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# CLINICAL AND IMMUNOLOGICAL PECULIARITIES OF INFLAMMATORY PERIODONTAL DISEASES IN PREGNANT WOMEN ON THE BACKGROUND OF IRON DEFECTIVE ANEMIA

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**Abstract**

*The gingival fluid of pregnant women was studied for interleukins 8 and 10, and immunoglobulins A and G in 31 female patients of SHI CH No.5 of Volgograd, at the age of 20-25 years - the first period of adulthood (Iordanishvili A.K., 2015), 15 of which - without IDA, and 16 - with manifestations of IDA. Treatment of mild and moderate periodontitis (K05.3) was carried out in pregnant women with IDA with the use of Lysobact; pregnant women without IDA were treated with traditional anti-inflammatory therapy according to the treatment algorithm. In both groups, professional oral hygiene, active training and monitoring of the performance of individual hygiene were carried out.*

*It was established that the concentration of IL-10 increases significantly ($p < 0.05$) from 0.010 [1.790] ng/ml to 3.050 [8.550] ng/ml after treatment, against the background of complex treatment of periodontitis in pregnant women with IDA with Lysobact. This confirms the importance of interleukin 10 as the main anti-inflammatory cytokine and objectively proves the correctness of the selected clinical tactics for treating mild and moderate inflammatory periodontal diseases with the drug "Lysobact" against the background of iron deficiency anemia.*

**Keywords:** *pregnant women, iron deficiency anemia, periodontal disease.*

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## INTRODUCTION:

Morbidity among pregnant women is an actual problem of the present, as it negatively affects not only the health of the mother, but also her child's health. As before, the leading pathology remains anemia, registered in 95.0% of pregnant women, and up to 40.0% of non-pregnant women of reproductive age [4,6]. Pregnant women are a group of high-risk of dental diseases, provoked by anemia. During pregnancy, the prevalence of mild to moderate gingivitis and periodontitis varies from 49.1% to 100% (Kirilova E.N., 2009; Gaffield M.L., Colley B.J., 2009).

Drugs used in periodontology are often contraindicated to pregnant women, since they can have embryotoxic, embryo-lethal, teratogenic, and fetotoxic effects [1,7].

At the same time, the literature lacks information on the oral condition of pregnant women with iron deficiency anemia in the course of complex treatment of periodontal diseases, in conjunction with the indices of local immunity of the oral cavity and general obstetrical status.

**Objective of the research** is to study clinical and immunological features of inflammatory periodontal diseases in women with a physiological and pathological course of pregnancy against the background of iron deficiency anemia.

## MATERIALS AND METHODS:

The laboratory study of the gingival fluid was performed in 31 pregnant women in the State Penitentiary Hospital No. 5 in Volgograd, at the age of 22-35 years - the first period of adulthood (age periodization of the Institute of Age Physiology of the RAMS) (Iordanishvili A.K., 2015), 15 of which are pregnant women without IDA, and 16 have formed the group with manifestations of iron deficiency anemia.

In both groups, professional oral hygiene, active training and monitoring of the performance of individual hygiene were carried out.

Treatment of mild to moderate periodontitis (K05.3) in pregnant women with IDA was conducted with the use of Lysobact. Lysobact, due to its antiseptic and antiviral effect, is a drug of choice for pregnant women, who have trouble finding adequate, sparing and at the same time effective treatment. The drug enhances nonspecific immunity and maintains a normal balance of microflora in the oral cavity. The drug was used in the form of orodispersible tablets.

Pregnant women without IDA received traditional, in accordance with the treatment algorithm, anti-inflammatory therapy (Dmitrieva L.A., 2009).

The gingival fluid of pregnant women was studied for interleukins 8 and 10, immunoglobulins A and G (Table 1).

*The concentration of immunoglobulins A and G in the gingival fluid was determined* by olid-phase enzyme immunoassay using $IgG_{tot}$-IFA-BEST and IgA secretory-IFA-BEST diagnostic kits (CJSC vector BEST, Russia).Cytokine content in the gingival fluid was determined by solid-phase enzyme-linked immunosorbent assay, and the concentration of interleukins 8 and 10 in the gingival fluid was determined using INTERLEYKIN-8-IFA-BEST and IgA secretory-IFA-BEST diagnostic kits (CJSC vector BEST, Russia).In the course of the studies we used: Elmi SkyLine Shaker ST-3 thermostatable shaker (Elmi, Latvia) at 700 rpm in the range of 37±1°C, StatFax 2600 microplate reader (Stat Fax, USA), Stat Fax 2100 plate immunoassay analyzer (Stat Fax, USA),

**Table 1: The minimum volume of laboratory tests.**

| | IgA | IgG | IL-8 | IL-10 |
|---|---|---|---|---|
| IDA patients after treatment | 16 | 16 | 16 | 16 |
| IDA patients before treatment | 16 | 16 | 16 | 16 |
| Non-IDA patients after treatment | 15 | 15 | 15 | 15 |
| Non-IDA patients before treatment | 15 | 15 | 15 | 15 |
| Total | 62 | 62 | 62 | 62 |

and laboratory utensils and consumables. Immunoenzymatic analysis was performed in accordance with the instructions for the devices and reagents.Total 248 immunological studies were performed.

