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The problem of eco-dependent states in the area of public health (on the example of dental health)

Anna Vladimirovna Gordeeva/0000-0001-6948-3950*

Irina Dmitrievna Sitdikova /0000-0002-3699-5359*

Irina Alexandrovna Galimova /0000-0003-4887-0358**

Olga Anatolievna Gurevskaia/ 0000-0003-3378-7973**

Irina Nikolaevna Usmanova/ 0000-0001-7876-6020**

Violetta Robertovna Detochkina /0000-0002-1886-6975***

ABSTRACT

An integrated approach to the examination, differentiated treatment and rehabilitation of patients with various forms of recurrent aphthae of the oral cavity (K12.0) allows increasing the effectiveness of treatment, restoring the microbial landscape characteristic of a healthy oral cavity, increasing the period of remission of the disease, and reducing the rate of relapses and the severity of clinical manifestations. The clinical manifestations of chronic recurrent aphthae of the oral cavity in residents of regions with adverse environmental factors, including those with a developed petrochemical industry, using the example of the city of Ufa, are characterized by certain manifestations, which contributes not only to a slowdown in the process of recovery and regenerative processes in the area of pathological elements on the oral mucosa. The microbiological method using modern test systems found an extremely diverse state of the microbiota of the oral cavity and its species diversity on the surface of aphthae in patients with gastrointestinal pathologies. Using the microbiological method, we determined the triggers and established the role of various microorganisms - enterococci, staphylococci, streptococci, yeast-like fungi of the genus *Candida* (*C. albicans*) and obligate anaerobes in exacerbating the clinical course of recurrent aphthae of the oral cavity. The data obtained can serve as an indication for the development of an integrated approach to examination, the development of differentiated treatment regimens and rehabilitation of patients with pathology of the gastrointestinal tract and various forms of recurrent aphthae of the oral cavity (K12.0), which will not only increase the effectiveness of local and general treatment but also restore the microbial landscape characteristic of a healthy oral cavity, increase the period of remission, reduce the rate of relapses and the severity of clinical manifestations in this category of people.

KEYWORDS: eco-dependent conditions, recurrent aphthae of the oral cavity, mucous membrane, microbial contamination, gastrointestinal pathology

* Kazan Federal University, 420008, Kazan, 18 Kremlyovskaya str. annagordeeva92@mail.ru

** Federal State Budgetary Establishment of Higher Education "Bashkir State Medical University" of the Ministry of Health of the Russian Federation, 450008, Republic of Bashkortostan, Ufa, 47 Zaki Validi str.

*** Non-profit joint-stock company "Medical University of Astana", Nur-Sultan, Kazakhstan, Beibitshilik str., 49a.

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El problema de los estados eco dependientes en el ámbito de la salud pública (sobre el caso de salud oral)

RESUMEN

Un enfoque integrado para el examen, el tratamiento diferenciado y la rehabilitación de pacientes con diversas formas de aftas recurrentes de la cavidad oral (K12.0) permite aumentar la efectividad del tratamiento, restaurando el paisaje microbiano característico de una cavidad oral sana, aumentando el período de remisión de la enfermedad y reducción de la tasa de recaídas y la gravedad de las manifestaciones clínicas. Las manifestaciones clínicas de aftas recurrentes crónicas de la cavidad oral en residentes de regiones con factores ambientales adversos, incluidos aquellos con una industria petroquímica desarrollada, utilizando el ejemplo de la ciudad de Ufa, se caracteriza por ciertas manifestaciones, lo que contribuye no solo a una desaceleración en el proceso de recuperación y procesos regenerativos en el área de elementos patológicos en la mucosa oral. El método microbiológico que utiliza sistemas de prueba modernos encontró un estado extremadamente diverso de la microbiota de la cavidad oral y su diversidad de especies en la superficie de las aftas en pacientes con patologías gastrointestinales. Utilizando el método microbiológico, determinamos los desencadenantes y establecimos el papel de varios microorganismos: enterococos, estafilococos, estreptococos, hongos similares a levaduras del género *Candida* (*C. albicans*) y anaerobios obligados a exacerbar el curso clínico de las aftas recurrentes de la boca. Los datos obtenidos pueden servir como una indicación para el desarrollo de un enfoque integrado para el examen, el desarrollo de regímenes de tratamiento diferenciados y la rehabilitación de pacientes con patología del tracto gastrointestinal y diversas formas de aftas recurrentes de la cavidad oral (K12.0), lo que no solo aumentará la efectividad del tratamiento local y general, sino que también restaurará el paisaje microbiano característico de una cavidad oral sana, aumentará el período de remisión, reducirá la tasa de recaídas y la gravedad de las manifestaciones clínicas en esta categoría de personas.

