

побудовані усі 17 можливих індивідуальних моделей показників варіабельності серцевого ритму (ВСР) в залежності від особливостей конституціональних параметрів тіла, віку та сили стискання кистей з коефіцієнтами детермінації R2 більшими 0,7 (коефіцієнт детермінації R2 обумовлює допустимо залежну змінну в групі статистичних показників ВСР від 81,0 % до 95,7 %; в групі показників варіаційної пульсометрії – від 79,5 % до 91,7 %; в групі показників вегетативного гомеостазу за методом Баєвського – від 76,6 % до 89,8 %; в групі спектральних показників ВСР – від 79,5 % до 86,2 %). Найбільш часто до моделей показників ВСР входять ширина дистальних епіфізів довгих трубчастих кісток кінцівок (23,5 %, переважно нижньої кінцівки), сила стискання кистей (17,6 %, рівномірно на обох кистях), обхватні розміри тіла (12,2 %, переважно за рахунок кінцівок) і вік (11,8 %).

**Ключові слова:** показники варіабельності серцевого ритму, антропологічні показники, практично здорові дівчата, регресійні моделі.

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регресійного аналізу, побудовані всі 17 можливих індивідуальних моделей показників варіабельності серцевого ритму (ВСР) в залежності від особливостей конституціональних параметрів тіла, віку та сили стискання кистей з коефіцієнтами детермінації R2 більшими 0,7 (коефіцієнт детермінації R2 обумовлює допустимо залежну змінну в групі статистичних показників ВСР від 81,0 % до 95,7 %; в групі показників варіаційної пульсометрії – від 79,5 % до 91,7 %; в групі показників вегетативного гомеостазу за методом Баєвського – від 76,6 % до 89,8 %; в групі спектральних показників ВСР – від 79,5 % до 86,2 %). Найбільш часто в моделі показників ВСР входять ширина дистальних епіфізів довгих трубчастих кісток кінцівок (23,5 %, переважно нижньої кінцівки), сила стискання кистей (17,6 %, рівномірно на обох кистях), обхватні розміри тіла (12,2 %, переважно за рахунок кінцівок) і вік (11,8 %).

**Ключевые слова:** показатели вариабельности сердечного ритма, антропологические показатели, практически здоровые девушки, регрессионные модели.

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## THE ROLE OF MICROBIAL COMPONENT IN THE PROGRESSION OF THE ACUTE SUPPURATIVE INFLAMMATION OF TISSUES OF MAXILLOFACIAL AREA IN CHILDREN

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The paper presents the generalization of the experience acquired at the clinic of the Department of Children's Oral Surgery and Propeedics of Oral Surgery at Ukrainian Medical Stomatological Academy, which refers to the study of the role of microbial factor in the etiology, pathogenesis and clinical course of the acute odontogenic and nonodontogenic inflammatory processes in the maxillofacial area in 896 children with lymphadenitis, adenophlegmon and odontogenic osteomyelitis. The comparison of our own achievements and scientific studies, presented in publications, indicate about the urgent need in further routine study of the issue taking into account the possibilities of involving the state-of-the-art technical achievements and developments made in the field of microbiology.

**Key words:** children, inflammatory process, odontogenic lymphadenitis, osteomyelitis, maxillofacial area.

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Among the key factors that lead to increase in number of children with inflammatory processes of the oral cavity and maxillofacial area, the most significant are [1, 3, 9].

Socio-biological: health disturbances in the vast majority of pregnant women during pregnancy; low level of awareness of parents, relatives and children with regard to dental morbidity; prevalence of artificial and mixed feeding of babies and the acute infections and general somatic diseases in the history; low level of physical development of the child. Socio-hygienic: unsatisfactory hygiene of the oral cavity and low efficacy of the sanitary-educational activities, poor effectiveness of dental preventive measures, delayed ask of parents for medical aid and non-fulfillment of doctors' recommendations. Purely social: outdated dental armamentarium or lack of effective treatment and preventive programs concerning the target groups of population (both pregnant women and children), impoverishing of the fellow citizens.

**The purpose** of paper was the study of generalization and comparison of our own observations and publication data regarding the role of microbial factor in the onset and clinical course of the acute nonspecific inflammatory processes in the maxillofacial area in children.