The results were recorded using a flatbed analyzer, measuring the optical density in a single-wave mode: the main filter was 450 nm. The concentration of immunoglobulins and cytokines was calculated using the calibration plot with the Concentration/Optical density coordinates.

*Statistical processing* of the results was performed using Microsoft Office 2007 and Statistica 6.0 software packages. The data were checked for normality using the asymmetry-excess criterion. The test revealed a difference in the distribution from normal, so a nonparametric Mann-Whitney test was used to compare the results in patient groups. The median and interquartile range were used as descriptive statistics.

## RESULTS:

**DETERMINATION OF THE CONCENTRATION OF IMMUNOGLOBULINS IN THE GINGIVAL FLUID.**

1. **Determination of the concentration of immunoglobulins in the gingival fluid of pregnant women without IDA.**

The concentration of secretory immunoglobulin A in the gingival fluid of pregnant women without iron deficiency anemia before treatment was 148.0 [112.0] mg/l, in the course of treatment - 112.0 [117.0] mg/l (Table 2). There were no statistically significant differences between these groups according to the Mann-Whitney test. It is shown that pregnant women have an increased level of immunoglobulin A secretion with salivary glands in comparison with non-pregnant ones [5]. Perhaps, the treatment does not significantly affect the background secretion of IgA.

The level of IgG in the gingival fluid examined before the treatment was 7.1 [8.5] mg/ml, after treatment - 5.7 [8.7] mg/ml. There were no significant differences according to the Mann-Whitney test between these indicators. It is known that the level of IgG in the gingival fluid is determined by the serum level of this immunoglobulin and the activity of immunocompetent cells in the salivary glands [8].

An increase in the level of immunoglobulins in the gingival fluid is usually associated with inflammatory processes. The absence of significant differences in the level of immunoglobulins can be explained by the absence of active inflammation in the examined patients without IDA [5].

2. **Determination of the concentration of immunoglobulins in the gingival fluid of pregnant women with IDA.**

The level of secretory IgA in the gingival fluid of pregnant women with iron deficiency anemia before treatment with Lysobact was 312.0 [311.0] mg/l, after treatment - 187.0 [264.0], respectively (Table 3).

**Table 2:Immunoglobulin levels in the gingival fluid of pregnant women without IDA: median [interquartile range].**

| Indicator | Non-IDA pregnant women before treatment | Non-IDA pregnant women after treatment |
|---|---|---|
| sIgA, mg/l | 148.0 [112.0] | 112.0 [117.0] |
| IgG, mg/ml | 7.1 [8.5] | 5.7 [8.7] |

**Table 3. Immunoglobulin levels in the gingival fluid of pregnant women with IDA: median [interquartile range].**

| Indicator | IDA pregnant women before treatment | IDA pregnant women after treatment |
|---|---|---|
| sIgA, mg/l | 312.0 [311.0] | 187.0 [264.0] |
| IgG, mg/ml | 7.3 [8.9] | 4.1 [4.7] |

The concentration of IgG in the gingival fluid of pregnant women against the background of iron deficiency anemia was 7.3 [8.9] mg/ml before treatment and 4.1 mg/ml after treatment, respectively [4,5]. There were no statistically significant differences in the levels of immunoglobulins of the gingival fluid. Perhaps, this is due to a slight change in the synthetic activity of plasma cells of salivary glands before and after therapy with Lysobact.

