INTEGRATION FEATURES OF ORAL HYGIENE AND PERIODONTOPATHOGENIC MICROBIOTA IN CHILDREN WITH GENERALIZED CHRONIC CATARRHAL GINGIVITIS AND ATOPIC DERMATITIS

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Abstract

Introduction. Generalized parodontal diseases with specific features of qualitative and quantitative characteristics of the microbiota fill the body with antigenic substances, prolonging their direct influence on the immune system, which can disrupt the process of recognizing «one's own» - «alien» and trigger a mechanism that potentiates the development of the autoimmune response, as well as of nonspecific factors for body protection. This can be a prerequisite for the development of diseases of the internal organs and systems, including atopic dermatitis in children. The integration features of periodontopathogenic microorganisms in patients with generalized chronic catarrhal gingivitis (GCCG) and atopic dermatitis (AD) are not sufficiently covered. **The purpose** of the present research was to determine the periodontopathogenic microorganisms in the oral fluid in patients with GCCG and IgE-dependent and IgE-independent forms of AD. **Materials and methods.** 60 children (37 boys and 23 girls, age 6-12 years, with GCCG who had an IgE-dependent and IgE-independent form of AD (main group) were examined. Subgroup 1 included 30 children with GCCG with IgE-dependent AD, while subgroup 2 consisted of 30 children with GCCG and IgE-independent form of AD. The comparative group was represented by 30 GCCG children without background pathology. The control group consisted of 30 practically healthy children without oral pathologies. Clinical radiological, microbiological and statistical methods were used. **Results and discussion.** A high percentage of children with GCCG had an unsatisfactory oral hygiene, children with IgE-dependent and IgE-independent forms of AD being observed in PMA - Green-Vermillona index and GI bleeding index 78.0±1.2, 61.0 ± 1.4, 8.0 ± 2.0% of cases in group GCCG of IgE-dependent form of AD and 70.0 ± 1.6, 52.0 ± 1.8, 7.0 ± 2.0% of cases, respectively, in the group of patients with IgE-independent form of AD. In all subgroups of the main group, a high incidence of aggressive microbiota in the mouth was observed. It should be noted that a poor oral hygiene increased the frequency of the presence of periodontal pathogens of the red complex. **Conclusions.** A high frequency of unsatisfactory oral hygiene in groups of patients with GCCG was found, which is more pronounced in children with an IgE-dependent form of AD. Patients with GCCG with IgE-dependent and IgE-independent forms had in the oral fluid only «red complex» of the periodontopathogenic microbiota, which is in direct correlation with the state of their oral hygiene. The occurence of some aggressive periodontopathogenic microorganisms of the «red complex» in practically healthy children, without dental pathology, may serve as a marker of their pre-exposure status.

Keywords: *atopic dermatitis, generalized chronic catarrhal gingivitis, immunological reactivity, genetic determination, periodontopathogenic microflora.*

1. INTRODUCTION

One of the key areas of modern medicine is the attention paid to the health of the pediatric population. First of all, this aims at an early assessment of the pre-health status of children, to prevent many diseases in the adult population of the future. However, often due to certain objective and subjective reasons, the condition of the disease is not possible. In many ways, this is due to the lack of clear ideas on the etiopathogenetic mechanisms of the emergence and development of a number of diseases in children. This connotation, in full, refers to atopic dermatitis, one of the most common manifestations of atopic pathology in childhood. Among adults, atopic dermatitis occurs in 20% of the general population, being characterized by widespread skin eczematous lesions, which have pronounced age-specific features [1,2].

Many researchers point to the genetic determination of this disease and to the immunological preconditions permitting the

ability to form IgE to a greater extent than other Igs [3-6]. In other words, it is considered that a condition for the development of atopic dermatitis in children is a hereditary predisposition to increased IgE production. Scientists have found that the likelihood of atopic dermatitis (AD) is directly proportional to the IgE content of the newborn's serum [1-4]. In this case, the IgE dependent form of AD is taken into account. At the same time, several scientists [1,2] indicate that an increase in IgE does not necessarily indicate the presence of an allergic disease, since increased levels of IgE to the most common antigens were detected in 15% of the completely healthy people.

