

Assessment of Oral Health Status in Epileptic Children and Healthy Children in Bengaluru City: A Comparative Study

Sugandha Tiwari¹, Rajnish K Verma², Kanika S Dhull³ , Suma G⁴

ABSTRACT

Introduction: Epilepsy is a neurological disorder, which is identified by repeated episodes of abnormal synchronous discharge of brain, resulting in several types of deficits. A percentage of them also have mental and motor deficits. Both the epileptic conditions and their medical management can influence oral health.

Objective: To assess and to compare the oral health status of epileptic children and the healthy children in Bengaluru city.

Material and methodology: Data was collected from the study group, which included 100 children between age-group 5 and 16 years registered under the Department of Neurology, Indira Gandhi Institute of Child Health (IGICH). Data collected from healthy children as control group and they visited Department of Pedodontics and Preventive Dentistry, VS Dental College & Hospital (VSDCH) for routine dental check-up. All subjects were examined by single qualified examiner. Gingival Index, plaque index, decayed missing filled teeth for primary teeth (dmft) and for permanent teeth (DMFT) were recorded for both study and control group. Other findings were also recorded such as injury to dentition or oral soft tissues and gingival hyperplasia as side effect of antiepileptic drug therapy.

Results: There was no statistically significant difference found in dmft and DMFT between control group and study group. But, there was significant difference present in dmft and DMFT on gender basis between control and study group.

Conclusion: The group of children with epilepsy suffer from several oral health problems such as dental caries, gingival enlargement, periodontal disease, and injuries of the oral cavity, which are associated with seizure-related trauma.

Keywords: DMFT, dmft, Epilepsy, Gingival hyperplasia, Gingival health, Plaque Index, Seizures

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INTRODUCTION

Oral health is a major threat to general health. In children who suffer from systemic disease, oral health is commonly seen as neglected aspect. Epilepsy is the commonly reported as long-standing neurologic disorder in pediatric neurology. It is distinguished by recurrent seizures, with predominant etiologies as birth injury and congenital abnormalities. In developing countries, occurrence of epilepsy is approximately 43 per 1,000 people.¹ World Health Organization ranked it next to some psychiatric problems and reported that disability due to epilepsy accounts for about 1% of the global load of disease, as measured by disability-adjusted life-years.²

Epileptic children have been included under children with special needs. The federal Maternal and Child Health Bureau defines children with special healthcare needs (CSHCN) as:

“Those who have or are at increased risk for a chronic physical, developmental, behavioral, or emotional condition and who also require health and related services of a type or amount beyond that required by children generally.”³

At present, treatment for epilepsy aims to make better quality of life, by repressing seizure and prescribing medications with minimum side effects. Both the epileptic condition and anticonvulsant drugs can deteriorate oral health. Thus, monitoring of oral health for prevention and early interventions are crucial for the well-being of people with epilepsy.⁴ Pediatric patients of age-group <16 years are commonly included among epileptic person. A sizeable population of them also suffers mental and motor deficits.^{5,6} The superimposed side effects of anticonvulsant

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drugs over compromised ability of self-care put these children at risk of oral health.

Available literature on the overall oral health status and treatment needs of children with epilepsy, and also the seizure-related injuries of the oral cavity in children is sparse, especially in the Indian context. Therefore, aim of this study was to assess oral health status and dental treatment to compare the same with healthy children and to know dental treatment needs of epileptic children, also if epilepsy has specific effect on oral health, then to find possible reasons and measures to be taken to prevent it. Oral health is a

prime aspect of life and every attempt should be made to improve it, especially in a group of epileptic children.

