

**EPIDEMIOLOGICAL STUDY ON THE PREVALENCE AND
INCIDENCE OF PERIODONTAL DISEASE OF PATIENTS AGED 4-
17 YEARS WITH SYSTEMIC CONDITIONS**

Diana Gheban, A Maxim, Marinela Păsăreanu

Faculty of Dental Medicine, University of Medicine and Pharmacy "Gr.T. Popa", Iași, România

Abstract: The **aim** of the study is to characterize from the epidemiological point of view a group of 122 patients with general diseases, supposed to install gingival overgrowth and to provide valid data related to some epidemiological variables (age, gender, type of disease, biological general data, and clinical aspects of periodontal involvement). **Material and method.** The study was conducted on a sample of hospitalized children and adolescents diagnosed with insulin-dependent diabetes type I, leukemia, chronic renal failure and epilepsy. The group consisted in 122 children, 60 girls and 62 boys, aged between 4 and 17 years, from the Clinic Pediatrics Hospital "St. Maria" Iași and Psychiatric Hospital No. 9 Iași, in the period 2005-2008. We used for comparison a control group, composed 30 children of the same age, without general systemic conditions, which were in dental treatment in assistance upon request. Periodontal status assessment was made by clinical general and local examination and comprehensive para-clinical tests. Indices of periodontal evaluation used: Plaque index (PI), Papillary bleeding index (PBI) and Gingival overgrowth index. Information on diabetes, chronic renal failure, epilepsy and leukemia were recorded from the medical records, discussions with the therapist or family. The systemic disease diagnostic for all children was made based on their general symptoms, most of them (92%) being hospitalized with complicated disease. **Results and discussion.** As regards the distribution group of study on gender is a predomination of female sex (53%). Batch distribution according to age groups is heterogeneous, with maximum values around the age of 17 years. The distribution by type of disease is as follows: 29 cases of insulin-dependent diabetes type I, 31 cases of chronic renal failure, 30 epileptic and 32 cases of leukemia. Graphical representation of classes of variation for plaque index was computed over 10 classes, observing the relative maximum frequency of 47.2% of values between 1.8 and 2.2, followed by values between 1.21 and 1.4 with relative frequency of 37.36% and between 2.61 and 2.8 with relative frequency of 15.38%. For bleeding index were built 10 variation classes; half of the values recorded were between 1-1.2 and 36.17% of records having values between 1.61 and 2.2. A relative frequency of 13 83% is observed for the PBI index values between 2.81 and 3. In our group of patients were recorded overgrowth indices between 1.21-1.4/2 with a relative frequency of 57.41%, from 1.81-2/2 with a relative frequency of 37.4% and higher values between 2.61-1.8/2 in 5.56% of cases. **Conclusions** Drug induced overgrowths are becoming more frequent because of the widespread use of phenytoin, cyclosporine A and calcium channel blockers. Among the factors that influence overgrowth, inflammation, through the oral plaque and pharmacokinetic variables appear to be most important. Hormonal disorders and some diseases may contribute to the overall growth rate of the gingival overgrowth.

Key words: child, gingival overgrowth, diabetes, renal failure, epilepsy, leukemia