Especially important is that IgE antibodies are involved in binding of antigens to the oral mucosa. Some scientists, not neglecting the genetic determination in the IgE-dependent form of blood pressure, emphasize the role and significance of chronic foci of mouth infection, considering bacterial infection as responsible for the initiation of atopic dermatitis. In this case, they speak of an IgE-independent form of AD.

Generalized parodontal diseases with specific features of qualitative and quantitative characteristics of the microbiota fill in the body with antigenic substances, their prolonged direct influence on the immune system possibly disrupting the process of recognizing «one's own» - «alien» and triggering a mechanism that potentiates the development of an autoimmune response, as well as of nonspecific factors for body protection. This can be a prerequisite for the development of diseases of the internal organs and systems, including atopic dermatitis in children.

In the literature of the field, the integration features of periodontopathogenic microorganisms in patients with generalized chronic catarrhal gingivitis (GCCG) and AD are not sufficiently covered.

In this regard, **the purpose** of the present research was to determine periodontopathogenic microorganisms in the oral fluid in patients with GCCG and IgE-dependent and IgE-independent forms of AD.

We paid attention to GCCG as a disease that, on one hand, occupies one of the leading places in the structure of dental diseases in children, on the other - GCCG progressing over the years, it leads to complete destruction of all periodontium tissues, teeth loss, impaired speech, chewing apparatus, potentiating the psycho-emotional changes and violating socialization in society [5].

To solve this goal, the following tasks were put forward:

1. To evaluate the level of hygienic condition of the oral cavity in patients with GCCG with an IgE-dependent form of AD.
2. To evaluate the hygienic condition of the oral cavity in patients with GCCG with IgE-independent forms of AD.
3. To determine the composition and frequency of periodontopathogenic microbiota prevalence in the oral fluid in patients with GCCG with IgE-dependent and independent forms of AD [6,7].

2. MATERIALS AND METHODS

60 children (37 boys and 23 girls from 6 to 12 years of age, listed in the dispensary registration in branch No. 6 of the Consulting and diagnostic center of the Shevchenkivskyi district of Kyiv) with GCCG and IgE-dependent and IgE-independent forms of AD (main group) were examined. The diagnosis was established according to Hanitin and Rajka criteria.

Subgroup 1 included 30 children with GCCG with IgE-dependent AD, while subgroup 2 consisted of 30 children with GCCG and IgE-independent form of AD.

The comparative group was represented by 30 GCCG children without background pathology.

The control group consisted of 30 practically healthy children without oral pathologies.

Clinical radiological, microbiological and statistical methods were used.

The clinical methods included clinical examination to determine the hygienic condition of the oral cavity (PMA index, Green-Vermillon index, GI bleeding index). The radiological methods included evaluation of orthopantomograms, as well as the realization of intra-oral near-focal radiographs.

PCR was used to perform microbiological studies on the oral fluid in children with GCCG and AD, by using a DNA assay kit, imported to

Ukraine, for five types of periodontal pathogenic bacteria from Hain Lifescience GmbH, a micro-Identkit. The research was performed according to the Instruction of this set. Microbiological researches were conducted in the Department of Clinical Immunology and Allergology within the Department of Medical Genetics of "Bogomolets" National Medical University.

Statistical methods were ãpplied using the Kruskal-Wallis, Chi-square, and Maras-Cuialo procedures.

3. RESULTS AND DISCUSSION

To determine the role and place of oral hygiene in GCCG patients with different forms of AD, it was considered appropriate to analyze the data of patients with satisfactory and unsatisfactory oral hygiene.

The data obtained from the oral cavity of patients with GCCG are presented in Figures 1, 2.