**Method and material.** We have analyzed the results of the comprehensive 10 year long examination of 896 children with acute inflammatory processes of maxillofacial area of both odontogenic and nonodontogenic origin. All children received treatment at the Surgical Unit of Poltava Children's Municipal Clinical Hospital, affiliated to the Department of Children's Oral Surgery at HSEEU "Ukrainian Medical Stomatological Academy". Special consideration has been given to the findings of the microbiological and serological examinations, reported in the histories of patients with lymphadenitis (420 cases (46.9%)), adenophlegmon (26 cases (29.1%)) and acute odontogenic osteomyelitis (215 cases (24.0%)). Bacteriological

examination of the wound effluent has been made at the moment of surgery and on day 6-7 of treatment to determine the qualitative and quantitative characteristics of microbial flora in compliance with medical recommendations on the General Clinical Microbiology. Antibiotic sensitivity of the selected strains of bacteria has been also studied and their serological diagnosis has been made.

**Results and discussion.** While considering the etiology and pathogenesis of the inflammatory processes in the maxillofacial area it is necessary first to pay attention to the correlation of the "microorganism-macroorganism" system, which, undoubtedly, inerects with each other, since the study of the role of the single link of the biological system only inevitably leads to the erroneous interpretation of the involvement of the compound mechanisms of the progression of inflammation. We hypothesize that dominant factors have a significant impact on this, influencing on the antenatal and postnatal periods of child's development (64 to 100%) [5]. Apparently, all of them, regardless of the origin, are infectious in nature. It has been generally assumed that odontogenic microbial flora (96-98%) is the prevalent etiological factor, which extends from the tooth cavity due to the dental caries aggravation, first in the apical periodontium and then through multiple small holes in the cortical plate of the alveolar socket into medullary canal of the alveolar ridge [2, 4, 13]. Noteworthy, the most of them are representatives of the normal microflora, which vegetate on the skin and oral mucosa. Due to their disintegration and lesions of marginal periodontium, as well as significant destruction of hard tooth tissues, bacteria penetrate into adjoining tissues. Some of them are killed immediately under the influence of the factors of non-specific and specific host defense. Others, on the contrary, adapt to new conditions of coexistence and begin to reproduce rapidly. Notably, the progression of infectious-inflammatory process requires the presence of the "critical" concentration of the pathogen, the aggressiveness of which largely depends on its pathogenic properties. This view is also confirmed by the findings of our studies [4, 6, 7, 8, 14].

Recently, opportunistic pathogenic bacteria, particularly, obligate anaerobic bacteria that do not produce spores, have been of particular importance in the etiology of odontogenic inflammatory diseases of the maxillofacial area. V.V. Roginskiy reports that such microorganisms account for 65-67% of the whole number of the selected strains. Among them bacteroides and fusobacteria are the most commonly found, mostly presented by the human saprophytic bacteria. They vegetate on the mucosa and in the dentoalveolar plaque much more often than the anaerobes. However, it is proved that lowering of immunologic reactivity of the body can accelerate biological aggressiveness of these microorganisms, leading to inflammation. Being opportunistic pathogenic, these microorganisms have a number of "benefits": a high degree of virulence, marked toxigenity and resistance to the majority of antibacterial medications that was confirmed by our observations [10, 13]. Obviously, the presence of the association of Streptococcus and Staphylococcus in the effluent is crucial, but once the fact of presence of anaerobes is not established, the final diagnosis cannot be considered as reliable. This is confirmed by the bacteriological study of different substrates of purulent wounds, resulted in obtaining of "sterile" inoculations without the presence of the strain [11].

In particular, we have established that microbial strains in the focus of infection were presented mainly by Streptococcus in monoculture in patients with such limited forms of the acute odontogenic infection as periodontitis and periostitis, and in complicated course of the acute odontogenic osteomyelitis of the jaws staphylococci in association with beta-hemolytic Streptococcus have been found [7, 8, 9].

Widespread use of antibiotics of different pharmacological groups led to the change in species composition and biological properties of the strains of pyogenic microbial flora, leading to the decrease in the effectiveness of antibiotic therapy with a tendency to increased severity of many inflammatory diseases, making the purulent infection generalized and chronic. This fact does not contradict with our findings, showing the high incidence of such event, accounting for 15 to 20%, depending on the nosology of the disease [11]. V.S. Agapov ascertains that this is caused first by the increasing virulence of the microorganism, associativity of composition of microflora of the purulent focus, changes of immunologic reactivity of the body and presence of the prolonged odontogenic foci of chronic infection. The recent significant changes contribute to the increased incidence of mortality after severe inflammatory processes (0.13-0.3%) [2].