METHODOLOGY

This comparative study has been done to assess oral health status of epileptic children and it was carried out in Indira Gandhi Institute of Child Health, Bengaluru and Department of Pedodontics and Preventive Dentistry, VS Dental College and Hospital, Bengaluru, Karnataka. A total number of 200 children, 100 diagnosed cases of epilepsy aged 5–16 years, under regular antiepileptic drug therapy, and 100 healthy children as control group who were similar with epileptic children with regard to age and gender, were included in the study. Exclusion criteria were any systemic disorder or treatment with drugs known to affect gingival or periodontal health or patients who recently undergone gingival surgery or periodontal treatment.

Institutional ethical clearance was obtained and written informed consent from the parents/guardians of the children participating in the study was obtained.

Information was gathered by same two investigators, pediatric neurologist and dentist throughout the study. Structured questionnaire was used to collect information, which included questions regarding epilepsy itself, medication history, and oral hygiene practices. Oral health examination was performed for all the subjects including the epileptic children group and healthy children group by single qualified trained examiner. The investigator himself conducted all the clinical examination with the help of recording assistant. The modified gingival index (GI), plaque index (PI), and DMFT, dmft scores of epileptic children and healthy children were compared. Injury to dentition or oral soft tissue, gingival hyperplasia as side effect of antiepileptic drug therapy was recorded as present or absent in the epileptic children group. Data was collected from the healthy children group at the Department of Pedodontics and Preventive Dentistry, VS Dental College & Hospital, Bengaluru, who visited for regular dental checkup.

Each child and parent were educated and encouraged about the significance of maintaining good oral hygiene, severity, and prognosis of oral health aspects of epilepsy. During the study, all participating children were given complete dental treatment with emphasis on preventive measures. All participating children were advised regular oral health checkup once in 3 months period.

Collected data were analyzed using Statistical Package for Social Sciences (SPSS) version 13.0 software (SPSS Inc. Chicago, Illinois, USA). The data were expressed as mean +SD. The χ^2 test was used for intra group comparison of type of epilepsy and PI or GI, type of drug administered and gingival or PI, intergroup comparisons such as brushing habits, prior dental visit. Z test was used for intergroup comparisons of parameters such as GI, PI, and treatment requirement. Mann-Whitney test was used for gender-wise comparison of PI, GI, dmft, DMFT for both study and control group.

RESULTS

Gender distribution for study group (Males—56, Females—44) was similar to control group (Males—55, Females—45). Types of epilepsy and antiepileptic drug administered are depicted in Figures 1 and 2.

Statistically no significant difference was found between DMFT and dmft scores of study and control group (Table 1 and Fig. 3). Significantly higher number of teeth required restoration in study group compared to control group ($p < 0.001$) (Table 2 and Fig. 4). GI and PI scores of the children with epilepsy were determined to be statistically higher than control group ($p < 0.001$) (Table 3 and Fig. 5).