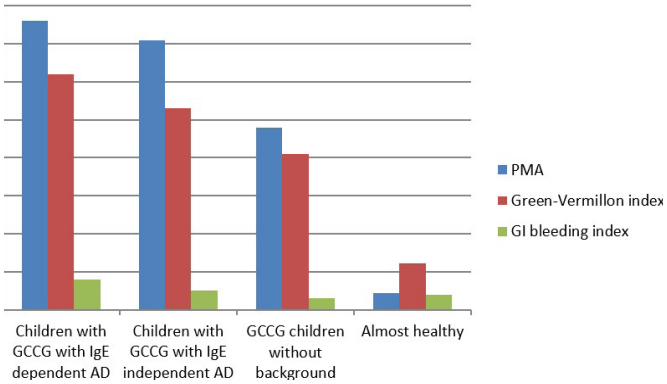

Fig. 1. Frequency of unsatisfactory oral cavity in children with IgE-dependent and independent forms of AD and GCCG

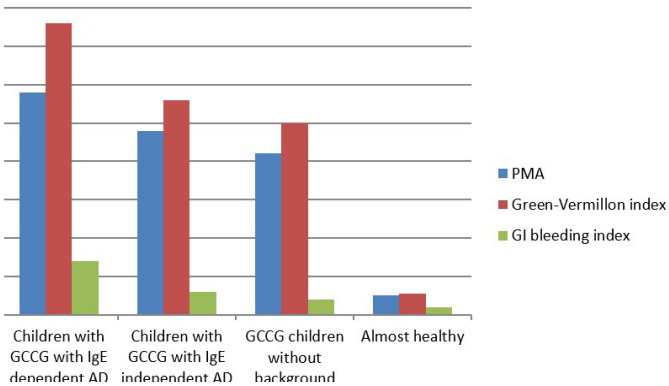

Fig. 2. Frequency of satisfactory oral cavity status in children with IgE-dependent and independent forms of AD and GCCG

A high percentage of children with GCCG had an unsatisfactory oral hygiene, as well as of children with IgE-dependent and IgE-independent forms of AD was registered in PMA, with the Green-Vermillona and the GI bleeding index> 78.0±1.2, 61.0 ± 1.4, 8.0 ± 2.0% of cases in the GCCG group of IgE-dependent form of AD and 70.0 ± 1.6, 52.0 ± 1.8, 7.0 ± 2.0% of cases, respectively, in the group of patients with an IgE-independent form of AD. The most significant changes were observed in PMA and simplified Green-Vermillon index, in both IgE-dependent and IgE-independent AD children. The most unfavorable one was the group of children with IgE-dependent AD, which could indicate the low ability of IgE antibodies to participate in the binding of microbial antigens in GCCG and oral mucosa, thus disrupting the ingress into the inflammatory cells of other protective, cellular and humoral: IgG, complement, neutrophil migration factors, etc.

It can be assumed that the IgE-independent form of AD IgE antigens was involved in the binding of antigens of the microbiota, and 11SIgA could contact specific IgE antibodies on the surface of basophils and, as a result, inflow into the cell inflammation of other protective factors: cellular, humoral as well as non-specific security factors.

The incidence of an unsatisfactory oral hygiene in the comparison group (GCCG without background pathology) by PMA, Green-Vermillon and GI bleeding index were significantly lower than in subgroups 1 and 2 of the main group, being of 48.0 ± 1.6, 40.0 ± 2.5 and 2.0 ± 1.8% of cases, respectively, which could indicate the attraction of compensators of the specific and non-specific factors of protection of the oral cavity, which slow down the development of microbial sensitization of the organism.

The values recorded in the control group differed significantly from those observed in the main and comparative subgroups (Fig. 1).

We noted a similar trend in assessing the frequency of a satisfactory oral hygiene in patients with HCG with IgE-dependent and

IgE-independent forms of AD, being significantly lower than in children with poor condition. The worst results of oral hygiene in GCCG patients were observed in children with IgE-dependent AD. In the comparison and control groups, the high incidence of PMA, Green-Vermillona and GI bleeding indices was significantly lower compared to the IgE-dependent and IgE-independent AD.

