

Correction of Tissue Immunity in Patients with Chronic Generalized Periodontitis and Concomitant Neurologic Diseases

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Abstract

0.2% oxymethyluracil in a 10% dimexide solution was added as part of the combined therapy of patients with syringomyelia and chronic generalized periodontitis to correct tissue immunity.

IgA, IgM, IgG, secretory IgA, the lysozyme level in the gingival and oral fluids, as well as periodontal clinical condition were criteria for assessing the effectiveness of using oxymethyluracil. All patients under observation with chronic generalized periodontitis and concomitant neurologic disease – syringomyelia - were divided into two groups of different genders aged 30 to 45 years. The treatment of the patients with chronic generalized periodontitis in the first group (47 patients) was carried out according to the traditional method, and that ones in the second group (46 patients) included additional local applying of 0.2% oxymethyluracil in a 10% dimexide solution to the traditional treatment, according to our own method developed. The analysis of the study results in short term and long term after the completion of the treatment course indicates the effectiveness of using oxymethyluracil for the correction of tissue immunity in patients with chronic generalized periodontitis and syringomyelia.

Keywords: chronic generalized periodontitis; tissue immunity; oxymethyluracil; syringomyelia.

INTRODUCTION

Multidirectional changes in immunological parameters in chronic generalized periodontitis (CGP) make it possible to treat this disease as a secondary immunodeficiency state that requires individual immunocorrective therapy with regard to concomitant diseases. Earlier and concomitant diseases (vitamin deficiency, atherosclerotic vascular disease, endocrine disorders, gastrointestinal diseases, blood diseases, psychosomatic disorders, hormonal disorders, etc.) by reducing the periodontal barrier resistance, contribute to the development of autosensitization and immunopathological process with the bone resorption in the alveolar processes [1; 2; 3; 4; 5; 6; 7; 8; 9].

Syringomyelia is one of the most common diseases of the nervous system in central Russia including in the Republic of Bashkortostan (RB). Its prevalence is everywhere with incidence on average of 8-9 per 100,000 population in the world and reaches up to 125 incidences per 100,000 population in some regions of the RB. With this regard, syringomyelia assumes the significance of regional pathology in the RB [10]. In recent years a wide clinical and paraclinical study of syringomyelia has made it possible to consider it as pathology of the whole human body. The syringomyelia causes the so-called minor development abnormalities, including that of the dentoalveolar system, that lead to the development of generalized periodontitis, on the one side, and immunity disorders, on the other side, and require correction of tissue immunity. The purpose of the study is to evaluate the effectiveness of using a new pyrimidine derivative for the correction of tissue immunity in patients with CGP and syringomyelia.

MATERIALS AND METHODS

83 patients of different genders aged 30 to 45 years suffering from syringomyelia and having moderate and severe degree of CGP, as well as 30 people with intact periodontium, who didn't have chronic diseases of organs and systems, were under observation. The patients were divided into two groups. The treatment of the patients with CGP in the first group (a control group of 47 patients) was carried out according to the traditional method. And the treatment of patients of the second group (a main therapeutic group of 46 people) included also a pyrimidine derivative 5-oxy-4-methyluracil (oxymethyluracil, or oxymetacil) for the tissue immunity correction.

0.2% oxymetacil was added to the 10% solution of dimexide according to our own method developed. Soft cotton drain sponges impregnated with 0.2% oxymetacil added to a 10% solution of dimexide were introduced into the periodontal pockets, and applied (in form of applications) to the mucosa of the maxillary

and mandibular alveolar processes for 10 minutes every day during 10 days. In case of deep periodontal pockets, the drain sponges were changed 2 times during the appointment.

IgA, IgM, IgG, secretory IgA (SIgA), the level of lysozyme of the gingival fluids and oral fluids (GF and OF), the amount of GF and the periodontal clinical condition before and after treatment were an outcome measure of 5-oxy-4-methyluracil.

The amount of immunoglobulins in GF and OF was determined by the single radial immunodiffusion technique in agar gel according to Mancini using monotypic conventional antisera to human IgA, IgM and IgG, and the lysozyme level was determined by nephelometric technique.

The amount of GF was determined by measuring the paper strip impregnation area. The tests were carried out on the 7th, 10th and 14th day and at 3, 6 and 12 months from the start of the treatment course.

The results of the study were subjected to statistical processing on a personal computer using the program "Excell 2000" MS Program Package added by XLSTAT-Pro and calculating Student's t-test. The difference $p < 0.05$ was considered to be significant.

RESULTS AND DISCUSSION

Edema and hyperemia of the marginal gingiva remained in patients of the control group on the 7th day from the beginning of the treatment course. The decrease or disappearance of these symptoms was observed only on the 14th day.

Parameters of the plaque index (PI), approximal plaque index (API) and sulcus bleeding index (SBI) on the 7th and 10th days significantly differed from those ones of healthy individuals ($p < 0.05$). Significant positive dynamics were noted in this group of patients only on the 14th day remaining at this level during 3 months after the completion of the treatment course, and then a tendency to their return to the initial state was observed.