The progression of the inflammatory processes in the perimaxillary soft tissues, caused by anaerobic bacteria is quite specific. In this way the leading role is given to the inflammatory reactions of the body associated with the market intoxication, whereas local clinical manifestations are characterized by the predominance of necrosis of the tissues above the exudation. Unfortunately, we do not possess the adequate resources to make the studies more profound [12]. The progression of the inflammatory process caused by the pathogenic strains of Staphylococcus greatly contributes to the incidence of more widespread destruction of bone tissue. At the same time nonpathogenic strains of staphylococci and streptococci cause the progression of limited bone injury or evident tendency to spread the inflammation to the adjacent soft tissues [1, 5].

Furthermore, our own achievements and world experience indicate that the progress of the acute inflammatory process is quite closely related both to the biological properties of microorganisms and their amount, and immune status of the patient. Topographoanatomic location of the focus of inflammation, as well as its correlation with other areas and cellular spaces, possessing the relevant immunological potential, which we confirmed, is of great importance, too [4, 11].

In response to microbial aggression the patient's body activates the systems of various adaptive and protective reactions that are defined as reactivity and presented by the nonspecific and specific protective factors [7, 9, 14].

Nonspecific reactions are primary ones and protect the body in case of the contact with pathogens regardless of its species identity and play a certain role in elimination of opportunistic pathogenic bacteria, whilst the specific reactions determine the possibility of protection against specific antigenic stimuli; however, these two systems are working synchronously, interacting in different periods of ontogenesis and at different stages of immunogenesis [4, 10]. The severity of the clinical course of the acute odontogenic inflammation depends not only on the pathogen species, but is determined by the degree of sensitization and the degree of nonspecific reactivity of the organism. Depending on the ratio of these factors three types of clinical course of the inflammatory process are distinguished: normoergic, hypoergic and hyperergic. Recently, the problem of early diagnosis of the types of inflammatory response has been of special importance, since it defines the doctor's approach in choosing pharmacological drugs for local and general treatment, allows predicting the likelihood of the occurrence of complications and warning them. In hyperergic and hypoergic forms of inflammation the strength of the immune response is partly lost, affecting the final outcome of the disease. It should be noted that at the time of hospitalization our serological studies of blood serum of children with streptococci, detected in the wound during the opening of the abscess, showed no increase of titres of antistreptococcosis antibodies [11, 14].

One of the features of odontogenic inflammatory processes is that carious lesions of the hard tooth tissues and their complicated forms cause permanent additional antigen load on maxillofacial tissues, contributing to the formation of the foci of chronic infection. Importantly, unsteady balance is established between them and the patient's body, which can be immediately broken as a result of the changes of immunologic reactivity or increased virulence of infectious agent. This excluded the possibility of the onset of inflammation, clinical features of which is dependent only on the localization and the prevalence of inflammation in the jaw and perimaxillary tissues [10].

Clinical observations show, that the acute odontogenic inflammatory process is often preceded by hypothermia or overheating, excessive UV exposure, physical and emotional defatigation, acute infections. Apparently, the mechanism of the influence of the above factors is associated with the formation of the general non-specific reaction of the body, i.e., response activation, since the increase of the functional activity of immunocompetent systems causes the rise of immunological capacity of the tissue directly in the focus of infection, too [4, 6, 14].

Evidently, in the progression of infection accumulation of the "critical" concentration of the pathogen is more important than the presence of microbial agent and its virulent properties. It has been experimentally and clinically established that the progression of inflammatory process requires that the total number of bacteria in the biological substrate should exceed the amount of  $10^5 - 10^6$  of microbial cells per 1 ml, or 1 g of tissue, that is confirmed by the general surgical research made on this issue. We have been emphasizing that the method of quantitative accounting of microbial flora in the inflammatory processes of maxillofacial area in children has not been widely used, that was ascertained by the small number of both domestic and foreign publications [5, 10]. Publication data report that the impact of the degree of microbial sensitization of the organism as the triggering factor for the resolution of the pathological process in the progression of inflammation is of significant importance. Skin allergic tests of patients with chronic foci of inflammation of the oral cavity have shown that the pre-sensitization of the body to Staphylococcus and Streptococcus was accounted for 84.0% and 66.0% of patients, respectively, indicating about the significant role of this factor in the progression of inflammatory process. However, the nature of the occurrence of significant sensitization to allergens of Staphylococcus and Streptococcus in anaerobic infection is still under investigation [2].