Rezumat: Scopul studiului este de a caracteriza din punct de vedere epidemiologic un lot de 122 pacienți cu afecțiuni considerate generatoare de hipercreșteri gingivale și să oferim date valide legate de o serie de variabile epidemiologice (vârstă, sex, tip de afecțiune, constante biologice generale, aspecte parodontale). **Material și metodă** Studiul s-a efectuat pe un lot de copii și adolescenți internați și diagnosticați cu diabet insulino-dependent tip I, leucemii, insuficiență renală cronică și epilepsie. Lotul a fost compus din 122 de copii, 60 fete și 62 băieți, cu vârste cuprinse între 4 și 17 ani, aflați în tratament la Spitalul Clinic de Pediatrie "Sf. Maria" din Iași și în evidențele Spitalului de Psihiatrie nr.9 din Iași în perioada 2005-2008. Am folosit pentru comparare un grup martor de 30 de copii de aceeași vârstă, fără probleme sistemice generale, care erau în tratament stomatologic la cerere. Evaluarea statusului parodontal s-a făcut prin examen clinic complex general și local și prin examene paraclinice. Indicii de evaluare parodontală utilizați: Indicele de placă (PI), Indicele de sângerare papilară (PBI) și Indicele de hipercreștere gingivală. Informațiile privind diabetul, insuficiența renală cronică, epilepsia sau leucemia au provenit din înregistrările medicale, discuțiile cu medicul curant sau familia. Diagnosticarea bolii sistemice s-a făcut la toți copiii pe baza simptomatologiei generale, majoritatea (92 %), fiind internați în faza de complicații a afecțiunilor de bază. **Rezultate și discuții.** În ceea ce privește distribuția lotului de studiu pe sexe, este o predominantă a sexului feminin (53%). Repartiția lotului pe grupe de vârstă este eterogenă, cu valori maxime în jurul vârstei de 17 ani. Repartiția pe tipuri de afecțiuni este următoarea: 29 cazuri de diabetici insulino-dependenți de tip I, 31 cazuri de insuficiență renală cronică, 30 epileptici și 32 cazuri de leucemie. Reprezentarea grafică a claselor de variație pentru indicele de placă s-a calculat pe 10 clase, observându-se o frecvență relativă maximă de 47,2% a valorilor cuprinse între 1,8 și 2,2, urmate de valori cuprinse între 1,21 și 1,4 cu o frecvență relativă de 37,36% și valori cuprinse între 2,61 și 2,8 cu o frecvență relativă de 15,38%. Pentru *indicele de sângerare* s-au construit 10 clase de variație, jumătate din valorile înregistrate fiind situate între 1-1,2, iar 36,17% dintre înregistrări având valori cuprinse între 1,61 și 2,2. O frecvență relativă de 13,83% se observă pentru valori ale indicelui PBI cuprinse între 2,81 și 3. La pacienții din lotul nostru s-au înregistrat indici de hipercreștere cu valori cuprinse între 1,21-1,4/2 cu o frecvență relativă de 57,41%, între 1,81-2/2 cu o frecvență relativă de 37,4% și valori mai mari cuprinse între 2,61-1,8/2 în 5,56 % din cazuri. **Concluzii** Hipercreșterile datorate medicamentelor sunt din ce în ce mai frecvente datorită utilizării pe scară largă a fenitoiniei, ciclosporinei A și a blocanților canalelor de calciu. Dintre factorii care influențează hipercreșterile, cea mai importantă pare a fi inflamația, prin prezența plăcii orale și prin variabilele farmacocinetice. Tulburările hormonale și unele boli generale pot contribui la creșterea frecvenței hipercreșterilor gingivale.

Cuvinte cheie: copil, hipercreștere gingivală, diabet, insuficiență renală, epilepsie, leucemie

INTRODUCTION

Drug induced gingival overgrowth has attracted much interest from researchers, this is reflected in the great number of articles appeared on the clinical manifestations and treatment of these pathological gingival conditions.

PURPOSE

We proposed to characterize from the epidemiological point of view a

heterogeneous group of 122 patients with general diseases, favored to install gingival overgrowth and to provide valid data related to some epidemiological variables (age, gender, type of disease, general data and clinical aspects of periodontal involvement.

In the context of a possible increased incidence of gingival disease in children we get new data to be

THE PREVALENCE AND INCIDENCE OF PERIODONTAL DISEASE

reported compared to earlier studies and international studies conducted with the same epidemiological variables.

MATERIAL AND METHOD

The study was conducted on a sample of hospitalized children and adolescents diagnosed with insulin-dependent diabetes type I, leukemia and chronic renal failure which consists in 122 children, 60 girls and 62 boys, aged between 4 and 17 years, from the Clinic Pediatrics Hospital "St. Maria "Iași records and Psychiatric Hospital No. 9 in Iași, in the period 2005-2008.

We used for comparison a control group, composed 30 children of the same age without general systemic conditions, which were in dental treatment in assistance upon request. Periodontal status assessment was made by clinical general and local examination and comprehensive para-clinical tests to guide us on the periodontal events and contribute to elucidating the factors involved in the emergence of different clinical forms of manifestation of the periodontal disease, factors related to local conditions in children with systemic disease, compared with the healthy.

