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Pathogenetic Aspects of Diseases of Hard Tissues, Teeth, In Patients with Thyroid Glands Disorder

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Abstract: Thyroid diseases are increasing worldwide. Thyroid pathology ranks second among all endocrine diseases after diabetes mellitus. This is due to the the influence of various exogenous factors: iodine deficiency in the environment, the effects of various stromogenic factors, the deterioration of the ecological situation, and improved diagnostics of thyroid nodules. Studying the impact of thyroid pathology on the condition of periodontal tissues is also important because one of its diseases - endemic goiter - is quite widespread, especially in regions with a deficiency of a number of natural focal factors - iodine and fluorine. This is due to the influence of exogenous factors: iodine deficiency in the environment, the action of various stromogenic factors, the deterioration of the ecological situation, and improved diagnostics of thyroid nodules.

Keywords: Periodontium, periodontal diseases, dental hard tissue diseases, somatic diseases, dental nail.

Introduction: Numerous data have been accumulated on the combination of generalized inflammatory lesions of the periodontium with various internal organ diseases. In their works, they confirm..."the effect of iodine deficiency on periodontal tissue".

In our country, research is being conducted to prove the relationship between dental hard tissue lesions and periodontitis with hypothyroidism, and the effectiveness of its prevention and treatment in such patients is limited.

Thyroid dysfunction contributes to the development and spread of caries, changes in the mineralization of hard tissues, and periodontal pathology. It has been noted that in women aged 18-50 years, an increase in the diameter of enamel prisms in hypothyroidism is

observed in the enamel of intact teeth, as well as thickening, loosening, disruption of enamel prism shape, and dentin deformation with destruction of tubules in caries foci, however, the nature of morphological changes in diffuse endemic goiter remains poorly understood [1].

Thyroid diseases are increasing worldwide. Thyroid pathology ranks second among all endocrine diseases after diabetes mellitus. This is due to the influence of exogenous factors: iodine deficiency in the environment, the action of various stromogenic factors, the deterioration of the ecological situation, and improved diagnostics of thyroid nodules [2].

Studying the impact of thyroid pathology on the condition of periodontal tissues is also important because one of its diseases - endemic goiter - is quite widespread, especially in regions with a deficiency of a number of natural focal factors - iodine and fluorine [3].

In the world, based on data of interest in the development and improvement of methods for early diagnosis and prevention of inflammatory diseases of the periodontal tissues in patients with thyroid dysfunction, it is one of the urgent tasks requiring its solution in the treatment, prevention, and prediction of periodontal diseases, a number of scientific results have been obtained: substantiation of pathology occurring in a background regime, affecting general dental diseases. It has been established that the leading sign of sialadenosis in patients with hyperthyroidism (86%) and hypothyroidism (72%) is an objective decrease in the secretory activity of the salivary glands [4,5].

In patients with thyroid dysfunction, data were obtained on an increase in the prevalence of dental caries in patients, allowing the dentist to formulate a new approach to diagnosis, prevention, and treatment [6,8].

The purpose of the study: Based on clinical and laboratory data, assess the structural changes in the enamel and dentin affected by caries and increase the effectiveness of treatment of chronic generalized periodontitis in patients with diffuse (endemic) goiter of mild and moderate severity.

Research objectives:

To study the condition of the hard tissues of the teeth and periodontium in patients with diffuse endemic goiter of mild and moderate severity;

to determine morphostructural changes in the microelement composition in patients with diffuse endemic goiter of mild and moderate severity using the scanning microscopy method;

to analyze the biochemical indicators of bone metabolism in oral fluid by determining the content of total calcium, phosphorus, and alkaline phosphatase in oral fluid in patients with diffuse endemic goiter of mild and moderate severity;

to study the phagocytic, cellular, and humoral immune status of patients with enamel and dentin demineralization and generalized periodontitis against the background of diffuse endemic goiter of mild and moderate severity;

Improve measures for the prevention of caries and treatment of patients with generalized periodontitis against the background of diffuse endemic goiter of mild and moderate severity.

