderate risk, while 9.3% graded as low risk and 5.6% were not sure of the response to be given.

17.6 % dentists refer to alternate higher centre, if patient had seizures in past. 64.8 % does not refer to alternate centre. 17.6 % refer only at times.

47.7 % ask neurologist opinion for change of Antiseizure medications, even if they were well controlled epilepsy and has dental issues. 39.4 % does not ask for change of antiseizure medications.

Most of the dentists (50%) prefer yearly twice dental check-up for patients with epilepsy, while 13.6 %

Table 6. Patients' Perspective			
No	Question	N	%
1	Do you believe in keeping your mouth clean?		
	a. Yes	a. 77	a. 95.1%
	b. Sometimes	b. 4	b. 4.9%
	c. No	c. 0	c. 0%
2	Teeth should be cleaned or not?		
	a. Twice a day	a. 45	a. 55.6 %
	b. Once a day	b. 30	b. 37 %
	c. Whenever I can	c. 6	c. 7.4%
3	How long do you brush your teeth?		
	a. 1-2 minutes	a. 20	a. 24.7%
	b. 2-3 minutes	b. 35	b. 43.2%
	c. More than 3 minutes	c. 26	c. 32.1%
4	Do you use other aids for cleaning your mouth?		
	a. Mouth wash	a. 22	a. 27.2%
	b. Floss	b. 4	b. 4.9%
	c. Tooth pick	c. 20	c. 24.7%
	d. Other	d. 35	d. 43.2%
5	What do you do when you notice a tooth with caries in your mouth?		
	a. Take preventive measures	a. 28	a. 34.5%
	b. Wait and watch	b. 18	b. 22.2%
	c. Visit a dentist soon as possible	c. 35	c. 43.2%
6	Have you had difficulty doing your usual jobs because problems with your teeth or mouth?		
	a. Yes	a. 10	a. 12.3%
	b. Sometimes	b. 17	b. 21.1%
	c. No	c. 54	c. 66.7%
7	How do you feel when you are waiting for treatment in a dental chair?		
	a. Nervous	a. 24	a. 29.6%
	b. Calm	b. 45	b. 55.5%
	c. Scared	c. 10	c. 12.3%
8	How many dental treatments have you undergone in the past year?		
	a. More than one	a. 36	a. 45.7%
	b. More than three	b. 10	b. 12.3%
	c. More than six	c. 34	c. 42%
9	Do you feel unusually stressed during treatment?		
	a. Yes	a. 8	a. 9.9%
	b. Sometimes	b. 26	b. 32.1%
	c. Always	c. 2	c. 2.5 %
	d. No	d. 44	d. 54.3%
10	Do you take your antiseizure medicines before going for any dental treatments?		
	a. Yes	a. 33	a. 40.6%
	b. Sometimes	b. 14	b. 17.3%
	c. No	c. 34	c. 42%
11	How do you feel after your dental appointment?		

	a. Relieved it's over	a. 27	a. 33.3%
	b. Satisfied with the treatment	b. 50	b. 61.7%
	c. Disappointed with the service	c. 4	c. 4.9%
12	Oral health is as important as overall health?		
	a. Yes	a. 72	a. 88.9%
	b. No	b. 6	b. 7.4%
	c. Not sure	c. 2	c. 2.5%
13	Do you go for routine dental check-ups?		
	a. Yes	a. 16	a. 19.8%
	b. No	b. 65	b. 80.2%
14	According to you, what is the ideal time to visit a dentist?		
	a. Once every 3 months	a. 8	a. 9.9%
	b. Once every 6 months	b. 13	b. 16.0%
	c. Once a year	c. 11	c. 13.6%
	d. Only when I have pain	d. 49	d. 60.5%
15	You prefer tablet or syrup form of medications?		
	a. Tablet	a. 68	a. 84%
	e. Syrup	e. 13	e. 16%

opined for yearly once and 28.2% opined for once in 3 months.

Most dentists (34.9%) opined that anxiety was the most common issue faced during the procedure in PWE. 24. 8% opined gum bleeding as the most common problem, while seizures were the major reason for worry in 9.2%.

As a response to the question on common cause of increase in dental health issues in persons with epilepsy, 57.7% of dentists opined that antiseizure medications are the most common cause, while 27.9% opined poor dental hygiene as the cause.

If patient got an infection sensitive only to antibiotics that reduces seizure threshold like Quinolones, 51% of dentists opined that they prefer to use other antibiotics, while 37.3% will go ahead with quinolone, while 11.8% are unaware of such interactions.

