Ph.D. Thesis

Oral health of patients with epilepsy: an epidemiological study.

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1. **Introduction**: Epilepsy is a chronical neurological disorder characterized by recurrent seizures, with various kinds of etiology, according to WHO. Seizure is recurrent episodes of abnormal synchronous discharge of the brain, that may occur occasionally in anyone. It might have various clinical and laboratory manifestations. In Hungary, 50-60 thousand people are living with epilepsy (10, VII).

2. **Aim of the study**: It is a general impression, that patients with epilepsy tend to have poorer oral health in comparison to the general (non epileptic population) (Westphal Friedlander, Ogunbodede). They receive less adequate dental treatment in almost all aspects, and the design of prosthetic appliances didn’t take into consideration their special needs. Possible causes for this phenomenon include social and medical factors. Socio-economic background is generally worse compare to general (non epileptic) population, because labour relations frequently involves difficulties. So the costs of prosthetics with high level might be burdening. The stigma of the disease may affect dentists themselves. They try to choose treatment options that are quick and simple, such as tooth extraction, foregoing more complicated procedures (14). Such an attitude results in an early edentulous state, which adds to the difficulties of patients living with epilepsy. The significantly worse oral health and dental condition is shown with statistical means. According to our knowledge, there is only one study published so far (Ogunbode), but it was however uncontrolled. The aim of our study was to collect and analyse datas, about the dental status and oral health of patients with epilepsy.

1. We examined the differences found in data of the employment rate, smoking habits, alcohol drinking habits, and systemic diseases.
2. We collected datas pertaining to the epilepsy itself (including present and previous antiepileptic medication, type and frequency of seizures and psychiatric symptoms, oral cavity injuries, clonisation of facial or masticatory muscles.)
3. We examined the differences in datas pertaining to dental anamnesis (frequency of visit to the dentist, frequency of tooth brushing, tooth attrition, number of broken tooth, classification of remaining teeth, type of denture.
4. Stomato-oncological study was performed according to WHO.
5. Dental status was compared between the two groups.
6. Parodontal status was compared between the two groups.
7. The characteristics of prosthodontics and the prosthetic index were examined in the two group.
8. We wanted to validate our classification system of epilepsy patients.

3. Patients and methods:
3.1. Patients: The study was performed with the collaboration of the Department of Prosthetic Dentistry and the Department of Neurology of the Semmelweis University Budapest, at the epilepsy out-patient unit. The age and sex matched control subjects in identical number were recruited at a community pulmonary X-Ray screening station in Budapest’s XIV-th district. The average age of 101 epilepsy patient was 37,34±14,9 years and of the controls was 37,86±15,8 years. Both group contained 44 woman and 57 man.

3.2. Classification system of epilepsy patients according to their dental manageability. We have set up a new classification system of epilepsy patients with treatment guidelines according to special dental risk factors and manageability (II.,III.,IV.,V.). Seizure types, frequency, effectiveness of antiepileptic drugs, psychiatric symptoms were taken into consideration. Results of three subgroups of epilepsy patient were compared to each other and to control subject’s.

Group I.: Patients who have been seizure free for years, either with or without medication. Patients with rare seizures (less often than once a year). Patients exclusively with seizures that do not involved the masticatory apparatus (absence, myoclonus, and certain partial seizures.) No special consideration in therapy.

Group II.: Patients with frequent partial seizures involving the masticatory apparatus such that are accompanied by clonisation of facial and masticatory muscles, or oral automatisms (e.g. grinding of teeth). Generalised tonic-clonic seizures, if present, appear less often than once a year. We recommend moderate constraints.

Group III.: Patients with frequent generalised tonic–clonic seizures (more often than once a year). Even today 25% of epileptic diseases are still resistant to antiepileptic drugs. We recommend strict constraints (I.).