PALABRAS CLAVE: afecciones ecodependientes, aftas recurrentes de la cavidad oral, membrana mucosa, contaminación microbiana, patología gastrointestinal.

Introduction

Chronic diseases of the gastrointestinal tract in the modern aspect are a serious problem for modern medicine in general, due to their steady growth on average up to 65% of cases, as a number of authors state. Currently, many researchers pay great attention to studying the mechanisms of the onset and progression of diseases of the gastrointestinal tract with manifestations on the oral mucosa, due to the fact that the oral cavity is the initial part of the digestive tract and the pathological processes that occur in this case most often have

manifestations of a specific nature (Lesions of the oral mucosa, 2017; Usmanova, 2016; Clemente et al., 2012).

Manifestations of the pathology of the oral mucosa, regardless of the presence of somatic diseases, is one of the most difficult and important problems of modern dentistry, which requires a more thorough examination using additional research methods. The reasons for the development of the pathology of the mucous membrane also have their own characteristic features depending on the presence of a complex of influence of various etiological factors, the region of residence, as well as on the relationship of pathogenetic factors with somatic status and chronic stress (Usmanova et al., 2015; Chim, 2012). In this regard, patients with gastrointestinal pathologies and recurrent aphthae of the oral cavity who seek specialized help, actively need not only a thorough comprehensive somatic examination by related specialists - gastroenterologists, therapists, immunologists, as well as a set of examinations by dentists-physicians (Lesions of the oral mucosa, 2017; Round et Mazmanian, 2009).

The prevalence of recurrent aphthae of the oral cavity in the modern aspect does not depend on any age criteria and gender differences. Nevertheless, cases of manifestation of a severe course of recurrent aphthous stomatitis with certain clinical symptoms are very common in dental practice (Lesions of the oral mucosa, 2017; Usmanova et al., 2015; Round et Mazmanian, 2009).

The analysis of the data obtained by flow cytometry allowed many researchers to note the accumulation of IgM and IgG, an increase in the integral protein ICAM-1, as well as the development of macrophage-lymphocytic tissue infiltration. In samples of oral fluid and in blood serum, non-specific protection factors are violated in the form of changes in the composition of subpopulations and enzymatic activity of lymphocytes, an increase in the number of cytotoxic lymphocytes (CD8+), and a decrease in the number of T-helper cells (CD4+) in peripheral blood. In 10-12% of cases in patients, the clinical manifestations of recurrent aphthous stomatitis take on characteristic features in the form of a permanent course, which is typical for Setton aphids in Behcet's disease, while 40% of cases of analysis of the data of additional research methods have HLA - B51 system antigens found in the blood (Galizina, 2014; Jünemann et al., 2012; Clemente et. al., 2012).

The state of the microbial biocenosis of the oral cavity in patients with recurrent aphthae of the oral cavity is directly dependent on the influence of various negative factors,

which determines the interconnected triggers for the development and maintenance of the pathological process not only on the oral mucosa but also in the body in general (Lesions of the oral mucosa, 2017; Usmanova, 2016; Round et Mazmanian, 2009; Chim, 2012).

Thus, patients with recurring aphthae of the oral cavity on the background of chronic gastrointestinal diseases are recommended to use clinical and laboratory methods to plan common approaches to the management of local and general treatment, which determined the relevance and objective of our study.

1. Methods

To solve the tasks, a comprehensive examination of 250 young people (average age - 32.2 ± 1.4 years) with diseases of the gastrointestinal tract was carried out. Using the open sampling method, we distinguished two clinical groups of patients comparable by sex and age. The main group included 90 patients with diseases of the gastrointestinal tract with chronic gastritis and duodenitis, chronic pancreatitis and cholecystitis with biliary dyskinesia with the presence of manifestations of recurrent aphthae of the oral cavity. The control group consisted of 35 patients with diseases of the gastrointestinal tract without pathology of the oral mucosa.

Dental examinations conducted in this category of persons included the recording of complaints, anamnesis vitae and anamnesis morbi, an assessment of the intensity of the manifestation of a pain symptom over time, as well as the severity and duration of local symptoms in the oral cavity. The diagnosis of the dental status of the examined patients used the STEPS approach that includes WHO recommendations, 2013.

The scheme of a comprehensive examination by gastroenterologists, therapists, and allergists consisted of a survey, analysis of data obtained by ultrasound of the internal organs, complete blood count and blood chemistry, and immunogram data (Vlasova et al, 2000).