55% dentists prefer local anaesthesia for dental procedures, 16.2% prefer general anesthesia, 10.8% prefer intravenous sedation. 9.9% opined that they were unaware of any definite consensus, 3.6% opined that no anesthesia was needed.

A total of 82 persons with epilepsy were included in the study. (Table 6) Out of 82 PWE, 78 believes keepin the mouth clean as essential while 4 were not knowing the same. 45 people opined about cleaning teeth twice daily, while 28 opined in favour of cleaning once daily, and 6 were cleaning the teeth whenever they can do it.

20 persons opined they spent 1-2 minutes for cleaning the teeth while, 35 spent 2-3 minutes for cleaning and 25 opined that they spent more than 3 minutes for cleaning their teeth.

27 people takes preventive measures if they notice a dental caries to prevent further decay, 18 opined for wait and watch policy, 34 will consult dentist at the earliest, while a single person alone wanted to seek the opinion of a neurologist. 11 people felt difficulty to do routine work/job due to dental issues, while 17 occasionally felt difficulties in daily routine, 53 did not report any difficulties in life due to dental issues.

24 people experienced nervousness while on dental chair, and 10 people feared being there and 46 had no such difficulties.

32 people takes antiseizure medications before going for dental procedures. 15 people takes it sometimes and 34 people does not take medications.

## DISCUSSION

Schipper et al studied the attitude of neurologists towards dental care of persons with epilepsy and dentists' attitude towards treating persons with epilepsy. It was found that dentists need to know more with respect to treating patients with seizures. They should know more regarding drug interactions and also the special care needed to be implemented for persons with epilepsy. Beyond that, it would be desirable for neurologists to take more time to answer their patients' questions regarding dental care. They also found that some patients refused dental treatment due to epilepsy, while many needed to know more information prior to the procedures.<sup>9</sup>

In our study, out of the 106 neurologists, 73 (68.9%) opined that PWE have increased risk of dental health issues, while 22.6% opined same risk compared to normal population. 50 neurologists (47.2%) recommend routine dental health check-up for PWE, while 47 responded against and 9 were not sure of the answer. The opinion of neurologists regarding fitness for dental procedures were also studied. 57.1 % gives fitness only in controlled epilepsy while 33.3 % opined that they gives fitness for all cases regardless of control of epilepsy. Among dentists, in our study, we found that if patient had history of seizures which is controlled on ASD, 23.1 % grade them as high risk, 62 % as moderate risk, 9.3% report as low risk, while 5.6% were not sure of the response.

Aragon et al conducted a study regarding the attitude of dentists towards epilepsy patients. They found that knowledge was patchy about the epidemiology, causes, treatment and recognition of epilepsy. Six percent of dentists did not think that they could safely treat a PWE in their offices.<sup>7</sup> In our study, 17.6 % dentists refer to alternate higher centres, if patient had seizures in past. 64.8 % does not refer to alternate centre. 17.6 % refer only at times. 38.2% of dentists ask for fitness from treating neurologist prior to dental procedures, for all PWE, while 49.1 % ask for clearance only in refractory cases. But 11.8% does not ask for clearance for all PWE.

Alaqeel et al conducted a study among health care professionals and found that 67% of respondents would not want their children to marry an individual with epilepsy, 10.5% believe that supernatural power is the cause of epilepsy, 67.2% did not know how to deal with an individual experiencing an epileptic episode, and 56% did not know that surgery was a treatment option for individuals with epilepsy in Saudi Arabia. Of the 822 respondents, 39% would not abide by a physician's advice not to operate a motor vehicle because of their illness.<sup>10</sup> But in our study, we mainly concentrated on Neurologists, Dentists, and PWE. Out of 82 persons with epilepsy, 78 believes in keeping the mouth clean as essential while 4 were not knowing the same. 45 people opined about cleaning teeth twice daily, while 28 opined in favour of cleaning once daily, and 6 were cleaning the tooth whenever they can do it. 20 persons opined they spend 1-2 minutes for cleaning the teeth while, 35 spend 2-3 minutes for cleaning and 25 opined that they spend more than 3 minutes for cleaning their teeth.

27 people takes preventive measures if they notice a dental caries to prevent further decay, 18 opined for wait and watch policy, 34 will consult a dentist at the earliest, while a single person wanted to ask the opinion of the Neurologist. 11 people feel it difficulty to do routine work/job due to dental issues, while 17 feels occasionally, 53 does not have any such issues.