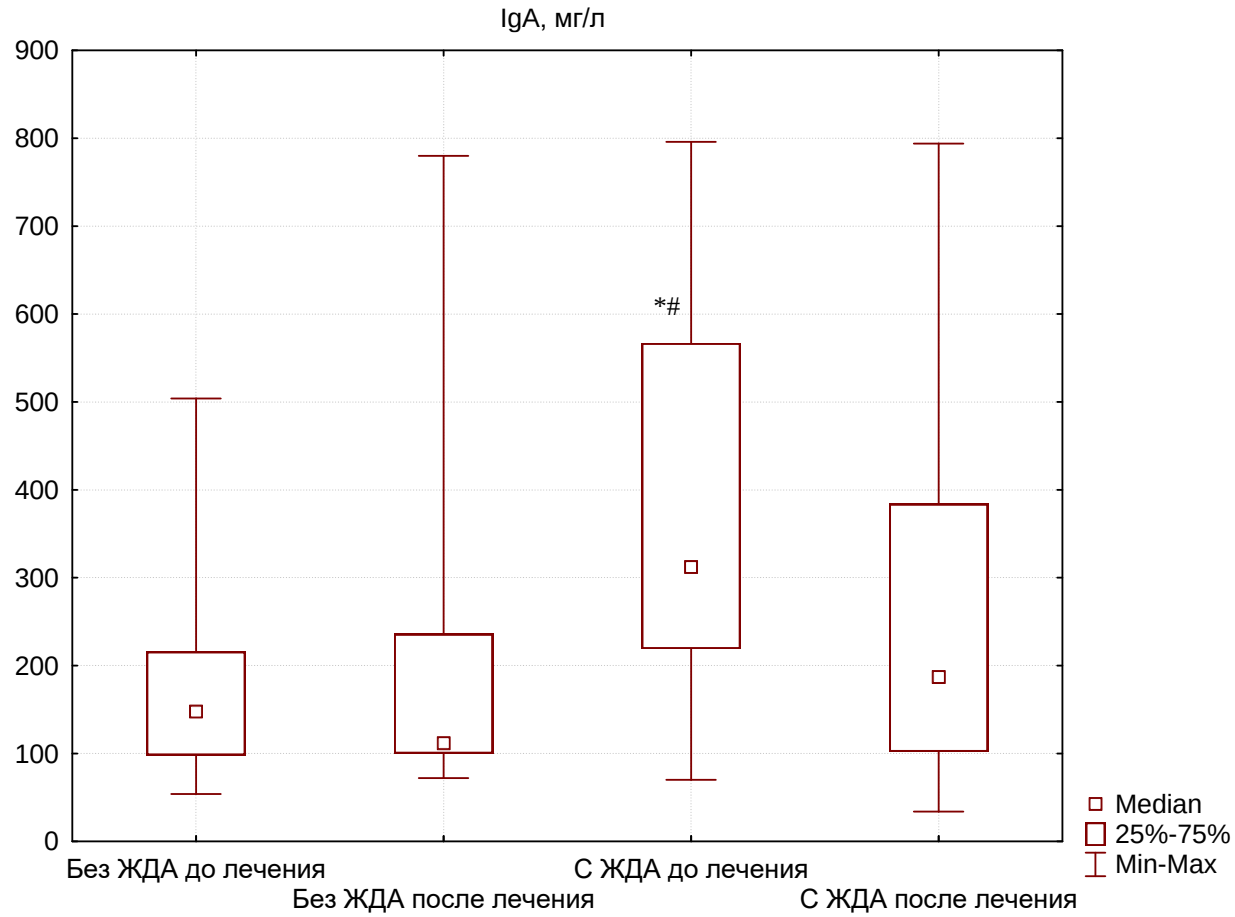
Comparison of immunoglobulin levels in the gingival fluid showed no statistically significant differences between the anemia group after treatment and the rest of the examined groups (Table 4). Perhaps, the therapy with Lysobact reduces inflammatory manifestations in the oral cavity, and thus the production of immunoglobulins by plasmatic cells of the salivary glands does not exceed the level of healthy patients without pathology (without IDA).

Statistically significant differences in the secretory IgA content in the gingival fluid of patients with IDA before treatment with Lysobact from that in patients without anemia before and after treatment were revealed. The level of immunoglobulin A secretion on the background of iron deficiency anemia before treatment was increased in comparison with both groups without IDA. The literature data suggest the opposite: iron deficiency reduces the activity of the blast-transformation of lymphocytes, as well as the production of secretory IgA [5].

**Table 4: Immunoglobulin levels in the gingival fluid of pregnant women without IDA and against anemia: median [interquartile range].**

| Indicator | Non-IDA pregnant women before treatment | Non-IDA pregnant women after treatment | IDA pregnant women before treatment | IDA pregnant women after treatment |
|---|---|---|---|---|
| sIgA, mg/l | 148.0 [112.0] | 112.0 [117.0] | 312.0 [311.0]*# | 187.0 [264.0] |
| IgG, mg/ml | 7.1 [8.5] | 5.7 [8.7] | 7.3 [8.9] | 4.1 [4.7] |

Note:
* - differences according to the Mann-Whitney test from the group without IDA before treatment, $p<0.05$
# - differences according to the Mann-Whitney test from the group without IDA after treatment, $p<0.05$




*IgA, mg/l*

*Without IDA before treatment* *With IDA before treatment*
*Without IDA after treatment* *With IDA after treatment*

**Fig.1. Levels of secretory immunoglobulin A in the examined patients, mg/l.**

Note:

* - differences according to the Mann-Whitney test from the group without IDA before treatment, p<0.05.