The object of the investigation: The object of the study was 115 patients with caries and chronic generalized periodontitis against the background of diffuse endemic goiter aged 25-45 years. The control group consisted of 40 patients with caries and inflammatory diseases of the periodontium, without somatic pathology and not residing in the endemic zone.

Subject of research: oral fluid, periodontal tissues for determining dental indicators.

METHODS

To achieve the goal and objectives, the following methods were used: instrumental, clinical-functional, laboratory, radiological, and statistical.

To fulfill the set goals and objectives of the study, a clinical and instrumental study of the condition of periodontal tissues was conducted in 75 patients aged 25-45 years with caries and chronic generalized periodontitis against the background of diffuse endemic goiter of I, II degree at the Samarkand Regional Stomatology Polyclinic and the Samarkand Regional Endocrinology Dispensary between 2020 and 2024. The control group consisted of 40 patients with caries and inflammatory diseases of the periodontium without thyroid pathology. In the second stage, to assess the effectiveness of the treatment and preventive measures we proposed, patients with diffuse endemic goiter were divided into 2 groups: the comparison group - 30 patients who received standard traditional treatment, and the main group - 45 patients who, along with standard treatment, received the complex treatment we proposed.

RESULTS

The results of the work "Clinical Observations and Analysis of Own Research" analyzed the simplified oral hygiene index (OHI-S). In patients with endemic goiter, an increase in this indicator was observed compared to the control group (Table 1). A low hygiene index of 1.2±0.15 in the control group aged 25-35 indicates good

oral hygiene. This index was also higher in the 35-45 age group compared to the control group (1.8±0.20).

Table 1
Results of the Green-Vermilion oral hygiene index of the studied groups

Age	Control group	Main group
25-35	1,2±0,15	1,9±0,13*
35-45	1,8±0,20	2,6±0,31*
Average parameter	1,5±0,17	2,25±0,22*

Note. * - differences are significant compared to the control group; p<0.05

Loe, Silness index (table. 2) reflected the presence of inflammatory phenomena manifested as gingivitis in the 25-35 age group. Severe gingivitis prevailed in the 35-45 age group. The lowest index in the control group was 2.22±0.11, which is 0.40 lower than in patients of the main group. The degree of gingivitis was moderate and severe in both groups. The gingival index was higher in the main group than in the control group.

Table.2
Gingival GI (Loe, Silness)

Age	Control group	Main group
25-35	1,23±0,06	1,52±0,10*
35-45	2,22± 0,11	2,62±0,14*
Average parameter	1,73±0,06	2,07±0,11*

Note. * - differences are significant compared to the control group; p<0.05

During cytological examination in patients' cytograms, the main

in the group, moderate cellularity of the cytograms with a predominance of damaged tissue structures of the periodontium was noted, the absence of immunocompetent cells against a background of moderate leukocyte infiltration, a moderate amount of fungal mycelial threads were revealed, indicating a decrease in protective processes in the periodontium during the development of chronic inflammation. In patients of the control group, immunocompetent cells were found in moderate amounts in all preparations, and fungal mycelium was detected in isolated cases.

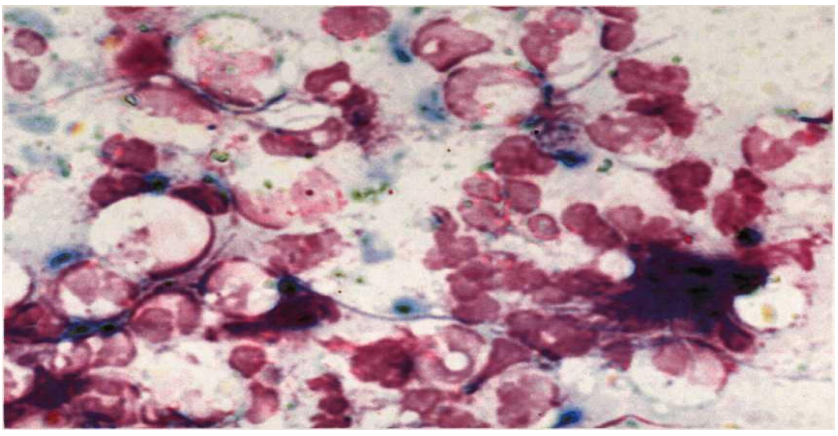

Figure 1. Sitogram of the main group of patients with moderate periodontitis. A significant number of total nuclear elements. Romanovsky-Giemsa coloring. Increase by 200.