Additional application of 0.2% oxymetacil added to a 10% solution of dimexide in the complex of treatment of CGP in patients with syringomyelia (the second group) contributed to a decrease in gingival bleeding, disappearance of pain, itching, unpleasant breath odor, hyperemia and edema of the marginal gingiva already on the 7th day, as well as to a significant decrease in the PI and API, and an increase in the SBI on the 10th day ($p < 0.05$). Thus, the PI in moderate CGP decreased from 4.18 ± 0.47 to 1.51 ± 0.23 ; the PI in severe CGP decreased from 5.42 ± 0.36 to 2.51 ± 0.13 ; the API in moderate CGP decreased from $31.46 \pm 3.27\%$ to $0.60 \pm 0.04\%$; the API in severe CGP decreased from $85.54 \pm 5.22\%$ to $0.80 \pm 0.02\%$ before treatment.

Table 1. Dynamics of indices in the GF and OF in patients with moderate CGP and syringomyelia after application of 0.2% oxymetacil in 10% dimexide solution.

| Indices | Healthy persons | Before treatment | From the beginning of the treatment course: | | |
|---|-----------------|------------------|---|-----------------|-----------------|
| | | | on the 7th day | on the 10th day | on the 14th day |
| The amount of the GF (mm ²) | 0.245±0.01 | 0.618±0.11 | 0.403±0.01 | 0.293±0.01* | 0.305±0.02* |
| Immunoglobulins in the GF (g/l) | | | | | |
| IgA | 0.18±0.01 | 0.07±0.01 | 0.10±0.01 | 0.16±0.01* | 0.16±0.003* |
| IgM | 0.08±0.01 | 0.24±0.03 | 0.18±0.01 | 0.11±0.02* | 0.09±0.009* |
| IgG | 0.55±0.11 | 3.71±0.62 | 2.85±0.20 | 1.15±0.10* | 0.92±0.10* |
| SIgA | 1.12±0.02 | 0.15±0.01 | 0.37±0.10 | 0.92±0.11* | 0.95±0.09* |
| Immunoglobulins in the OF (g/l) | | | | | |
| IgA | 0.18±0.01 | 0.09±0.009 | 0.11±0.01 | 0.16±0.01* | 0.16±0.008* |
| IgM | - | - | - | - | - |
| IgG | 0.28±0.01 | 0.46±0.02 | 0.39±0.01 | 0.29±0.01* | 0.29±0.001* |
| SIgA | 0.26±0.01 | 0.09±0.001 | 0.12±0.01 | 0.21±0.01* | 0.22±0.006* |

Note: * The difference compared to the value before treatment was significant.

Table 2. Dynamics of indices in the GF and OF in patients with severe CGP and syringomyelia after application of 0.2% oxymetacil in 10% dimexide solution.

| Indices | Healthy persons | Before treatment | From the beginning of the treatment course: | | |
|---|-----------------|------------------|---|-----------------|-----------------|
| | | | on the 7th day | on the 10th day | on the 14th day |
| The amount of the GF (mm ²) | 0.245±0.01 | 0.621±0.12 | 0.408±0.02 | 0.297±0.02* | 0.360±0.01* |
| Immunoglobulins in the GF (g/l) | | | | | |
| IgA | 0.18±0.01 | 0.06±0.01 | 0.09±0.01 | 0.14±0.01* | 0.15±0.001* |
| IgM | 0.08±0.01 | 0.38±0.03 | 0.28±0.2 | 0.13±0.009* | 0.13±0.007* |
| IgG | 0.55±0.11 | 4.01±0.20 | 3.05±0.12 | 1.23±0.30* | 1.01±0.20* |
| SIgA | 1.12±0.02 | 0.12±0.01 | 0.39±0.11 | 0.87±0.12* | 0.92±0.07* |
| Immunoglobulins in the OF (g/l) | | | | | |
| IgA | 0.18±0.01 | 0.06±0.01 | 0.09±0.01 | 0.15±0.01* | 0.15±0.007* |
| IgM | - | - | - | - | - |
| IgG | 0.28±0.01 | 0.47±0.02 | 0.41±0.01 | 0.31±0.01* | 0.31±0.003* |
| SIgA | 0.26±0.01 | 0.09±0.002 | 0.11±0.01 | 0.20±0.01* | 0.23±0.007* |

Note: * The difference compared to the value before treatment was significant.

During the same period of study, a significant increase in the SBI was observed: the SBI was 30.20 ± 0.70 sec in moderate CGP before treatment, and it increased to 40.25 ± 1.71 sec on the 10th day; the SBI was 11.21 ± 1.02 sec in severe CGP before treatment, and it increased to 25.30 ± 1.14 sec on the 10th day. At 14 days from the beginning of the treatment course, all indices didn't differ from those ones of healthy individuals ($p > 0.05$) and remained at the same level at 3, 6 and 12 months after the completion of the treatment course.