# - differences according to the Mann-Whitney test from the group without IDA after treatment, p<0.05.

**DETERMINATION OF THE CONCENTRATION OF INTERLEUKINS IN THE GINGIVAL FLUID.**

1. **Determination of the concentration of interleukins in the gingival fluid of pregnant women without IDA.**

The concentration of interleukin-8 in the gingival fluid of female patients without IDA before treatment was 70.80 [144.35] ng/ml, after treatment - 123.30 [191.80] ng/ml (Table 5).

**Table 5. Interleukin levels in the gingival fluid of pregnant women without IDA: median [interquartile range].**

| Indicator | Non-IDA pregnant women before treatment | Non-IDA pregnant women after treatment |
|---|---|---|
| IL-8, ng/ml | 70.80 [144.35] | 123.30 [191.80] |
| IL-10, ng/ml | 0.001 [1.259] | 2.900 [18.640]* |

Note: * - differences according to the Mann-Whitney test from the group without IDA before treatment, p<0.05

No statistically significant differences were found between these groups. The obtained result does not disagree with the data of other authors cited in the literature [3].

The level of interleukin-10 in the gingival fluid of the examined women without IDA before treatment was 0.001 [1.259] ng/ml, and after treatment - 2.900 [18.640] ng/ml, which is significantly higher. IL-10 is the main anti-inflammatory cytokine, which explains the increase in its production against the background of treatment of periodontitis.

2. **Determination of the concentration of interleukins in the gingival fluid of pregnant women with IDA.**

Analysis of the content of interleukins in the gingival fluid of pregnant women on the background of IDA showed statistically insignificant changes in IL-8 content: 253.25 [307.23] ng/ml before treatment and 110.0 [137.0] ng/ml after treatment (Table 6). The studies of other authors also point to minor changes established in this indicator [8].

The concentration of IL-10 on the background of treatment with Lysobact significantly increases (3.050 [8.550] ng/ml) as compared with the level before treatment (0.010 [1.790] ng/ml). Data from the literature also confirm the results; the reduction in the inflammatory process in the dentogingival pockets is associated with increased production of interleukin IL-10 [2].

During the processing of the obtained data, statistically significant differences in the level of interleukin-10 in the group with IDA after treatment were revealed, as comparison with the group without IDA before treatment (Table 7).