At each consultation were assessed information contained in the observation sheets.

Periodontal health was evaluated using classic periodontal epidemiological assessment, which allowed quantification of the degree of damage: It was taken on the special examination and interpretation of data on child and adolescent: a single examiner, excluding bags periodontal false teeth to

temporary the peeling and young permanent teeth eruption.

Indices of periodontal evaluation used: *Plaque index (PI)*-bacterial plaque was quantified by calculating the Silness-Löe index (IP) and the percentage of visible plaque on the tooth surfaces. Subjects were interviewed about health habits (frequency, duration and technique of tooth brushing and visits to the dentist.

Papillary bleeding index PBI (Saxen and Muhleman) -The presence or absence of gingival bleeding was assessed on papillas, excluding from the study permanent teeth during eruption and the temporary teeth in flaking.

Gingival bleeding scores were given on a scale of 0 to 4.

Gingival overgrowth index, which comprises two components-a vertical height in relation to the tooth crown and the gingival thickness expressed in a vestibulo-oral direction.

To the vertical component are assigned four values

- 0 - without overgrowth
- 1 - free gingival edge thickening
- 2 - overgrowth covering less than $\frac{1}{2}$ the length of dental crown
- 3 - overgrowth covering more than $\frac{1}{2}$ length of the dental crown.

The values for the horizontal overgrowth component

- 0 - normal thickness
- 1 - thickness up to 2 mm.
- 2 - thickness greater than 2 mm.

Information on diabetes, chronic renal failure, epilepsy and leukemia (type, age, the biological constants characterizing the best condition, and treatments carried out and existing

complications) were recorded from the medical records, discussions with the doctor and the therapist or family.

Systemic disease diagnosis was made on all children based on general symptoms, most (92%), being hospitalized for complications during the basic disease.

When dental investigations, children were already showing pediatrician and medical supervision, follow from the

general therapy, diet, presence of complications overall (through interdisciplinary consultations) and the biological constants.

RESULTS AND DISCUSSION

Group distribution by sex

As regards the distribution group of study on gender is a predomination of female sex (51%) than males (49%) (fig.1).

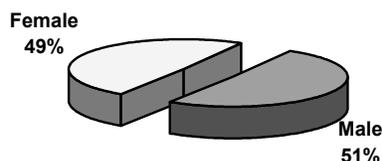


Fig. 1. Distribution of the patients according to sex

Group distribution according to age

The distribution is heterogeneous, with maximum values around the age of 17 years. This allowed the sharing

lot of study on 3 age ranges: 4-11 years prepubertary, pubertary 12-16 years and 17-18 years postpubertary (fig.2).

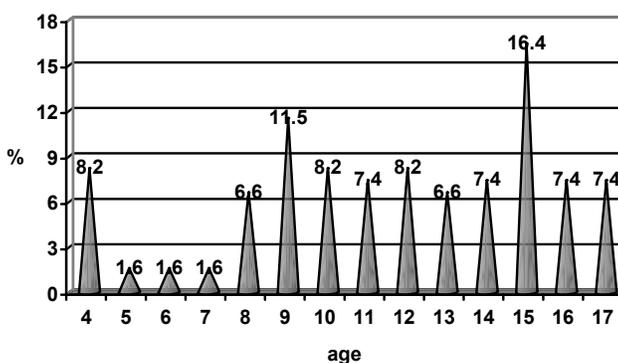


Fig. 2. Group distribution according to age groups

THE PREVALENCE AND INCIDENCE OF PERIODONTAL DISEASE

Frequencies of patients in ages ranging as follows: 16.4% (20 cases) with the age of 15 years, 11.5% (14 cases) with the age of 9 years, 8.2% (10 cases) with the age of 4, 10 and 12 years, and for ages 4-7 years low frequency sensitivity is equal to the value and the lowest 1.6% of the each age group (2 cases).

Group distribution by type of general conditions

The distribution by type of disease is as follows: 29 cases of insulin-dependent diabetes type I, 31 cases of chronic renal failure 30 epileptic and 32 cases of leukemia (fig. 3).