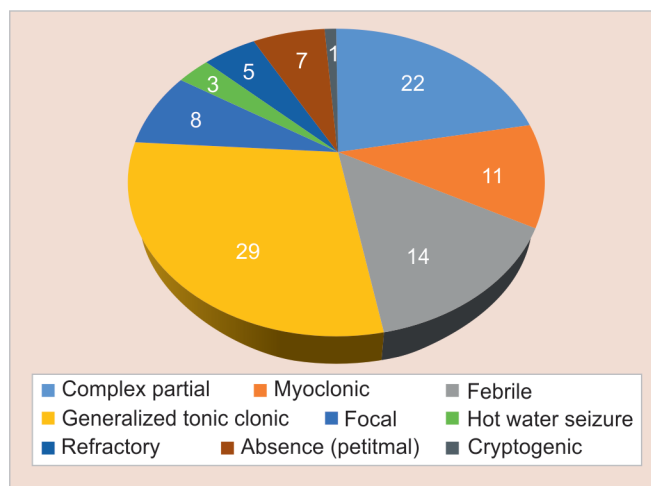


Fig. 1: Types of epilepsy in the epileptic group

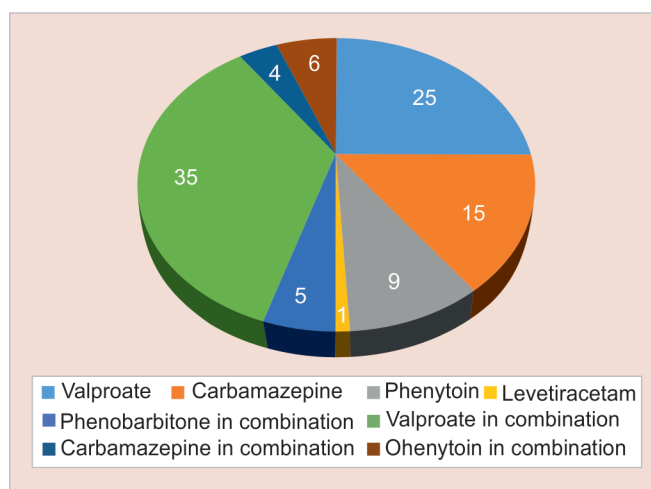


Fig. 2: Drug administered in the epileptic group

On gender-wise comparison, no significant difference was found in dmft and DMFT scores of study group (Table 4). In control group, dmft score revealed no statistically significant difference but DMFT score was lower for female (0.27) than male (0.65) and the association was significant with p value 0.039 (Table 2). No significant difference was revealed on gender-wise comparison of GI and PI (Table 4).

No significant difference found in DMFT score of mentally retarded children compared to normal children in study group (Table 4). dmft score (4.88) of mentally retarded children was significantly higher as compared to normal children (3.12) of study (p value 0.024) (Table 4). No statistically significant difference in PI and GI scores of mentally retarded children compared to mentally fit epileptic children (Table 4) was found.

Gingival hyperplasia was documented only in two patients. Both of them were taking valproate. One patient reported history of gingival hyperplasia caused by phenytoin drug monotherapy. Hard and soft tissue injury in epileptic children were documented. Anterior teeth injury was seen in seven patients. Tooth attrition was seen in seven (7%) children of study group. Soft tissue injury was reported by 11 children in study group.

A statistically significant difference was established in the prevalence of tooth brushing between the study and control

Table 1: Nongender-based comparisons of DMFT and dmft between control and study group

Parameter	Group	Mean	Standard deviation	SE of mean	Median	Mean difference	Z	p value
dmft	Epileptic	3.70	3.82	0.38	3.0	0.530	-0.381	0.703
	Control	3.17	2.86	0.29	3.0			
DMFT	Epileptic	0.71	1.36	0.14	0.0	0.227	-0.459	0.646
	Control	0.48	0.97	0.10	0.0			

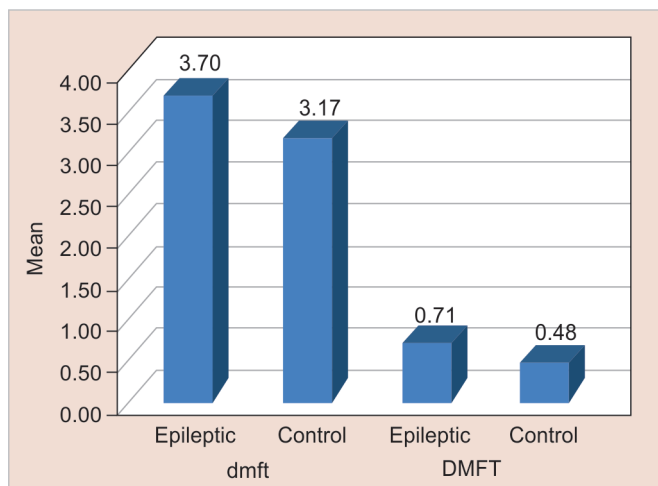


Fig. 3: Mean dmft and mean DMFT in two groups

groups (Table 5). Out of 100 children, only 5 children in the study group had visited to a dentist in past in comparison to 49 in control group. The difference between the two groups was established to be statistically significant with *p* value <0.001 (Table 6).