**Table 6: Interleukin levels in the gingival fluid of pregnant women with IDA: median [interquartile range].**

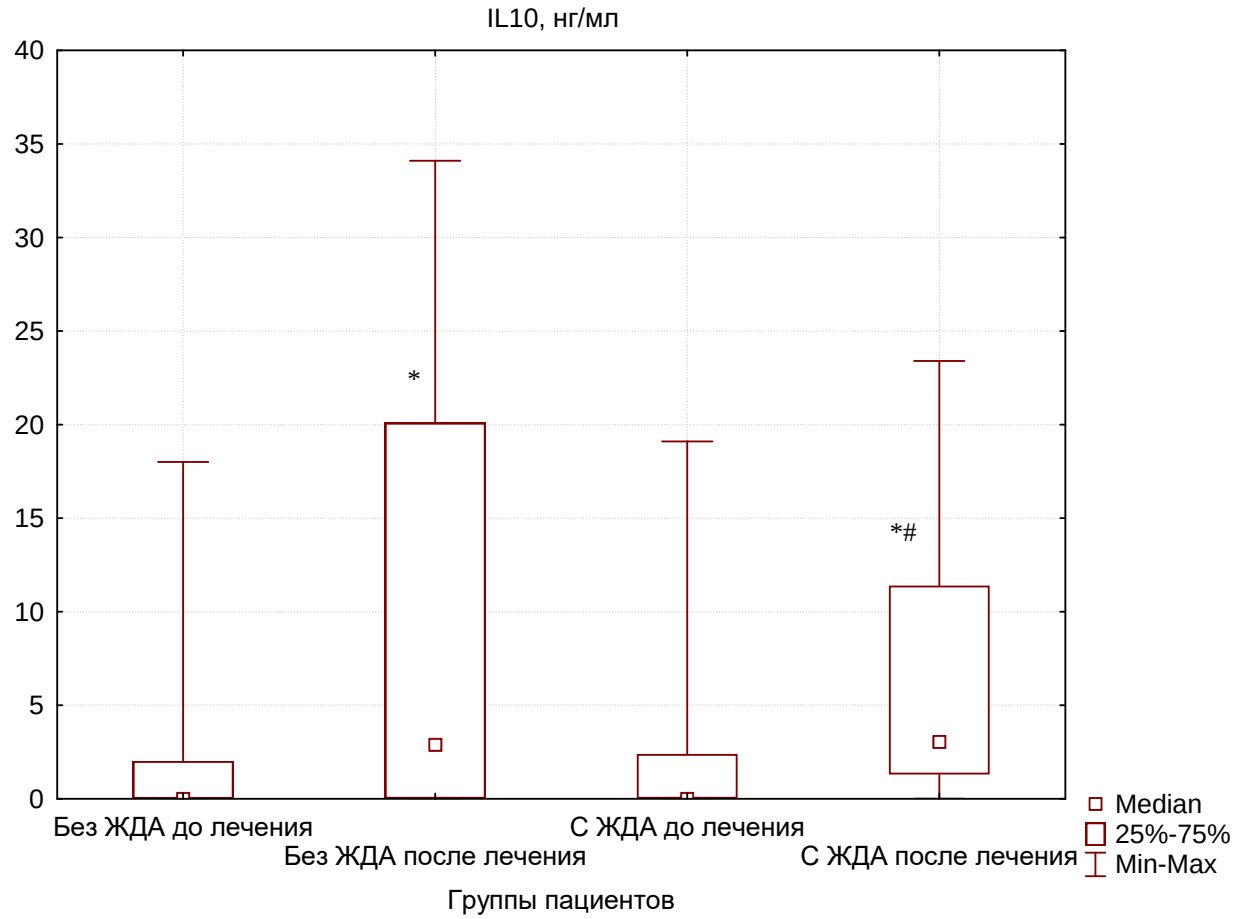
| Indicator | IDA pregnant women before treatment | IDA pregnant women after treatment |
|---|---|---|
| IL-8, ng/ml | 253.25 [307.23] | 110.0 [137.0] |
| IL-10, ng/ml | 0.010 [1.790] | 3.050 [8.550]* |

Note: * - differences according to the Mann-Whitney test from the group with IDA before treatment, $p<0.05$

**Table 7: Interleukin levels in the gingival fluid of pregnant women without IDA and against anemia: median [interquartile range].**

| Indicator | Non-IDA pregnant women before treatment | Non-IDA pregnant women after treatment | IDA pregnant women before treatment | IDA pregnant women after treatment |
|---|---|---|---|---|
| IL-8, ng/ml | 70.80 [144.35] | 123.30 [191.80] | 253.25 [307.23] | 110.0 [137.0] |
| IL-10, ng/ml | 0.001 [1.259] | 2.900 [18.640] | 0.010 [1.790] | 3.050 [8.550]* |

Note: * - differences according to the Mann-Whitney test from the group without IDA before treatment, $p<0.05$.




*IL10, ng/ml*

*Without IDA before treatment*
*Without IDA after treatment*
*Groups of patients*
*With IDA before treatment*
*With IDA after treatment*

**Fig. 1. Levels of IL-10 in the gingival fluid of female patients, ng/ml.**

Note:
* - differences according to the Mann-Whitney test from the group without IDA before treatment, p<0.05
# - differences according to the Mann-Whitney test from the group with IDA before treatment, p<0.05

The obtained results on the level of interleukins in the gingival fluid of pregnant women are consistent with the earlier literature data [2].

**CONCLUSION:**

The study of clinical and immunological peculiarities of inflammatory periodontal diseases in women with a physiological and pathological course of pregnancy against the background of iron deficiency anemia made it possible to establish the following.

Immunological indicator IL-10 is the main anti-inflammatory cytokine, which explains the increase in its production against the background of complex treatment of mild to moderate periodontitis (K05.3), confirming literature data that the decrease in the inflammatory process in the dentogingival pockets is associated with increased production of interleukin IL-10 [2,3].

**SUMMARY:**

Thus, in the course of a combination treatment of inflammatory periodontal diseases in pregnant women with IDA, the concentration of IL-10 increases significantly (p <0.05) from 0.010 [1.790] ng/ml to 3.050 [8.550] ng/ml after treatment with Lysobact. This objectively proves the correctness of the selected clinical tactics for treating mild and moderate inflammatory periodontal diseases with Lysobact against the background of iron deficiency anemia.

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