

USE AND EFFECTIVENESS OF OZONE IN THE COMPLEX TREATMENT OF CHRONIC RECURRENT APHTHOUS STOMATITIS IN PATIENTS WITH CHRONIC GASTRODUODENITIS»

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Abstract:

Objective: to increase the effectiveness of treatment of chronic recurrent aphthous stomatitis of the oral mucosa against the background of chronic gastroduodenitis by correcting dysbiotic disorders and enhancing antioxidant protection through pathogenetic therapy.

Methods: general clinical, laboratory, biochemical, functional, instrumental and statistical methods were used in the course of the study.

Results obtained: Clinical studies in patients with chronic recurrent aphthous stomatitis of the oral mucosa against the background of chronic gastroduodenitis have shown: a decrease in the following indicators by 1.24 times, a deterioration in hygiene by 1.92 times, an increase in the Schiller-Pisarev test by 2.06 times, an increase in stimulated salivation by 1.84 times and the absence of stimulated salivation by 2.09 times, a shift in The pH is in the acidic side.

Conclusions: The results of clinical and laboratory studies during operative and long-term follow-up showed that the therapeutic and prophylactic complex developed by us for the treatment of oral mucosal diseases in chronic gastroduodenitis has a long-term bactericidal effect against pathological microbes. The local immune status of the oral cavity was observed to approach the norm.

Keywords: Chronic recurrent aphthous stomatitis, dental caries, periodontal diseases, epidemiological study, chronic aphthous stomatitis, oral mucosa.

Introduction

It has been proven that patients with chronic gastroduodenitis experience alterations in the composition of microflora and changes in intestinal enzyme activity. As a result of normomicrobiota disruption, intestinal dysbiosis develops, leading to qualitative and quantitative changes in the resident oral microflora and restructuring of the oral biocenosis. This contributes to a decrease in the body's nonspecific resistance and antioxidant defense, predisposing the oral mucosa to infectious and inflammatory processes and exacerbating the development of oral diseases.

Many researchers have noted that dysbiotic conditions are associated with the suppression of obligatory normal flora while creating favorable conditions for the proliferation and colonization of coagulase-negative staphylococci, non-hemolytic streptococci, lactobacilli, corynebacteria, aerobic gram-negative rods (non-pathogenic fungi), and *Neisseria* species. The prolonged persistence of these pathogenic microorganisms on the oral mucosa leads to the development of chronic recurrent aphthous stomatitis (CRAS).

Over the past decade, the prevalence of oral mucosal diseases has increased by more than 30%, and the incidence of chronic stomatitis has risen to 60%. The high adaptability and constant evolution of microflora, along with the irrational selection of antibacterial therapy and increased resistance to antifungal agents, have led to a rise in relapses of lesions that are difficult to treat with conventional therapies. This significantly worsens the quality of life for affected patients.

Various exogenous and endogenous causative factors contributing to the development of oral mucosal diseases act as chronic, long-term stress agents, leading to cell adaptation disorders ("distress"). These factors trigger nonspecific reactions, including the inhibition of biologically active substrates such as respiratory enzymes and functionally related ultrastructures.

Recent scientific studies have shown that damage to teeth and oral mucosal tissues often occurs alongside inflammatory diseases of the digestive tract. This suggests that oral and maxillofacial system pathologies are not solely local issues but are also associated with significant systemic reactions of the body.

Currently, one of the main research directions in dentistry is the establishment of possible interrelations between oral pathology and systemic diseases, as well as the connection between regional homeostasis of the oral cavity and the overall

homeostasis of the body. Consequently, a comprehensive approach to the pharmacological treatment of periodontal diseases is being increasingly recognized.

Despite advances in modern dentistry, the development of an effective and widely applicable treatment method for oral mucosal diseases, including CRAS, remains an unresolved issue of high relevance and social significance.

Considering contemporary insights into the etiology of oral mucosal lesions, the primary therapeutic directions should include local anti-inflammatory therapy, a combination of general and local treatment approaches that account for the presence of chronic gastroduodenitis, and a pathogenetic treatment strategy.

Research objective:

To improve the effectiveness of treatment in patients with chronic recurrent aphthous stomatitis and chronic gastroduodenitis by enhancing oral cavity dysbiotic conditions and strengthening antioxidant protection through pathogenetic therapy.

Research Materials and Methods:

To accomplish the set tasks, we utilized comprehensive research methods. The study subjects included the clinical characteristics of disease progression in patients with chronic gastroduodenitis, the biochemical indicators of unstimulated saliva, and microbiological changes in chronic recurrent aphthous stomatitis (CRAS).