DISCUSSION

No statistically significant difference was documented between dmft and DMFT scores of epilepsy group compared to control group, however, scores obtained were higher for study group. Similar finding for DMFT index was obtained by Percival et al.;⁷ however, he reported lower dmft scores in epileptic group than control group. The explanation given for lower incidence of caries was carefully monitored diet at the institution, where the study was conducted, preference of sugar-free antiepileptic drugs, and monitored oral hygiene practices by children. Higher caries indices in the epileptic group have been reported by Gurbuz and Tan in 4–15-year-old epileptic children compared to controls. Storhaug and Holstet (1987)⁸ and Rajavaara et al. (2003)⁹ have also found significantly higher caries index in epileptic group compared to control group.

A total of 26% epileptic children included in present study were mentally disabled. The mean dmft score of mentally disable children in study group was recorded to be significantly higher than those of mentally normal epileptic children. The higher scores could be described by restrictions in personal abilities or technical difficulties faced by this group of children due to muscular incoordination and muscle weakness obstructing oral hygiene maintenance. Gupta et al.¹⁰ also reported highest prevalence of dental caries in mentally handicapped children among other debilitating conditions. In our study, mean DMFT scores were lower for mentally retarded children than normal epileptic children; however, difference was not statistically significant. Ashley¹¹ stated that physical and

intellectual difficulties can make spitting and rinsing difficult for severe epilepsy cases. Thus, topical effect of the fluoride-containing toothpaste can be enhanced. The reason seems to be suitable explanation for the lower mean DMFT scores in mentally retarded epileptic children, also with increase in age, the formulation of medication is switched from syrup to tablet form, which might be the reason for lower severity of caries in permanent dentition. The observed higher mean values for caries indices are in all likelihood, the result of a conjunction of factors such as poor socioeconomic status of epileptic children, lower frequency of dental clinic visits, regular long-term treatment with sugar containing medicines, the tendency of parents to avoid dental treatment due to inadequate knowledge about epilepsy, and fear that dentist might provoke seizures during treatment.

Compromised periodontal condition was the most common outcome investigated during studies of oral health status of individuals with epilepsy, which was included in review of literatures. In the present study, the plaque and gingival scores were remarkably higher in the epileptic children (*p* value of < 0.001). These results are comparable to the results obtained by Percival et al.⁷ and Gurbuz and Tan.⁴ Plaque and gingivitis scores were higher in mentally challenged epileptic children than mentally normal epileptic children, but the difference was not significant.

Mentally challenged children suffer motor and behavioral disorder that might affect their ability to maintain oral hygiene. That can be the cause for higher plaque and gingival scores in these children. Solanki et al.¹² found in their study that none of the children with mental disability had healthy periodontal status.

Gingival hyperplasia was documented in 2 out of 25 children who were on valproate monotherapy, while only one of the patients gave history of phenytoin-induced gingival hyperplasia. Ogunbodede et al.¹³ reported 33.3% patients receiving phenytoin monotherapy developed gingival hyperplasia, and 83.3% of patients receiving phenytoin in combination with phenobarbital manifested the disorder. The author also indicated toward possibility of potentiating effect of phenobarbital on phenytoin in causing gingival hypertrophy. According to Tan et al.,¹⁴ effect of valproate on gingival tissue is associated with interaction with medications rather than oral hygiene or inflammation. The etiology of phenytoin-induced gingival enlargement is considered to be mechanism related to interaction between phenytoin and the gingival fibroblast.¹⁰ Percival et al.⁷ reported gingival enlargement in 3 out of 14 children who received phenytoin in past. Gurbuz and Tan⁴ documented gingival enlargement in 42% of patients on valproate and 16% on phenobarbital medications. Ghafoor et al.¹⁵ have also reported gingival overgrowth as a common side effect of the antiepileptic drugs in 46% of patients.