Moreover, addition of the applications of 0.2% oxymetacil in a 10% solution of dimexide to the complex of treatment of CGP in patients with syringomyelia contributed to a decrease in the amount of the GF, as well as to the correction of the IgA, IgM, IgG and SIgA levels in the GF and OF.

While there was only a tendency to decrease in the amount of the GF as well as normalization of IgA, IgM, IgG and SIgA in the GF and OF compared with the values before treatment in the control group of patients on the 7th and 10th day of the study ($p > 0.05$), these indicators in the second group of patients significantly differed already on the 10th day of the study ($p < 0.05$; see table 1 and table 2). The indices remained stable in the long-term period study: in patients of the first group only up to 3 months, and in patients of the second group up to 12 months.

The level of lysozyme in the OF before treatment showed a significant decrease in patients with CGP of all degrees of severity. Conducting the common combined therapy of CGP did not lead to a significant increase in its level in all periods of the study. At the same time, the inclusion of 0.2% oxymetacil added to a 10% solution of dimexide in the complex of treatment in the form of an application contributed to stimulation of the of nonspecific factors' development aimed at oral cavity protection. Thus, the level of lysozyme increased from 7.63 ± 0.22 to 11.20 ± 0.13 µg/ml of protein in patients with moderate CGP, and from 4.79 ± 0.35 to 9.32 ± 0.12 µg/ml of protein in patients with severe CGP in the second group of patients on the 10th day of the study (compared with 14.78 ± 0.4 µg/ml protein in healthy individuals). And its level was significantly closer to the one of healthy individuals on the 14th day of the study and amounted to 12.87 ± 0.20 µg/ml of protein in patients with moderate CGP, and to 12.01 ± 0.30 µg/ml of protein in patients with severe CGP. The results of the study of the lysozyme levels in the same group of patients in the long term after treatment showed that its level had been nonsignificantly different from the those ones in persons with intact periodontium both at 3 months and at 6 and 12 months after treatment.

CONCLUSIONS

Thus, 5-hydroxy-4-methyluracil is an effective medicine for correcting tissue immunity in patients with CGP and syringomyelia.

Adding 0.2% methyluracil in a 10% solution of dimexide in the complex of treatment of CGP in patients with syringomyelia in the form of application contributes to disappearing of the majority of subjective and objective symptoms of the disease on the 10-14th day (complaints of gingival bleeding and unpleasant breath odor), as well as to the decrease in PI, API and increase in SBI values. Reduction of the intensity of the inflammatory process in periodontal tissues is accompanied by positive dynamics of the immunological parameters in the oral cavity. There is a decrease in the amount of the GF, as well as a significant increase of IgA and SIgA in OF, and decrease of IgG and increase of the lysozyme level in OF in patients with the introduction of 5-hydroxy-4-methyluracil in form of application already on the 10th day from the beginning of the combined treatment. These indicators do not differ from those ones of healthy individuals at the completion of the treatment course remaining at the same level in the long term after treatment.

REFERENCES

1. Orekhova, L. Y., Gorbacheva, I. A., Shestakova, L. A., Metabolic aspects of pathogenesis of inflammatory diseases in diabetes patients, *Periodontics*, 2012, 3(64), 7-11.
2. Klosinska, A., Nowacka, M., Kopec, G., Periodontitis and the risk of cardiovascular diseases – review of epidemiological studies, *Kardiol. Pol.*, 2010, 68(8), 973-976.
3. Ismoilov, A. A., Ashurov, G. G., Yudolshev, S. I., Condition of periodontal structures in patients with associated somatic pathology, *Bulletin of Tadjik department of International academy of sciences of higher school*, 2011, 4, 43-45.
4. Kozodaev, M. V., Manuilov, B. M., Ivanov, V. S., Ivanov, E. V., Dynamics of indicators of local immunity of the oral cavity in the treatment of periodontitis modern plant-based medicines in patients with diabetes mellitus, *Surgery*, 2011, 3(60), 22-26.
5. Ermolaeva, L. A., Shishkib, A. N., Lapaeva, N., The condition of periodontal tissues in patients with diabetic osteopathy, *Dental educational research journal*, 2012, 1/2, 26-37.
6. Leech, M. T., Bartold, P. M., The association between rheumatoid arthritis and periodontitis, *Best practic & Research Clinical Rheumatology*, 2015, 29(2), 189-201.
7. Gaur, S., Agnihotri, R., Alzheimer's disease and chronic periodontitis: Is there an association?, *Geriatr Gerontol Int*, 2015, 15(4), 391-404.
8. Naumova, V. N., Turkina, S. V., Maslak, Y. Y., Interrelation of stomatological and somatic diseases: Literature review, *Volgograd scientific-medical journal*, 2016, 2, 25-28.
9. Kilmukhametova, Y. K., Batig, V. M., Abramchuk, I. I., Periodontal disease affected by somatic pathologies, *Young scientist*, 2017, 26, 57-62.
10. Mirsaev, T. R., Syringomyelia in the republic of Bashkortostan, *Neurological journal*, 2014, 3(19), 29-31.