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## Original research article

# The prevalence of orodental trauma during epileptic seizures in terms of dental treatment – Survey study



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## ABSTRACT

**Introduction:** Epilepsy is one of the most common neurological disorders. Seizures that occur during attacks may lead to head injuries. It is crucial to establish proper prophylactic management against trauma occurrence, as nowadays prevention is not sufficient.

**Aim:** Assessment of the frequency of head and intraoral trauma during epileptic seizures and to evaluate factors that may predispose to injuries.

**Material and Methods:** The questionnaire was carried out among 106 patients with epilepsy. Survey conducted questions regarding development of the disease and occurrence of orodental and head trauma. Results were statistically analyzed with the chi-square test ( $p < 0.05$ ).

**Results:** 52.4% of subjects admitted the occurrence of oral trauma during epileptic seizures. The most common were lips, tongue or cheeks injuries. 18% patients suffered from tooth crack and 17% from tooth fracture. 50% of respondents suffered from head trauma during seizures: 41% patients reported bruises, 39% burns, 37% wounds, 10% nose fractures, 7% eye socket trauma and 3% skull crack. 14.1% of respondents experienced dentist refusal to undertake treatment, while 4% of patients had epileptic attack during dental procedures.

**Conclusions:** Dental trauma is common result of epileptic seizures. It is necessary to implement prophylactic management to prevent hard and soft tissues injuries, for example by using custom-made mouthguards. Moreover, specially designed dental programs for this group of patients should be provided.

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## 1. Introduction

Epilepsy is a disorder of the brain characterized by an enduring predisposition to generate epileptic seizures, and by the neurobiological, cognitive, psychological, and social consequences of this condition. An epileptic seizure is a transient occurrence of signs and/or symptoms due to abnormal excessive or synchronous neuronal activity in the brain [1]. The definition of epilepsy sometimes requires the occurrence of at least one unprovoked seizure with a probability of further seizures similar to the general recurrence risk after two unprovoked seizures [2].

The prevalence and cumulative incidence is the highest in older individuals, males in particular (3% of 75-year-olds, and about 1% of 20-year-olds) and is primarily caused by genetic defects and structural acquired brain abnormalities – head injuries, including perinatal injuries, vascular brain diseases, neurosurgical procedures, degenerative and atrophic diseases, primary tumors and metastases located in the CNS, encephalitis, or metabolic (e.g. mitochondrial disorders) [3–6]. In Poland, the largest groups are patients with focal onset (partial) seizures (33%) and secondarily generalized seizures (32.4%) [6]. The majority of them lead a traditional lifestyle, taking anti-epileptic drugs (AEDs). They often become dental patients, due to the fact that epileptic patients are more prone to oral health problems than healthy individuals. The reasons for that are particularly xerostomia and gingival hyperplasia related to AEDs administration (phenytoin, phenobarbital, carbamazepine). These drugs alter the metabolism and increase the removal of vitamin D from the body, contributing to osteopenia and osteomalacia, which predisposes individuals to teeth and adjacent soft tissues injuries [7–9]. Current recommendations for the pharmacological antiepileptic treatment in Poland do not include the use of phenytoin as a drug of first choice. A different situation is in India, the United States and the United Kingdom where it is usually recommended.

The likelihood of injuries in the area of head during epileptic seizures is about 47–63% [10–12], 90% of which are skin and mucous membranes traumas [10,12,14,15]. Lips and cheek injuries occur in 74%, while tongue biting in 56% of epileptic seizures, which is about 8–35.4% of all damages to the soft tissues [14–17]. The dental apparatus is damaged in less than 1% of seizures, in 1–37% of patients [16–18]. Fractures within the hard tissues of the tooth, regarding in particular incisors and canines, occur in 12–38.5%, avulsion of the tooth in 6–7.6%, luxation in about 5%. Injury to several teeth simultaneously occurred in 14.7% of all patients.

Fracture of the body of the mandible, often reported in a temporal lobe epilepsy and other kinds, occurred in 7.3% of cases, while the condylar process fracture in 2.5% of patients [16–18]. Displacement of the articular disk of the temporomandibular joint may also be the result of a seizure and was reported in 1.3% of epileptic patients [14,18].

Often the episodes are preceded by symptoms announcing the seizure.