Doshi et al, conducted a study regarding knowledge, attitudes and practices about epilepsy among group of dentists. They found that Indian dentists has a fairly high knowledge and positive attitudes toward patients with epilepsy. 84.3% of the dentists would not object to their children having association with patients with epilepsy, and 61.3% would not object to their relative marrying a person with a history of epilepsy. Many dentists (178; 82%) were confident to treat a person

with epilepsy. 95.3% assumed that they have an ethical responsibility to treat this population.<sup>11</sup>

Hassona et al, conducted a study among dental students and found that more than one-third of dental students believed that epilepsy is due to insanity or mental illness. Only 45% were able to identify convulsion or shaking as a sign of epilepsy, and more than one-third did not know how to act in case of an epileptic seizure in the dental clinic. About 50% indicated that their families would be concerned about them treating patients with epilepsy, and 30% believed that knowing that patients with epilepsy were treated in their clinic might make other patients reluctant to continue their treatment there.<sup>12</sup>

Singh et al conducted a study in North India about the knowledge of common man, about the knowledge of common man on dental health. They found that, 48% of the subjects had never visited a dentist before. 47% of the subjects still prefer other cleaning aids over toothbrush. 32% subjects were of the view that dental health has no effect on general health, whereas 34% subjects were of the opinion that tooth loss is a natural sequel of the aging process.<sup>13</sup> In our study, 27 people takes preventive measures if they notice a dental caries to prevent further decay, 18 opined for wait and watch policy, 34 will consult dentist at the earliest, while 1 person will ask neurologist opinion for the same. 11 people feel difficulty to do routine work/job due to dental issues, while 17 feels occasionally, 53 does not have any such issues.

Károlyházy et al conducted a study about oral health issues in PWE. They found that, in almost all aspects of oral health and dental status, PWE showed a significantly worse condition compared with the control group. Comparison of the subgroups of epilepsy patients revealed that the most severe findings concerning patients who have poorly controlled epilepsy, especially those who have frequent generalized tonic-clonic seizures. They also states that observed difference results from a combination of factors such as the effect of the seizures themselves, socioeconomic conditions, and the negative attitude of dentists.<sup>14</sup> In our study, we found that, 24 people experience nervousness while on dental chair, and 10 people are scared of being there and 46 have no such difficulties. 32 people takes antiseizure medications before going for dental procedures. 15 people takes it sometimes and 34 people does not take medications.

## CONCLUSION

We found that, the dental aspects of persons with epilepsy are under recognised and not given enough consideration. However, compared to studies conducted in other parts of the world, the attitude and knowledge of Neurologists, Dentists and Persons with Epilepsy were found to be better in India. The neurologists should give importance in enquiring the dental health problems and should advise for routine dental health check-ups for persons with epilepsy. Also, dentists should be educated in doing emergency measures during a seizure episode and should not defer patients from doing dental procedures due to history of seizures.

## END NOTE

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### Abbreviations:

PWE - Persons with epilepsy

ASD- Antiseizure drugs

### Highlights:

- Dental aspects of persons with epilepsy are under recognised
- Neurologists should give importance in enquiring the dental health problems.
- Dentists should not defer patients from doing dental procedures due to history of seizures

### Author Contributions:

1. Jithin George: preparation of the questionnaire, interviewing doctors, patients and /or relatives, data analysis, preparation of the manuscript.
2. Jayakumari Nandana : Collection of data, interviewing doctors, patients and /or relatives, critical revision, preparation of manuscript and editing.
3. Thania Elizabeth: Collection of data, preparation of the questionnaire interviewing doctors, patients and /or relatives
4. Lakshmi Priya: Collection of data, interviewing doctors, patients and /or relatives
5. Ramshekhar N Menon: Collection of data, critical revision
6. Ashalatha Radhakrishnan: Conceptualisation and Designing of study, Critical revision, final manuscript editing and proofing.

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All co-authors have seen and agreed with the contents of the manuscript, the ICMJE requirements for authorship have been met. Each author certifies that the manuscript represents honest work and that the submission including the abstract is not under review in any other publication. There is no competing interest/conflict of interest. No funding sources were involved in its completion. The authors report no disclosures relevant to the manuscript. As the corresponding author, I confirm that I have full access to all the data in the study and had final responsibility for the decision to submit for publication. No medical writer or editor was involved in the creation of your manuscript

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