Group IV.: Patients with mental disability excluding compliance during dental treatment.
3.3 General anamnestic data were recorded on a questionnaire by questioning the patient. (employment, smoking and alcohol drinking habits, other systemic diseases)
3.4. Data pertaining to the epilepsy itself was recorded on a questionnaire. By the caring neurologist (date of the first seizure, type and frequency of seizure, oral automatisms, oral cavity injuries, antiepileptic drugs, psychiatric symptoms).
3.5. Dental anamnesis was recorded by dentist on a questionnaire (including frequency of visiting the dentist, frequency of tooth brushing, Greene-Vermillion Oral Hygiene Index, damage of prosthetic appliances).
3.6. We examined oral mucosa for pre-cancerous lesions according to WHO.
3.7. Dental status was individually assessed, determining the DMF-T Index, biting anomalies, degree of abrasion, broken tooth, Fábián-Fejérdy prosthetic classification, type of prosthodontics, wearing habits of removable partial dentures.
3.8. The periodontal status was assessed by Williams periodontal probe. Periodontal pocket depth was measured in mm at 3-3 points on both the oral and vestibular surface of the tooth. The loss of gingival attachment of a tooth was calculated by adding the depth of periodontal pocket and the distance between the gingival edge and the cement-enamel border. This number was averaged for one tooth, then for all the teeth. The degree of gingival bleeding (Mühlemann index), provoked by periodontal probing was ranged from 0 to 4. The CPITN index and the maximum CPI scores were also recorded.
3.9. Prosthodontics were examined visually and by questioning as follows: Fixed partial dentures (number, material, time of wearing, worn out, abrasion of artificial teeth, esthetic cover of occlusal surface, cantilever, injury, prevention of interdental papilla, inflammation of oral mucosa around the denture, patient’s private opinion about the denture. Removable partial denture (wearing habits, supportation, anchorage, reduction of the baseplate, occlusal rest, continuous clasp, protection of the marginal periodontium, form of clasp, abrasion of artificial teeth, inflammation of oral mucosa, injury of denture caused by seizures). Complete denture (material, private opinion of patient, wearing time, extension of baseplate, distance between the upper and lower incisors in centric occlusion) were examined.
3.10. Prosthetic index (the ratio of artificial and missing teeth) was determined.

3.11. Statistical analysis: was performed by SAS 8.2 for Windows Software. Group means and standard deviations were calculated by SAS BASE MEANS FREQ. Age group of epilepsy patients and control subjects were compared using Wilcoxon signed rank test. Comparison of categorial variables we used chi square or Fisher exact statistics. All the indexes describing oral health (Greene Vermillon Oral Hygiene index, DMF-T etc.) were compared using modified two tailed-t test. ANOVA for continuous variables (wearing time). Statistical significance was set at p<0,05.

4. Results: The most important findings were the following:

4.1. General anamnthesis: 51% of epilepsy patients were active workers whereas 74% were active in control group (p=0,03). In Group I: 24%; in Group II: 29%; in Group III: 27% of epilepsy patients and 13% of control subjects were on invalid pension (5,12). 73% of epilepsy patients and 63% of control subjects were non smokers. 98% of epilepsy patients and 87% of control subjects drunk no alcohol. Presence of systemic diseases (other than epilepsy) was not different (neither diabetes, nor hypertonia).

4.2. Neurological aspects: Etiology was idiopathic: 65% and symptomatic in 35%. 91% of epilepsy patient suffered of grand mal seizures, 60% had seizure once in a few years. 19% of epilepsy patient had simple partial seizures, 28% of epilepsy patient had complex partial seizures, absence and myoclonus occured in 5%. First seizure was before age 30 in 77% of epilepsy patient, and in 80% it was already diagnosed for at least 5 years. Clonisation of facial and masticatory muscles appeared in 77% of epilepsy patients and oral automatisms in 9% of them. In 23% of epilepsy patient oral cavity injury was found together with tongue injury each case, 3 patient had broken teeth and lip injury (6.).