The episodes are often preceded by ill-localized sensation and aura prior to a seizure and are reported in 2–70% of patients [19–23] depending on the type of epilepsy. There are a

preictal phenomena that herald the onset of an epileptic seizures (prodrome) and a subjective ictal phenomenon that may precede an observable seizure (aura) with sensory, autonomic, experiential or dyscognitive events [24]. Preictal phenomena are usually: changes in mood and behaviour, sensory disturbances and anxiety [19–21]. Schulze-Bonhage et al. [25] reported that 7% of patients are able to predict the arrival of a seizure more than 30 minutes before the occurrence. In these patients, it is possible to prevent injury within the hard and soft tissues of the oral cavity by the use of custom-made mouthguards similar to the ones used by many sportsmen who are predisposed to injury due to the contact discipline [26].

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## 2. Aim

The aim was to assess the frequency of head and intraoral trauma during epileptic seizures and to evaluate factors that may predispose individuals to injuries.

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## 3. Materials and methods

The questionnaire was carried out in the period from December 2014 to December 2015 among 106 patients with epilepsy in the Department of Neurology and patients hospitalized in the Department of Neurosurgery. Survey included questions regarding development of the disease and occurrence of orodental and head trauma. Exclusion criteria were – single seizures associated with other underlying conditions and uncompleted surveys. Finally, we excluded 6 surveys. Results were analyzed statistically with the chi-square test ( $p < 0.05$ ). Authors have received an ethical committee approval.

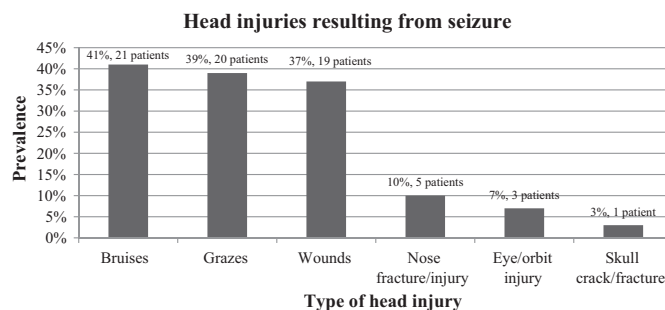
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## 4. Results

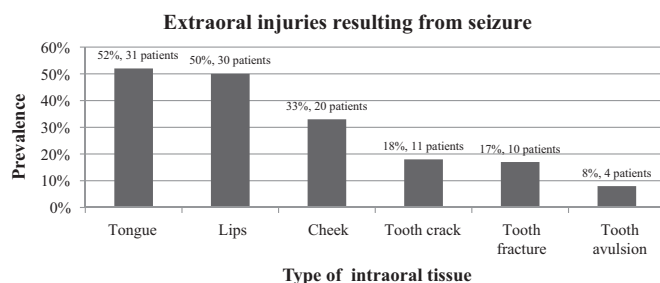
The study group comprised 38 men and 62 women, aged 15–60 years ( $M = 31.2$ ,  $SD = 9.10$ ). The majority of respondents (94%) took antiepileptic drugs permanently. Convulsive seizure occurred in the last 3 months in 33% (in 42% of cases preceded by aura), and during the last year in 45% of respondents. As for the location of epileptic events: 93% occurred in the place of residence, in place of work or study – 54%, in public place (church, shopping center, restaurant) – 50%, in public transport – 32%, in a health center – 31%, in a car – 25%. During sports, seizure occurred in 26%, and during visits to the dentist in 4% of patients.

The most common factors causing seizures were stress (71% of respondents), intense or flickering light (34% of respondents), high or low temperature (23%), noise (19%), fatigue or lack of sleep (11%) and trauma (10%).

The head injuries during a seizure occurred in a total of 54%, among those experiencing auras were 50% of individuals, and 56.9% of patients without prodromal signs (not significant,  $p = 0.495$ ). Bruises, cuts and abrasions happened most often. Serious injury – cracks and bone fractures – occurred less frequently.



**Fig. 1 – Head injuries.**



**Fig. 2 – Intraoral injuries.**

Respondents could choose from multiple types of injuries (Fig. 1). Traumatic injuries in the mouth during epileptic seizures were confirmed by 62% of total respondents, 52.4% of which reported prodromal signs, and 69% were without ones (not statistically significant,  $p = 0.092$ ). Soft tissue injuries were the most common traumas concerning lips, tongue or cheek.

Respondents had the possibility of multiple answers (Fig. 2).

There were 21% of individuals wearing prosthetic restorations among the respondents – acrylic removable dentures (7%) and fixed restorations (14%, 4% implant supported dentures). One person from this group reported damage to the restoration during a seizure.