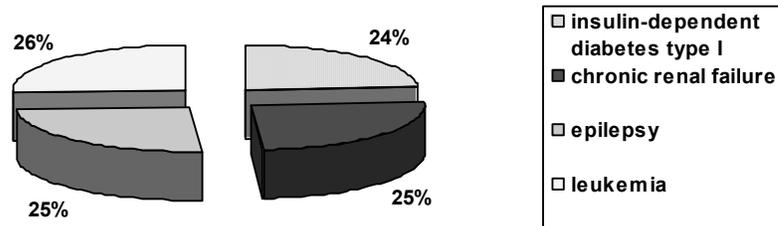


Fig. 3. Group distribution by type of general conditions

Group distribution parameters for assessment of periodontal status

Periodontal status assessment was made by clinical examination and comprehensive general and local laboratory tests to guide us on depth periodontal events and contribute to elucidate the factors involved in the emergence of all forms of clinical manifestation of periodontal disease, factors related to local reactivity.

To calculate the periodontal parameters and examined by us were calculated change strings.

Plaque Index (PI)

Diagram representation of classes of variation for plaque index was computed over 10 classes, observing the relative frequency of up to 47.2% of values between 1.8 and 2.2, followed by values between 1.21 and 1.4 with relative frequency of 37.36% and between 2.61 and 2.8 with relative frequency of 15.38% (fig. 4).

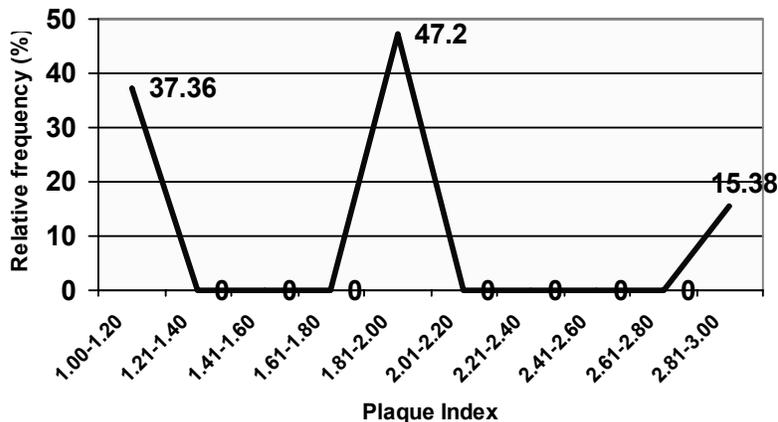


Fig. 4. Plaque Index values

Papilar Bleeding Index (PBI)

For bleeding index were built 10 variation classes, half of the values recorded were between 1-1.2 and 36.17% of records having values between 1.61 and 2.2 (fig. 5). A relative frequency of 13.83% is observed for the PBI index values between 2.81 and 3.

Gingival Overgrowth Index

In our group of patients were recorded overgrowth indices between 1.21-1.4/2 with a relative frequency of 57.41%, from 1.81-2 / 2 with a relative frequency of 37.4% and higher values between 2.61-1.8 / 2 in 5.56% cases (fig. 6).