Trauma to orodental tissue is an important finding that occurs during seizure. Ogunbodede et al.¹³ stated that these injuries occur due to fall as patient loses balance during seizure episode. There is also practice of placement of hard object between teeth during seizure.

Table 2: Nongender-based comparisons of plaque index and gingival index dmft between control and epileptic group

Parameter	Group	Mean	Standard deviation	SE of mean	Median	Mean difference	Z	p value
Plaque index	Epileptic	1.41	0.71	0.07	1.4	0.488	-4.899	<0.001*
	control	0.93	0.53	0.05	0.7			
Gingival index	Epileptic	0.90	0.73	0.07	1.0	0.453	-4.354	<0.001*
	control	0.45	0.48	0.05	0.3			

*Denotes significant association

Table 3: Treatment required in both control and epileptic group

Parameter	Group	Mean	Standard deviation	SE of mean	Median	Mean difference	Z	p value
Restoration required (number of teeth)	Epileptic	2.95	2.61	0.26	3.0	1.640	-4.321	<0.001*
	control	1.31	1.21	0.12	1.0			
Root canal treatment required (number of teeth)	Epileptic	0.95	1.94	0.19	0.0	-0.540	-3.854	<0.001*
	control	1.49	1.84	0.18	1.0			
Teeth to be extracted	Epileptic	0.52	1.07	0.11	0.0	0.100	-0.535	0.592
	control	0.42	0.74	0.07	0.0			

*Denotes significant association

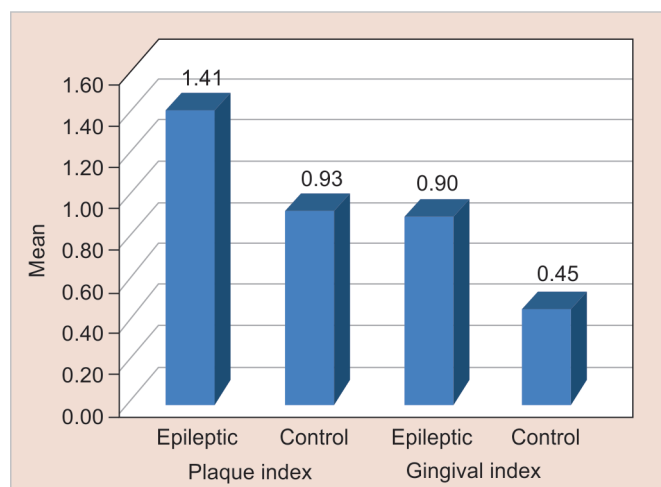


Fig. 4: Mean PI and mean GI in the two groups

In present study, anterior teeth injury was seen in seven children. Ogunbodede et al.¹³ in their study reported prevalence of trauma to anterior dentition as 46.4%, the reason of greater prevalence of anterior tooth trauma was reported as practice to force spoons and other articles between the teeth of patients during seizures to prevent biting of tongue. According to Tsai,¹⁶ protruded anterior teeth and increase in overjet leading to insufficient lip seal predispose to greater traumatic injury to anterior teeth. Holan et al. reported trauma of maxillary central incisors was the most common occurrence of seizure associated with fall. Percival et al.⁷ reported significantly higher number of epileptic children with trauma to anterior teeth compared to control. However, only few children in our study reported traumatic injury to dentition, and results are similar to findings by Gerreth and Gerreth¹⁷ who documented the incidence of traumatic dental injuries in lower number of patients.