Generally, the qualitative and quantitative characteristics of microbial flora and allergization are not always the key factors in the progression of inflammation. Moreover, the disbalance between the resistance of the immune system and bacterial factor is crucial. Most likely, this is due to the individual feature of the reactions of the body on the effect of the disturbing agent that is in fully concordance with our findings [7, 12].

*Perspectives of further research.* Purulent effluent sampling for microbiological study is mandatory in children's odontogenic and nonodontogenic maxillofacial suppurative inflammatory processes. Consideration of both the biotope species and its dynamic qualitative and quantitative characteristics is advocated to determine the need in correction of the antibiotic therapy.

### Conclusions

In conclusion, notwithstanding the significant success of the medical science the resolution of conceptual issues on the role of the microbial component in the etiology and pathogenesis of odontogenic and nonodontogenic inflammatory processes has not been made to date. Some authors signify the odontogenic infection without regard to its quantitative and qualitative properties. Other researchers, including us, emphasize the importance of such characteristics as the biological aggressiveness of microbial strains, especially opportunistic ones, their quantitative parameters and the severity degree of sensitization of the body to bacteria, which vegetate directly in the oral cavity. Although the contradictory views on this situation, we believe that this process should be considered from the perspective of multifactor influence on the onset and progress of the acute nonspecific inflammatory diseases of face and neck in children.

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### Реферати

#### РОЛЬ МИКРОБНОГО КОМПОНЕНТУ У РОЗВИТКУ ГОСТРОГО ГНІЙНОГО ЗАПАЛЕННЯ ТКАНИН ЩЕЛЕПНО-ЛИЦЕВОЇ ДІЛЯНКИ У ДІТЕЙ

Ткаченко П.І., Доброскок В.О., Коротич Н.М., Колісник І.А., Труфанова В.П.

У статті представлено узагальнення досвіду накопиченого в клініці кафедри дитячої хірургічної стоматології з пропедевтикою хірургічної стоматології ВДНЗУ «Українська медична стоматологічна академія», що стосується вивчення ролі мікробного фактора в етіології, патогенезі і клінічному перебізі гострих одонтогенних і неодонтогенних запальних процесів щелепно-лицевої ділянки у 896 дітей з лімфаденітом, аденофлегмоною і одонтогенним остеомиелітом. Співставлення особистих досягнень і наукових розробок, представлених в періодичних виданнях, вказують на нагальну необхідність подальшого повсякденного вивчення даного питання з врахуванням можливостей залучення сучасних технологічних досягнень і напрацювань в галузі мікробіології.

**Ключові слова:** діти, запальний процес, одонтогенний лімфаденіт, остеомиеліт, щелепно-лицьова ділянка.

#### РОЛЬ МИКРОБНОГО КОМПОНЕНТА В РАЗВИТИИ ОСТРОГО ГНОЙНОГО ВОСПАЛЕНИЯ ТКАНЕЙ ЧЕЛЮСТНО-ЛИЦЕВОЙ ОБЛАСТИ У ДЕТЕЙ

Ткаченко П.И., Доброскок В.А., Коротич Н.М., Колесник И.А., Труфанова В.П.

В статье представлено обобщение опыта накопленного в клинике кафедры детской хирургической стоматологии с пропедевтикой хирургической стоматологии ВДНЗУ «Украинская медицинская стоматологическая академия», что касается изучения роли микробного фактора в этиологии, патогенезе и клиническом течении острых одонтогенных и неодонтогенных воспалительных процессов челюстно-лицевой области у 896 детей с лимфаденитом, аденофлегмонами и одонтогенным остеомиелитом. Сопоставление личных достижений и научных разработок, представленных в периодических изданиях, указывают на настоятельную необходимость дальнейшего повседневного изучения данного вопроса с учетом возможностей привлечения современных технологических достижений и наработок в области микробиологии.

**Ключевые слова:** дети, воспалительный процесс, одонтогенный лимфаденит, остеомиелит, челюстно-лицевая область.

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