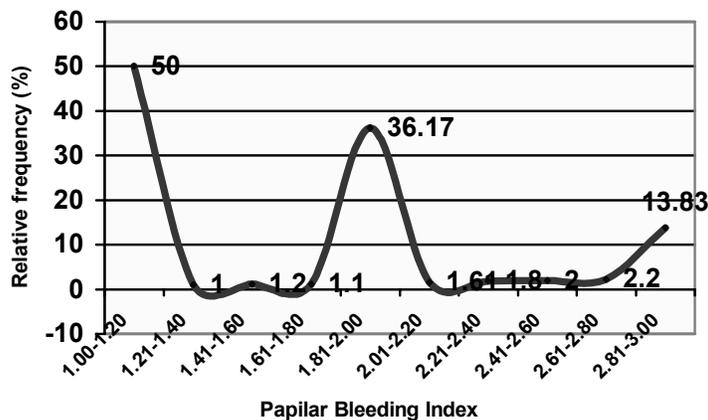


Fig. 5. Papilar Bleeding Index values

THE PREVALENCE AND INCIDENCE OF PERIODONTAL DISEASE

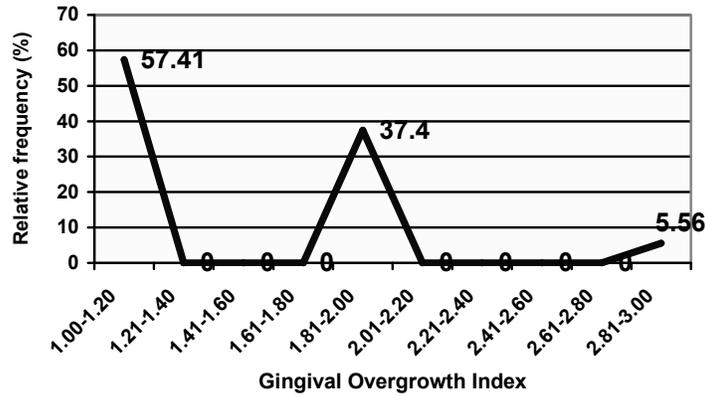


Fig. 6. Gingival Overgrowth Index

For these periodontal parameters was calculated the heritability coefficient and we noticed that, for the convergence matrix G of 99.99% and R of 99.98% in the 67 iterations can be seen strong heritability coefficient (greater than 0.45) only for hemoglobin values, and hematocrit values, while glycosylated hemoglobin and the gingival overgrowth index

have intermediary heritability coefficients (table 1).

We observed strong correlation fenogenotypic and environmental between: plaque index and bleeding index, overgrowth index and plaque index, and between plaque index and bleeding index (table 2).

Table 1. The Heritability Coefficient

Character	Heritability Coefficient
IH	0.39
AGE	0.16
HB	0.83
HT	0.89
HBA1C	0.31
PI	0.55
PBI	0.15

Table 2. Correlation between oral status and systemic condition

Character1	Character2	Fenotypic Correlation.	Genotypic Correlation	Environmental Correlation
IH	AGE	-0.15	-0.14	-0.09
IH	HB	-0.13	-0.12	-0.16
IH	HT	-0.34	-0.31	-0.32
IH	HBA1C	-0.27	-0.22	-0.32
IH	PI	0.63	0.84	0.53
IH	PBI	0.62	0.92	0.58
AGE	HB	0.32	0.56	0.41
AGE	HT	0.66	0.72	0.67
AGE	HBA1C	0.21	0.23	0.28
AGE	PI	-0.19	-0.23	-0.22
AGE	PBI	-0.34	-0.34	0.31
HB	HT	0.39	0.46	0.47
HB	HBA1C	-0.18	-0.19	-0.23
HB	PI	0.23	0.21	0.29
HB	PBI	-0.25	-0.27	-0.26
HT	HBA1C	0.31	0.44	0.36
HT	PI	-0.33	-0.35	-0.36
HT	PBI	-0.16	-0.22	-0.18
HBA1C	PI	-0.31	-0.29	-0.27
HBA1C	PBI	-0.18	-0.12	-0.19
PI	PBI	0.58	0.59	0.63

The interdependence between general pathology and oral pathology at the age of childhood, has been reported in literature, however it does not abound, and there is no comprehensive research in this regard (1,2).

The existence of general and local factors, which occur in periodontal tissue pathology acting in a complex interdependence could be the basis for triggering and evolution of lesions. Although the oral cavity is easily accessible to direct clinical examination and diagnosis of oral diseases in a

systemic context sometimes it is simple and easy to set, clinical signs based on subjective and objective details of pathological processes escape the usual clinical investigations, and may pass unnoticed (1,2).

In the gingival overgrowth due antiepileptic drugs (fig. 7), the basic lesion is characterized by slow, progressive, benign growth in volume of gingival tissues as a side effect of therapy with phenytoin and was described by the Kimbell in 1939 which reported that 57% of those 119 patients

THE PREVALENCE AND INCIDENCE OF PERIODONTAL DISEASE

studied had some degree of gingival overgrowth associated with phenytoin for control of epileptic crisis (3).