To study the species composition of microbiota from the surface of the aphthous element (aphthous, ulcers) in patients, clinical material was collected from the surface of the lesion elements. Subsequently, to isolate facultative anaerobic microorganisms, the material was inoculated on special HiCrome differential diagnostic media for their further cultivation and subsequent identification of microorganisms. A part of the obtained clinical raw material from the surface of the aphthous element (plaque) was tested on a PCR analyzer. PCR testing

of the clinical material was carried out in real time using the Dentoscreen test system for 6 types of periodontopathogens: *Porphyromonas gingivalis*, *Treponema denticola*, *Aggregatibacter actinomycetemcomitans*, *Tannerella forsythensis*, *P. endodontalis*, *Fusobacterium nucleatum*, *Prevotella intermedia*. The advantage of using PCR diagnostics is the ability to detect not only viable bacteria but also the identification of DNA fragments of the studied microorganisms in the resulting clinical material. To determine the quantitative secretory immunoglobulin A, the IgA sector-IFA-BEST kit was used using the enzyme-linked immunosorbent assay. The concentration of lysozyme in the samples of the oral fluid was studied using the agar gel diffusion method (Vlasova, 2000; Usmanova et al., 2015; Clemente et al., 2012).

Statistical processing of the obtained data was carried out on a personal computer. The level of significance was $p \leq 0.05$.

2. Results

To achieve our goals, we carried out a comprehensive dental examination of 250 patients with diseases of the gastrointestinal tract of the therapeutic department of the Clinic of FSBEI HE BSMU in the city of Ufa, and in the course of a targeted sampling we selected 90 men and women, aged 24 to 45 years, with chronic gastritis and duodenitis (49 patients), with chronic pancreatitis and cholecystitis and with biliary dyskinesia (51 patients).

During a comprehensive dental examination of patients with diseases of the gastrointestinal tract, recurrent aphthae of the oral cavity were diagnosed in an average of 37% of cases.

Painful aphthae with a corolla of hyperemia and covered with dense yellowish fibrinous plaque irremovable during scraping were more often located on the mucous membrane of the transitional fold of the upper or lower jaw in 28.9% of cases; more round aphthae were located on the transitional fold of the mucous membrane of the upper or lower lip in 21.1%, on the lateral surface or on the tip of the tongue in 18.9%, on the mucous membrane of the cheeks in 5.5% and a mixed form in 25.6% of cases.

The mucous membrane of the oral cavity was brighter in color, the aphthae were oval in shape, up to 3 mm in size, with clear boundaries and a rim of hyperemia, covered with a fibrinous coating, with sharp pain on palpation. The duration of aft existence is no more than

10-14 days, the periods of remission are also different and can vary on average from 1-2 to 6-12 months.

When examining the organs of the oral cavity, we studied the condition of the vermilion border and the corners of the mouth with a focus on their color, size, and the presence of pathological elements. Most often, patients complained of dryness and non-aesthetic appearance of the vermilion border and corners of the mouth. $58.8 \pm 0.33\%$ of the examined were diagnosed with meteorological cheilitis (dry vermilion border, flakes, and cracks), $29.6 \pm 0.66\%$ exfoliative cheilitis (dry form) - grayish flakes tightly attached in the center to red border and lagging along the edges, easily removable, with exposure of a bright red surface. Only $11.7 \pm 0.15\%$ of patients with a clinical dental examination had no pathological changes in their vermilion border. Recurrent herpes was detected on average in $33.8 \pm 0.08\%$ of cases. Desquamative glossitis was diagnosed in $54.4 \pm 1.4\%$, diamond-shaped glossitis was diagnosed in $33 \pm 1.2\%$ of the examined individuals.

Patients with chronic gastritis were in normal condition, had their skin clean, regional lymph nodes not palpated, and the face configuration not changed. Clinical manifestations of recurrent aphthae of the oral cavity on the oral mucosa are characterized by the appearance of painful oval secondary elements - aphthae in the amount of 0.1 to 0.8 mm, covered with fibrinous yellowish-white bloom in an average amount of 1 to 3, surrounded by a clear periphery of the aphtha with hyperemia, or inflammatory infiltration is observed. The main complaints during the survey of patients with chronic gastritis and duodenitis are heaviness and pain in the epigastric region, impaired taste perception in 69% of cases, respectively.

In the oral cavity, the mucous membrane is hyperemic in the area of aphthae in 37% of cases, with a whitish-gray plaque on the dorsal surface of the tongue - 100%, hypertrophic changes in the fungiform papillae of the tongue - 92%, as well as desquamative glossitis in 16.2% of cases.