Antiepileptic drugs (4, 3): 50% received valproate acid, half of the patients in combination. Side effects in oral cavity are rare, stomatitis, bleeding of gingiva, increased possibility of infections, delayed recovery. 40% received carbamazepine, half of them in combination. Side effects in oral cavity are rare, xerostomia, bleeding of gingiva, lasted recovery. 1% received phenytoin, in combination. 35% received phenytoin before. Side effect in oral
cavity is hyperplasia of gingivae. Psychiatric symptoms occurred in 20% of epilepsy patients.

4.3. **Dental anamnesis** (8, VII): Controls visit dentist more frequently (p<0.001), clean their teeth (p=0.01) and use special instruments (p=0.03). Epilepsy patients had bad oral hygiene: OHI-S 3.2 ± 1.4, while the control’s were suitable: OHI-S: 2.8±1.4. As the disease become severe, the difference becomes significant (p=0.03).

4.4. We found no precancerotic lesions in both groups.

4.5. **Dental status**: in epilepsy group DMF-T index was higher (p<0.001), such as all the components were worse: decayed (p<0.001), missed (p=0.02), filled (p=0.02) compared to controls. Tooth attrition was higher only in the upper jaw (p=0.04) in epilepsy group, but in Group III. (frequent GM seizures) statistical significance reached (p=0.01). According to Fábián–Fejérő classification epilepsy patients showed worse condition (p=0.005), in Group III. it was the worst.

4.6. **Periodontal status** (2, 3, 7, 9): Attachment loss was higher (p=0.008) Mühlemann index was higher (p=0.001) in the epilepsy group. Maximum CPI scores were worse in epilepsy group. Healthy gums: E:3.2% C:21.6%; bleeding and inflamed gum: E:9.7% C:11.3%; calculus: E:50.8% C:48.4%; shallow pocket: E:31% C:19%; deep pocket: E:5.4% C:1%.

4.7. **Prosthetic status** (1, 5, 11, 13, VI, VIII.): Fixed partial denture: number: in E group: 29 persons wore 61 pieces; in C group 37 persons wore 92 pieces. Rate of metal-ceramic dentures was higher (p=0.02) in control’s. Interdental papilla was better preserved (p=0.04) in upper jaw of the controls’. Oral mucosa was not inlamed (p=0.05) in controls’. They wore fixed partial dentures for longer time (p=0.001). Private opinion about the denture is worse (p=0.05) in Group III. The denture was injured 9 times in epilepsy group because of seizure, and 11 times in control group. Removable partial denture: number in E group: 8 persons wore on 12 jaw; in C group 7 persons wore on 13 jaws. Material in E group: 5 acrylic, 4 metal baseplate, C group: 10 acrylic 3 metal baseplate. Supportation is muco-dental (p<0.004) in epilepsy group, and 100% mucosal in control group. Occlusal rest is more (p=0.007) in epilepsy group. Clasp arm is wider in control group (p<0.001). Anchore was bar and clasp retention in epilepsy group, and 100% clasp retention in controls. Seizure injury caused damage 1 time. Complete denture:
number in E group: 8 persons wore on 12 jaws, in C group 3 persons wore on 5 jaws. Material was 100% acrylic in both groups. Extension was conventional in both groups. Seizure injury appeared in one case. Complete edentulousness appeared so early as age 37 and 48 in epilepsy group. Special needs of epilepsy patients were not taken into consideration in designing dentures.

Prosthetic index was worse in epilepsy group (p<0.001).

5. Discussion: Comparison of statistical datas in the three group were verified our classification system. In epilepsy Group I. (67%) treatment plan needs no special consideration. In Group II. (7%) loading is increased, moderate constraints are necessary. In Group III. (26%) breaking of the teeth and dentures might occur so aspiration is a danger. Therefore we recommended strict contraints. In Group IV. patients with severe mental disability excluding compliance during dental treatment. Prosthetic treatment is possible only in anaesthesia.