Under the dental care there were 71% of respondents. Some of them (30%) visited the dentist regularly, at least once a year, and 19% only in case of pain occurrence. Due to the risk of a seizure, 14% of respondents met with the refusal of dental treatment.

## 5. Discussion

Some of the epileptic patients, due to their condition and often co-existing CNS disorders, require frequent hospitalization, but most of them are able to function normally in the society, to work and study [22].

Patients participating in the study were treated in the Department of Neurology and hospitalized in the Department of Neurosurgery, which is important in evaluating the responses and may differ from the general population.

Despite pharmacological treatment (94% of patients are on long-term drug administration), almost half of the patients

surveyed experienced at least one seizure within 12 months, and a third of them had an epileptic attack within 3 months.

A frequent complication of seizures is damage to different parts of the body that occurs during episodes of epilepsy (72.7%) [10]. According to Asadi Pooya et al. [15] 47.3% of patients experienced at least one injury in 12 months, among which 14.4% were severe complications, the others did not require hospitalization.

In the present study, more than half (54%) of patients surveyed suffered from head injuries, predominantly affecting soft tissues, causing bruises, wounds and skin abrasions in the past. Damage to the hard tissue – bone fractures and cracks occurred less frequently. The results are consistent with those obtained by researchers in foreign centers among both adults and children [10,14]. They indicate that the intraoral injuries, important from the perspective of dentists, affect more than half of the surveyed patients with epilepsy. Cohen et al. [27] suggest that the number is even larger but difficult to assess, due to the initiation both through seizures characterized by motor disorders and changes in muscle tone, and due to uncontrolled involuntary movements during sleep, resulting in biting, especially in the lateral surface of the tongue, lips or cheeks (52–33%) [6,13].

Other survey questions are related to damages to the hard tissues of the tooth during seizures. These include fracture of a slight (18%) or wide area (17%). Comparable results were obtained by Thomas et al. [10,13,28].

The main aim of the scientists, as have been shown in a few publications, is focused on prevention of traumatic injuries in patients with epilepsy. Some authors indicate the need to supply them in safety helmets or face shields, especially in the

case of frequently recurring damage [33]. Many methods are invented for the prevention of intraoral injuries. Individually designed intraoral mouthguards, similar to those used by athletes, may be a great solution. Researchers from India described the case of the use of such protective splints in one-year-old girl suffering from cerebral palsy with seizures and SIB (self-injurious behaviour). Non-healing wound on her lower lip, caused by a strong and long-lasting biting, was protected with an acrylic mouthguard combined with a soft protective splint, covering partially dentulous alveolar ridge, and head strap to improve retention. After a three-month period wound was completely healed [34].

Individual, flexible intraoral mouthguards used during different sport disciplines, not only contact and extreme ones, provide excellent retention, stabilization and high capacity to absorb energy, thus preventing trauma and reducing potential of the energy transferred to the temporomandibular joint or the base of the skull. They are made of a biocompatible material of proper thickness (3–5 mm). Most of the athletes, who use them, do not report their negative impact on speech or breathing [35]. It seems that individual protectors could significantly prevent intraoral injuries in patients with epilepsy, especially those who are able to predict a seizure, thanks to the existence of prodromal symptoms or aura. In the presented research they constitute 42% of all epileptic patients.

The last part of a survey included questions enabling one to assess the quality of dental care concerning epileptic patients. It turned out that 71% of the respondents see the dentist. However, only 30% of them are treated regularly. Due to the tendency to rapid loss of the teeth and oral cavity injuries, patients with epilepsy should have their dental care further intensified and, above all, it should be long-term, top-down planned and organized [13,16,29–32,36].

The results of the study indicate that one in seven patients met with a refusal of treatment because of his illness and the accompanying risk of attack, despite the fact that only 4% of respondents have ever experienced the attack during a visit to the dentist.

## 6. Conclusions

Due to high frequency of dental trauma in epileptic patients, it is necessary to implement prophylactic management to prevent hard and soft tissues injuries. It seems that custom-made mouthguards in patients anticipating an epileptic seizure can be a good standard manner to prevent trauma. It is also necessary to pay special attention to the expansion and improvement of dental care concerning epileptic patients.

## Conflict of interest

None declared.

## Ethics

The work described in this article has been carried out in accordance with The Code of Ethics of the World Medical

Association (Declaration of Helsinki) for experiments involving humans; Uniform Requirements for manuscripts submitted to Biomedical journals.

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