Patients with chronic duodenitis, chronic pancreatitis, and cholecystitis with biliary dyskinesia were in satisfactory general condition. Most often, patients complain of burning and soreness in the tongue, aggravated in the evening, or bitterness in the mouth - 33% of cases. Objectively, atrophy of the filiform papilla and the presence of yellow plaque on the dorsal surface of the tongue, hyperemic mucous vestibule and the oral cavity proper are

determined in 83% of cases, tongue edema, dryness and taste disturbance are observed on average in 33% of examinations.

100% of patients with chronic recurrent aphthae had representatives of *Enterococcus spp.*, *Staphylococcus spp.*, *Streptococcus spp.* revealed. 45.6% of the examined patients had microorganisms not characteristic of the oral cavity, both aerobic and anaerobic - *Escherichia spp.*, *Klebsiella spp.*, *Bacteroides spp.* In 20% of cases in individuals with recurrent aphthae, yeast-like fungi of the genus *Candida* (*C. albicans*) in the amount of 10^1 - 10^2 CFU/ml were detected, in 39.2% of cases a quantitative increase in yeast-like fungi of the genus *Candida* (*C. albicans*) from 10^3 to 10^4 CFU/ml was observed. In 40.8% of cases, an increase was from 10^3 to 10^5 CFU/ml ($p \leq 0.05$). The number of yeast-like fungi in the oral cavity among the young people with recurrent aphthae of the oral cavity examined by us ranged from lg 1.0 CFU/ml to lg 5.0 CFU/ml.

Microscopic examination of smears from various parts of the oral cavity most often found yeast-like fungi of the genus *Candida* (*C. albicans*) in smears from the tongue in 55% of cases, mucous membranes of the cheeks and gums in an average of 22% of cases.

The results of PCR diagnostics in patients with recurrent aphthae of the oral cavity in 64% of cases showed the average prevalence of obligate-anaerobic microorganisms in the affected areas - *Porphyromonas gingivalis*, *Treponema denticola*, *Aggregatibacter actinomycetemcomitans*, *Tannerella forsythensis*, *Fusobacterium nucleatum*, *Prevotella intermedia*.

3. Discussion

During the healing period of aphthae, a whitish, opalescent area remains on the mucous membrane in the area of their location, most often disappearing without a trace within 7-10 days, which indicates a fibrinous form according to the ICD-X classification – small aphthae, of moderate severity.

However, when interviewing patients, the most painful single or multiple aphthae were located in transitional folds and on the lateral surface of the tongue. In the oral cavity, this was clinically expressed in increased tissue infiltration, hyperemia in the area of aphtha location.

Patients with chronic gastritis were in normal condition, had their skin clean, regional lymph nodes not palpated, and the face configuration not changed. Clinical manifestations

of recurrent aphthae of the oral cavity on the oral mucosa are characterized by the appearance of painful oval secondary elements - aphthae in the amount of 0.1 to 0.8 mm, covered with fibrinous yellowish-white bloom in an average amount of 1 to 3, surrounded by a clear periphery of the aphtha with hyperemia, or inflammatory infiltration is observed. The main complaints during the survey of patients with chronic gastritis and duodenitis are heaviness and pain in the epigastric region, impaired taste perception in 69% of cases, respectively.

The average concentrations of secretory immunoglobulin A and lysozyme in oral samples in the group of patients with chronic recurrent aphthae of the oral cavity against diseases of the gastrointestinal tract were 0.115 ± 0.001 g/l and 0.146 ± 0.001 µg/ml, respectively, which is significantly lower than normal values.

4. Summary

36% of patients with diagnosed somatic pathology have recurrent aphthae of the oral cavity detected.

Identification of individual characteristics of the state of the oral microbiome in chronic recurrent aphthae of the oral cavity includes a combination of microbiological studies and PCR diagnostics.

The results of an in-depth study of the state of the oral microbiome showed frequent detection of bacteria of the genus enterococci, streptococci and yeast-like fungi of the genus *Candida* (*C. albicans*), *Porphyromonas gingivalis*, *Treponema denticola*, *Aggregatibacter actinomycetemcomitans*, *Tannerella forsythensis*, *Fusobacterium nucleatum*, *Prevotella intermedia*.

Samples of the oral fluid showed a deficiency of humoral factors of local immunity.

Conclusions

Thus, 36% of patients with diagnosed somatic pathology have recurrent aphthae of the oral cavity detected, which requires the development of modern methods of therapeutic and preventive measures in this category of people.

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