Soft tissue injury was reported by 11 children. It has been reported that generalized tonic-clonic seizures frequently causes minor oral cavity injuries such as biting of tongue or other areas of oral mucosa. In present study, low incidence of the soft tissue

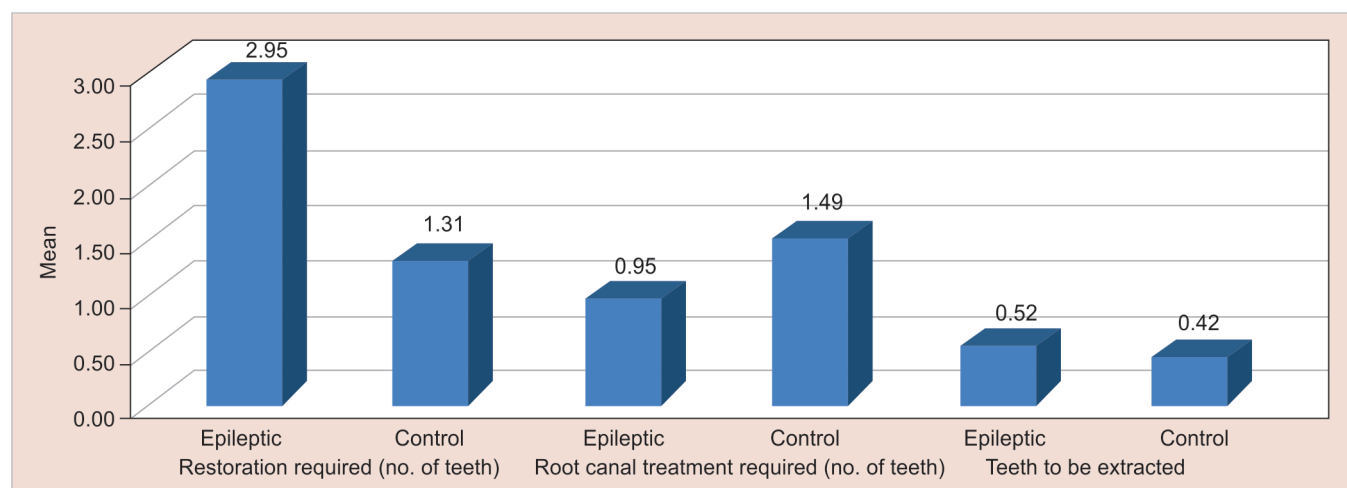


Fig. 5: Mean number of teeth requiring restoration, RCT and extraction in the groups

Oral Health Status in Epileptic Children and Healthy Children

Table 4: Gender-based comparisons of DMFT, dmft, plaque index, and gingival index between control and epileptic group

	Group	Gender	n	Mean	Standard deviation	SE of mean	Mean difference	Z	p value
dmft	Epileptic group	Male	56	3.05	3.39	0.45	-1.469	-1.682	0.093
		Female	44	4.52	4.19	0.63			
	Control group	Male	55	3.15	3	0.4	-0.055	-0.242	0.809
		Female	45	3.2	2.72	0.41			
DMFT	Epileptic group	Male	56	0.63	1.2	0.16	-0.189	-0.287	0.774
		Female	43	0.81	1.56	0.24			
	Control group	Male	55	0.65	1.09	0.15	0.388	-2.067	0.039*
		Female	45	0.27	0.75	0.11			
Plaque index	Epileptic group	Male	56	1.39	0.74	0.1		-0.454	0.65
		Female	44	1.45	0.68	0.1	-0.061		
	Control group	Male	55	0.98	0.53	0.07	0.122	-1.154	0.248
		Female	45	0.86	0.54	0.08			
Gingival index	Epileptic group	Male	56	0.78	0.71	0.1	-0.27	-1.79	0.074
		Female	44	1.05	0.73	0.11			
	Control group	Male	55	0.47	0.46	0.06	0.047	-0.81	0.418

*Denotes significant association

Table 5: Comparisons of DMFT, dmft, plaque index, and gingival index between normal and mentally retarded children