Fig. 7. Gingival overgrowth in epileptic child

In diabetes, gingival condition is accentuated, with the development of inflammation (fig. 8), due to the low response of the organism (4).



Fig. 8. Gingival condition in diabetes

Diabetes has been incriminated as a factor of aggravation of pre-existing inflammatory lesions, which led to the emergence of more or less emphasized overgrowth.

In renal failure, gingival hypertrophy (fig. 9), has been shown in 19% of children are suggesting that there is a positive correlation between the degree of damage and gingival

changes of renal function in relation to the filter (5,6).



Fig. 9. Gingival hypertrophy in renal failure

Oral signs and symptoms suggestive of leukemia (fig. 10) have been reported in 29% of children with leukemia. Reduced incidence of oral manifestations in children with leukemia may in part be attributed to early age of diagnosis and increased incidence of leukemia LAL in pediatric age groups. Oral manifestations occur in all types of leukemia and in all age groups, but gingival overgrowth and gingival bleeding and are more frequently encountered in patients with nonlymphocytic leukemia (7).

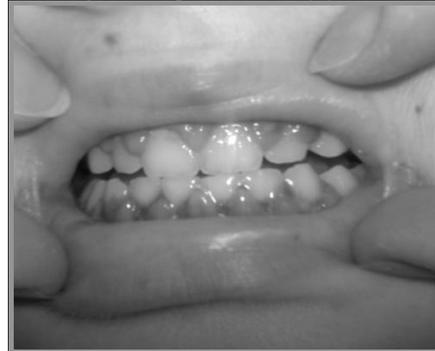


Fig. 10. Oral manifestations in a child with leukemia

Direct invasion of tissues infiltrated with leukemia cells can produce gingival hypertrophy despite a rigorous oral hygiene.

Complex etiopatogenic factors and varied aspects of pathology at different levels of the stomatognathic system and the existence of risk factors represented by some systemic diseases often pose special problems in diagnosis, but also in elucidating the mechanisms of disease,.

CONCLUSIONS

1. Drug induced overgrowths are becoming more frequent because of the widespread use of phenytoin, cyclosporine A and calcium channel blockers.
2. These events occur with predilection on the papilla, at the frontal area mandibular or maxillary, sometimes extending to the attached gingiva. Changes are in volume, texture, consistency and color, bleeding.
3. False periodontal pockets create favorable conditions to retention and development of bacterial plaque, creating a vicious circle which enhances the gingival inflammation.
4. Among the factors that influence overgrowth, inflammation, through the oral plaque and pharmacokinetic variables appear to be most important.
5. Hormonal disorders and some diseases may contribute to the overall growth rate of the gingival overgrowth.

REFERENCES

1. Maxim A, et al: *Tendențe demografice actuale ale afecțiunilor stomatologice la copil și adolescent în România – raport în cadrul workshop-ului Centrului de Colaborare O.M.S pentru sănătate orală din România- Iași 2003.*
2. Koch G, Poulsen S: *Pediatric dentistry - a clinical approach*, Munksgaard, Copenhagen, 2001.
3. Brunet L, Miranda J, Roset P, Berini L, Farré M, Mendieta C: *Prevalence and risk of gingival enlargement in patients treated with anticonvulsant drugs.* Eur J Clin Invest. 2001 Sep, 31(9): 781-8.
4. Cura E, Moraru B, Rusu M, Halițchi G: *Studiu privind statusul parodontal la copiii cu diabet zaharat insulinodependent*, Supliment al Revistei de Medicină Stomatologică, Iași, 2001, 5 (1).
5. David-Nieto E, Carvalinho Lemos FB: *Impact of Cyclosporin A pharmacokinetics on the presence of side effects in pediatric renal transplantation*, J Am Soc Nephrol, 2000, 11: 343-349.
6. Thomason JM, Seymour RA, Ellis JS: *Risk factors for gingival overgrowth in patients medicated with ciclosporin in the absence of calcium channel blockers.* J Clin Periodontol, 2005 Mar, 32(3): 273-9.
7. Quassol, Scipionic et al: *Complicaciones periodontales en las leucemias en edad pediátrica*, Avances en Periodoncia, 2005, 17(2).