To achieve the research objective, 118 patients aged 24 to 56 years were examined, including 70 men and 48 women. A total of 118 individuals participated in the clinical study (Table 1). Among them, 34 were practically healthy individuals without somatic pathology, while 84 were patients suffering from chronic gastroduodenitis.

According to the ICD-10 classification, the diagnosis of "gastritis and duodenitis" (code K29) and "unspecified gastroduodenitis" (code K29.9) was established by gastroenterologists in the gastroenterology department.

1- жадвал Distribution of Patients by Age and Gender

Age Groups	Gender			
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	Abs.	%	Abs.	%
24-29 age	4	5.71	3	6.25
30-35 age	9	12.86	6	12.50
36-40 age	6	8.57	4	8.33
41-45 age	16	22.86	12	25.00
46-50 age	13	18.57	8	16.67
51-56 age	22	31.43	15	31.25
Total	70	100	48	100

The first (main) group consisted of 46 patients (25 men and 21 women) suffering from chronic recurrent aphthous stomatitis and chronic gastroduodenitis. Traditional treatment methods for chronic recurrent aphthous stomatitis were used, including local anesthesia, antiseptic treatment, antiviral, antibacterial, and antifungal drugs, as well as keratoplastic agents.

In addition to conventional treatment, a special treatment algorithm was developed for chronic recurrent aphthous stomatitis associated with chronic gastroduodenitis (Figure 2). One of the modern and scientifically proven theories is the immunological concept of the pathogenesis of this pathology. Therefore, the priority direction in the treatment of chronic recurrent aphthous stomatitis is immunomodulatory therapy.

One of the immunomodulation methods is strengthening the immune system using lipopolysaccharides of bacterial origin. Among the drugs containing bacterial lysates, Immunal is included.

The second (comparison) group consisted of 38 patients (24 men and 14 women) suffering from chronic recurrent aphthous stomatitis and chronic gastroduodenitis, who were treated according to generally accepted (traditional therapy) standards. Patients in both the main group and the comparison group had to repeat the treatment course after six months.

The third (control) group included 34 individuals (21 men and 13 women) without somatic pathology. Examination data and treatment courses were recorded in the patient's personal medical record. The effectiveness of the treatment was evaluated

based on clinical outcomes, biochemical, and microbiological indicators after 14 and 30 days. Long-term results were assessed after 12 months of follow-up.

- Ozone, as a disinfectant, has several advantages over other substances:
- Ozone is an extremely powerful disinfectant, capable of neutralizing 99.9% of pathogenic microorganisms.
- It reacts much faster than other antiseptic agents.
- Due to the fact that ozone molecules are 150% smaller than the molecules found in other liquid antiseptics, it has the ability to penetrate nanostructure
- The locally applied ozone-oxygen solution generated by the Prozone device, which has high clinical efficacy, significantly reduced the need for several medications with side effects and enabled the complete elimination of future recurrences (Figure 2).
- In recent years, accumulated clinical experience has shown that while treatment measures can halt the progression of pathologies affecting the organs and tissues of the oral cavity, they do not ensure complete recovery. Therefore, it is essential to develop and widely implement preventive measures for major dental diseases while understanding the principles of a healthy body's functioning.
- Diseases of the oral mucosa, which often have a chronic course with periodic remissions and exacerbations, arise against the background of acquired secondary immunodeficiency. One of the modern and scientifically proven theories is the immunological concept of the pathogenesis of this pathology.
- For this reason, immunomodulatory therapy is a priority in the treatment of chronic recurrent aphthous stomatitis. One method of immunomodulation involves strengthening the immune system with lipopolysaccharides of bacterial origin. Among the drugs containing bacterial lysates, Immunal is included.

Results: Clinical examination results were confirmed by biochemical studies. Analysis of indicator changes 14 days after applying the treatment-prevention complex in the main group showed a 1.81-fold decrease in elastase activity ($p < 0.05$) and a 1.56-fold reduction in MDA concentration. Ozonated water and **Immunal**, which have anti-inflammatory effects, prevented the accumulation of lipid peroxidation products in the oral cavity.

A significant increase in MDA concentration, which serves as an indicator of lipid peroxidation processes, completely disappeared in the main group 30 days after the treatment. A marked reduction in inflammation was observed, with the proteolytic enzyme elastase decreasing 2.53-fold ($p < 0.02$) and MDA levels decreasing 2.15-fold ($p < 0.05$), reaching nearly normal values.

Long-term results after one year of observation in the main group showed that elastase activity decreased 2.0-fold ($p < 0.02$), and MDA levels dropped 1.87-fold ($p < 0.05$), aligning with normal values.