In the study of the dynamics of blood serum cytokine levels, significant differences were established after treatment in the main group in the indicators of IL-1RA, IL-8, TNFα, and INFγ (Table 18). The concentration of IL-1RA in the main group after treatment decreased significantly by 51.8% (876.5±97.35) after 1 month, and by 57.5% (774.1±85.42) after 6 months from the baseline level (1743±162.1). The level of IL-8 significantly decreased in the main group after treatment by 76.5% (18.22±3.11) after one month and by 80.6% (14.88±4.17) after 6 months from the baseline (78.5±03.03). A significant decrease in the

concentration of TNFα was detected only after 6 months in patients of the main group by 14.8% (2.13±0.07) of the baseline (2.48±0.06). The dynamics

of INFγ in the form of a significant 68% increase was observed after 1 and 6 months only in patients of the main group.

The concentration of immunoglobulins of all classes in oral fluid varied significantly only in the main group. The concentration of IgA in the oral fluid is indicated as an indicator of a decrease in the inflammatory process, most pronounced after 1 month of treatment by 80.3% (0.102±0.02) of the initial level (0.52±0.02), which is confirmed by the positive dynamics of clinical and laboratory indicators. After 6 months, the concentration of IgG was 91.2% (0.08±0.02). In the main group, the concentration of IgM in oral fluid significantly decreased from 72.6% (0.005±0.002) after 1 month to 90.8% (0.003±0.002) after 6 months (0.022±0.007), but in the control group, a tendency to decrease was observed only after 6 months.

CONCLUSIONS

Chronic generalized periodontitis in patients with diffuse endemic goiter is characterized by a prolonged latent course with characteristic clinical manifestations in the form of a combination of generalized gingival recession, pronounced loss of clinical attachment, and a potentially long-term course. In the presence of endemic goiter, a significant increase in the frequency of dental caries occurs. Analysis of dental CPI indicators showed that in 100% of cases in the main group, there were carious lesions of the hard tissues of the teeth. In the control group, the CPI index was 9.4±1.7 and significantly lower than in the group with diffuse endemic goiter.

The cytological picture in periodontitis in patients with diffuse endemic goiter is characterized by moderate leukocyte infiltration and the absence of immunocompetent cells. The BMI indicators for periodontitis in patients with hypothyroidism are 1.4 times (27.5%) higher, the BMI indicators are 1.3 times (33.3%) higher than the corresponding indicators in patients with chronic generalized periodontitis without thyroid pathology ($p<0.05$). In the groups of patients with moderate and severe endemic goiter, a decrease in calcium content (0.26 mmol/l) and an increase in magnesium (3.4 mmol/l) against a background of slight changes in phosphorus levels (0.4 mmol/l) were found in mixed saliva. A decrease in calcium concentration undoubtedly affects the mineralizing ability of saliva, which, against the background of an increase in its acidity, will adversely affect the condition of the hard tissues of the tooth. Chronic periodontitis against the background of primary hypothyroidism is characterized by disorders in immune homeostasis: marked suppression of the factors protecting the phagocytic link of the immune system in the form of a significant decrease in the indicators of AP, NST-test, and FI; insufficiency of the cellular link of immunity, expressed in a decrease in the level of CR4-lymphocytes and the immunoregulatory index; insufficiency of the humoral link in the form of a decrease in the concentration of IgM and IgA in blood serum, a decrease in the concentration of IgM, an increase in IgA and IgG in oral fluid. The cytokine status is characterized by an increase in the concentration of IL-1PA in oral fluid, an increase in the concentration of IL-8 in blood serum, and a decrease in the level of IL-4.

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