The investigations performed evidenced 5 types of microorganisms detected in the oral fluid, all belonging to the «red complex» (Figs. 3,4).

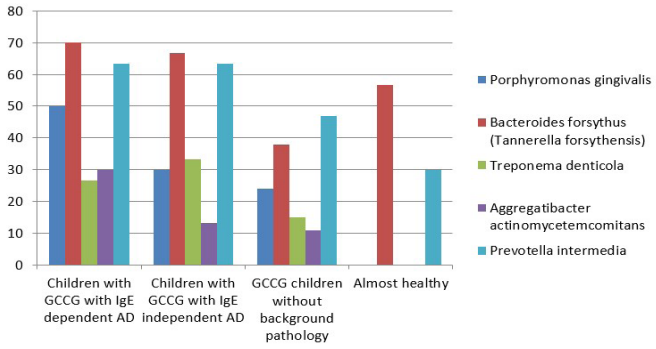

Fig. 3. Frequency of periodontopathogenic microorganisms in the oral fluid of children with GCCG with different IgE-dependent forms with unsatisfactory oral hygiene

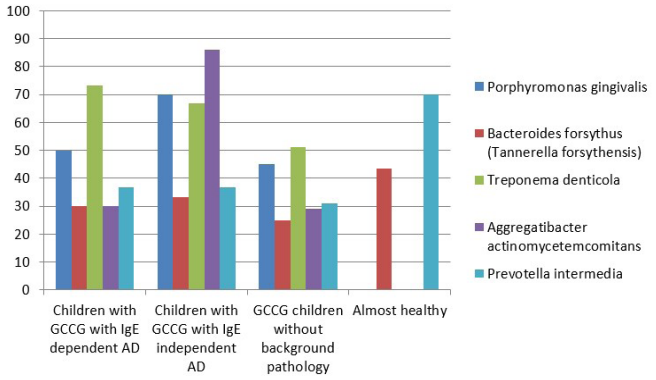

Fig. 4. Frequency of periodontopathogenic microorganisms in the oral fluid of children with GCCG with different IgE-dependent forms with satisfactory oral hygiene

In all subgroups of the main group, a high incidence of aggressive microbiota in the mouth was observed. It should be noted that a poor oral hygiene increased the frequency of the periodontal pathogens of the «red complex».

The presence of aggressive periodontopathogenic microorganisms in the comparison group (sick children GCCG without concomitant pathology AD) showed an increased tendency of their frequency in cases of poor oral hygiene, which confirms that the inflammatory diseases of the tissues are caused by an irritant. As a result, they can potentiate changes in the system of immunological reactivity with the development of delayed-type hypersensitivity to microbial antigens, initiate the development of autoimmune reactions, modify and complicate the course of somatic diseases, thus becoming an obstacle in achieving a sustainable treatment of satisfactory parotid.

Detection of periodontopathogenic microbiota «red complex» (*Treponema denticola and Porphyromonas gingivalis*) in practically healthy children without dental diseases, both with satisfactory and unsatisfactory oral hygiene, may indicate that some latent disease is already developing, which requires the supervision of such children. It can be assumed that the occurence of these microorganisms in the saliva of children, regardless of the hygienic condition in the oral cavity, may serve as a marker of the development of pathology in the periodontium in the future.

4. CONCLUSIONS

1. A high frequency of unsatisfactory oral hygiene in groups of patients with GCCG was found, which is more pronounced in children with an IgE-dependent form of AD.
2. It is revealed that in patients with GCCG with IgE-dependent and IgE-independent forms in the oral fluid, only the «red complex» of the periodontopathogenic microbiota is present.
3. The high frequency of the periodontopathogenic «red complex», which is in direct correlation with the state of oral hygiene in patients with GCCG and AD, has been determined.
4. The occurrence of some aggressive periodontopathogenic microorganisms of the «red complex» in practically healthy children without dental pathology may serve as a marker of their pre-exposure status.

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