In the comparison group, a 1.17-fold reduction in elastase activity and MDA concentration was recorded after 14 days, though they remained at significantly high levels. A notable decrease in inflammation markers was observed after 30 days, with elastase decreasing 1.94-fold and MDA 2.0-fold ($p < 0.05$).

One-year follow-up studies in the comparison group demonstrated only a short-term effect of standard treatment methods. The lipid peroxidation indicator did not return to normal: MDA levels showed only a 1.12-fold decrease and remained significantly higher than in the main group, while elastase activity slightly decreased by 1.21-fold.

Table 2 Indicators of the Biochemical Marker of Inflammation in Unstimulated Saliva Elastase After Treatment, m-cat/L ($M \pm m$)

No	Observation Group	n	Before Treatment	After 14 Days	After 30 Days	After 1 Year
1.	Main Comparison	46	0,38±0,06	0,21±0,004*	0,15±0,005* *	0,19±0,006* *
2.	Comparison	38	0,35±0,08	0,30±0,007	0,18±0,006*	0,29±0,003

The state of the body's peroxidation processes and antioxidant systems was more accurately monitored using the API dynamics before treatment and one month after. In the main observation group, 30 days after treatment, the activity of the antioxidant enzyme catalase significantly increased 3.0 times ($p < 0.01$), approaching normal values as much as possible. In the comparison group, treatment had no significant effect on this enzyme, with an increase of only 1.67 times ($p < 0.02$).

The API index, calculated based on MDA and catalase levels, showed a significant upward trend in the main group—6.96 times ($p < 0.001$), whereas in the comparison group, the API index increased slightly—by 2.18 times ($p < 0.001$).

One year after treatment, biochemical studies of unstimulated saliva in the main group demonstrated positive trends. The use of **ozonated water** (for rinsing and oral administration) led to a 2.75-fold increase in catalase activity ($p < 0.01$) and a 6.21-fold increase in the API index ($p < 0.001$), corresponding to the values of healthy individuals.

The specific antioxidant properties of the food concentrate contribute to the normalization of the antioxidant-prooxidant system and demonstrate its long-term effects.

The obtained long-term results confirm the ability of **ozonated water** to prevent pathological processes in the oral cavity caused by excessive lipid peroxidation over an extended period. After one year of observation, the dysbiosis level in patients from the main group decreased 3.06 times ($p < 0.01$), indicating the beneficial effects of therapeutic and preventive agents on the oral microbiota. In the comparison group, the dysbiosis index (DI) decreased only 1.28 times compared to the initial state, reflecting a decline in the oral cavity's protective functions, local immunity, and defense mechanisms. This contributes to the growth of opportunistic pathogenic microorganisms (OPM), an increase in microbial proliferation, and the worsening of chronic stomatitis clinical conditions.

The recommended **ozonated water** for rinsing, along with **Immunal**, effectively inhibits microbial colonization. It can be used for oral cavity treatment to prevent **Candida** colonization, as well as the formation of bacterial-fungal associations in the oral cavity.

Study results indicate that the proposed treatment complex effectively suppresses fungal growth, preventing the recurrence of chronic **Candida** infections and the exacerbation of this disease.

Conclusion:

The study of microbial contamination in the oral cavity of patients with chronic gastroduodenitis revealed a heterogeneous microbial composition. In patients with chronic gastroduodenitis, *Staphylococcus epidermidis* strains were detected in 38.9% of cases, *Enterococcus* strains in 16.7%, and *Staphylococcus aureus* strains

in 5.5% of cases. Staphylococcus epidermidis strains were predominant (33.3%) in the oral cavity of these patients, while Streptococcus haemolyticus strains were also found (5.5%). In all patients with chronic hepatitis B and C, the oral microbiota was dominated by Staphylococcus epidermidis strains.

When complex therapy with immunomodulators was administered, patients in the main group exhibited a positive clinical effect, manifested by the cessation of aphthous ulcers on day 2 of treatment and their complete disappearance by day 4. In the control group, similar changes occurred much later (days 8-10). After 20 days and 6 months of treatment for chronic recurrent aphthous stomatitis (CRAS), a good level of oral hygiene was observed according to the Fedorov-Volodkina index. In contrast, control group patients demonstrated unstable clinical effectiveness, with worsening of key pathological indicators over time.

In patients with chronic gastroduodenitis, the treatment algorithm—including ozonated water, laser therapy, and Immunul—led to an increase in T-lymphocytes and T-helper subpopulations, which were initially low in both groups, bringing their levels close to those observed in healthy individuals. This treatment also significantly improved immunological parameters in patients with chronic gastroduodenitis.

Various degrees of inflammation and dystrophic changes were observed in the oral mucosa and periodontal tissues, with severity depending on the virus type, viral load, and activity of the pathological process in the gastrointestinal tract.

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