General anamnesis: WHO datas showed that employment rate of epilepsy patients are 50-75% of healthy population. Unemployed rate are 2-3 times bigger, and 20% of them receiving pension earlier then healthy population. In our survey number of employed epilepsy patients are 68% of controls, 22% of epilepsy patients are earlier on pension that causes worse socio-economic background. The rate of invalid pensioner didn’t correlate to the severity of the disease.

The lower smoking and alcohol drinking rate in epilepsy group are influenced by worse socio-economic background, antiepileptic drugs and seizures. Alcohol drinking and sudden withraw might cause seizure as well.

Neurological datas: Data of our epidemiological study were identical to Rochester Study. Clonisation of the masticatory muscles (77,5%) and oral automatisms (9%) are related to higher attrition and tooth mobility. Modern antiepileptic drugs are already displaced Phenytoin. Psychiatric symptoms appeared in less than quarter of the patients, not in severe form, so dentists shouldn’t be afraid of frequent non compliance.

Dental anamnesis: According to WHO data in 2000. 67,4% of the hungarian population visit dentist only in case of pain. 72% of them are cleaning teeth more than once daily, 7,5% neglect tooth brushing. 96,6% use toothbrush for cleaning teeth. Results above
equal to results of our control’s and significantly better than in epilepsy group. Preventive dental treatments are surpassed inspite of it’s great importance in quality of life, because isolation and lack of iniciativa caused neglecting oral hygiene. They get into worse and worse prosthetic class.

Dental status: WHO global goals for 2000. in: 35-44 age group 20 functioning teeth in 75% of persons, over 65 years: in 50%. Our results fall behind. Fejérdy et al. surveyed 9991 persons and found in 35-44 age group that the number of missing teeth is very high. Hungary is the sixth one comparing eight countries.

According to WHO datas 2000. The DMF-T index in 35-44 age group is: 15,6 and the unprovoked rate DT/FT :0,52. Epilepsy patients are 7 times unprovided DT/FT :3,8 inspite younger average age, becouse of worse socio-economic background, neglecting oral hygiene, and choosing treatment options that are simple. Unprovided rate in control group is twice than WHO datas DT/FT :1,1 that might point to dental provision.

Parodontal status: WHO datas in 2000. in 35-44 age group : maximum CPI scores of hungarian population were the following: healthy gum: 4,5%; bleeding and inflammed gum: 8,3%; calculus :63%; shallow pocket : 21,3%; deep pocket : 3%. Results in epilepsy group are worse inspite of younger average age. Calculus was the highest percentage in each group, that underlines the importance of preventive aspects. Though 50% of epilepsy patients were beneath 35 years, periodontal pocket appeared in higher degree than the hungarian average. Percentage of healthy gum is lower than hungarian average and one-seventh (1/7) of the controls’.

Prosthetic status: The number, material, quality were better in control group. The metal strengthening of the baseplateamong removable partial dentures in epilepsy group and better dental suppportation showed the consideration of the disease, but we recommend precisional attachments for anchorage. Complete edentulousness appears in younger age, and in more people in epilepsy group. We recommend metal base or net, to strenghten the base. Prosthetic index was worse in the epilepsy group.

6. Conclusions:
1. Employment rate, socio-economic background of epilepsy patients are worse than healthy population.
2. 70% of epilepsy patients are well controlled by antiepileptic drugs, so the adequate dental treatment is the same as in healthy population.
3. As the illness is getting serious patients take less care about oral health, so tooth prevention is suppressed, they are in worse prosthetic class, they became completely edentulous sooner.
4. Both the DMF-T index and all the components are worse in epilepsy group, and evidently values are the worse in Group III.
5. Parodontal status is significantly worse because of neglected oral hygiene, overloading of the remaining teeth, and side-effects of antiepileptic drugs. Inflammation of gums and periodontitis are found more often than hungarian WHO datas and control datas.
6. Prosthodontics are not completely acceptable of functional point of view specially for epilepsy patients. Prosthetic index is lower in epilepsy group.
7. Cooperation on interdisciplinar field may strengthen dental prevention.

Publications:
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