Parameter	Group	Mean	Standard deviation	SE of mean	Median	Mean difference	Z	p value
dmft	Normal	3.12	3.66	0.43	2.0	-1.761	-2.260	0.024*
	Mentally retarded	4.88	3.40	0.67	5.0			
DMFT	Normal	0.83	1.48	0.17	0.0	0.449	-1.088	0.277
	Mentally retarded	0.38	0.94	0.18	0.0			
Plaque index	Normal	1.39	0.73	0.09	1.3	-0.129	-0.680	0.496
	Mentally retarded	1.52	0.64	0.12	1.7			
Gingival index	Normal	0.83	0.68	0.08	1.0	-0.260	-1.222	0.222
	Mentally retarded	1.09	0.84	0.17	1.0			

*Denotes significant association

Table 6: Teeth brushing habit and prior dental clinic visit

	Epileptic		Control		χ^2	p value
	n	%	n	%		
Brushing:						
Not daily	11	11%	3	3%	6.767	0.034*
Yes	89	89%	95	95%		
No	0	0%	2	2%		
Total	100	100%	100	100%		
Prior dental visit:						
Yes	5	5%	49	49%	49.112	<0.001*
No	95	95%	51	51%		
Total	100	100%	100	100%		

*Denotes significant association

injury in study group was documented. Benbadis et al.¹⁸ specified that tongue biting on lateral surface of tongue is the hallmark in epileptic children during generalized tonic-clonic seizure. Buck et al.¹⁹ stated that generalized tonic-clonic seizures frequently cause minor oral injuries. Ghafoor et al.¹⁵ reported lip/cheek biting in 74% children and tongue injury in 56% children.

A statistically significant difference was established in oral hygiene practices between study and control group (p value 0.034).

11% epileptic children were not able to brush their teeth due to motor and/or mental disability. The most striking finding was reported by Gurbuz and Tan⁴ who found that 76.3% of children with epilepsy in Turkey never brushed their teeth. In our study, only 4% epileptic children brushed their teeth twice in a day as compared to around 24% healthy children, which was statistically significant with p value < 0.01. The results obtained by Gurbuz and Tan⁴ who found that controls were more likely to be regular brushers were



similar. Jovanovic and Gajic²⁰ in their study showed that epileptic children and their parents had unacceptable attitude and behavior toward oral hygiene habits than healthy children and their parents. These epileptic children are at high risk of poor oral hygiene due to regular long-term medications that may contain sugar, and some of them also suffer mental and/or motor disorder thus the impressive oral hygiene can be difficult to achieve for children with these impairments. Epileptics have high caries prevalence and poor periodontal health in comparison to the general population. Hence, routine dental care is a must for epileptic patients. In our study, only 5% of children in the study group visited to a dentist for dental checkup in past. Lower frequency of dental visit has also been reported by Ogunbodede et al.,¹³ Karolyhazy et al.,²¹ and Gurbuz and Tan.⁴ A general concept among parents that dental procedures provoke seizures that restrict them to visit dentist unless severe toothache necessitate may play a role in these circumstances.⁴

The factors influencing oral health are complicated and, for those with epilepsy living in India are influenced by ignorance and stigma attached to epilepsy, which has made their disease more painful than the pathology. Considering evidence from other studies alongside the hurdles to oral health care potentially faced by epileptic patients, it is logical to conclude that the oral health of those with epilepsy is inferior to that of general population.

CONCLUSION

Within the limitations of present study, it can be concluded that, children with epilepsy have a poor oral health condition as compared to the healthy children. It is necessary to educate the families of patients with epilepsy to be observant of the oral hygiene condition of these patients and ensure timely visits to the dentist. A comprehensive understanding of the oral health conditions of epileptic patients is essential for the purpose of comparisons and decision-making. Dentists must take adequate care during the treatment procedures to minimize the factors that are known to trigger seizures such as avoiding the dental light being focused on the patient's eyes, use of rubber dam during restorative treatment, and reducing anxiety. It is imperative for dentists to provide ample reassurance to the epileptic patients that they can attain good oral health.

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