Association between periodontal infection and systemic diseases

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Summary

Over the past decade, a growing body of scientific evidence suggests an exquisite association between oral infection and systemic diseases. The purpose of our study is to compare the periodontal statusof healthy population of Belarus with the periodontal status of patients with systemic disease.

Materials and methods. The clinical study included 52 adults aged 40-55 with coronary artery diseases (CAD), 54 patients with chronic obstructive pulmonary diseases (COPD) and 59 patients without systemic diseases. We measured the oral status using the following criteria: simplified oral hygiene index (OHI-S, Green-Vermillion, 1964), gingival index (GI, Loe, Silness 1964), periodontal index (CPITN, Ainamo et al., 1982), tooth mobility (Mobility index, Miller, Fleszar, 1980). Levels of IgM, IgG antibodies to Chlamydia pneumonia/psittaci, Mycoplasma pneumonia, and Helycobacter pylory were assessed in blood serum.

Results and discussion. Moderate periodontal diseases with pocket probing depth up to 5 mm are seen in 25.4±5.7% of the control (healthy) group, in 46.3± 6.8%* ($p < 0.05$) of patients with COPD and in 59.4± 6.8%* ($p < 0.01$) of CAD patients. Tooth mobility was registered only in CAD patients (31.3±6.43%). Serum Mycoplasma pneumonia antibodies were significantly higher in patients with systemic diseases, especially for coronary heart diseases (50% in CAD patients, 10% in control group, $p < 0.05$).

Conclusions. The evaluation of periodontal status of the population of Belarus reveals the statistically significant low level of periodontal health in patients with systemic diseases as compared to control. Serum Mycoplasma pneumonia antibodies were significantly higher in patients with coronary heart diseases.

Keywords: periodontal infection, systemic diseases, periodontal indices.

IntIntroduction

Over the past decade, a growing body of scientific evidence suggests an exquisite association between oral infection (eg, viruses, bacteria, yeast) and systemic diseases (atherosclerosis, cardiovascular disease, cerebrovascular disease, prematurity and low birth weight, and pulmonary diseases) [1,2].

The oral cavity contains almost half the commensal bacteria in the human body; approximately 6 billion microbes representing 300 to 500 species reside in the oral cavity. The oral microbial ecosystem is remarkably dynamic. As a consequence, there has been a resurgence of interest in oral microbial ecology, mucosal immunity, and associations with systemic conditions.

Several studies relate oral infections, including periodontal diseases, to coronary artery diseases [3,4,5,6]. Infectious agents that have been linked to an increased risk to coronary heart diseases include Chlamydia pneumonia, Helicobacter pylori, Cytomegalovirus and others.

Accumulating evidence suggests that oral disorders, particularly periodontal disease, may influence the course of respirato-

ry infection. The major respiratory diseases are caused or influenced by bacteria. Community-acquired bacterial pneumonia is usually associated with Mycoplasma pneumoniae, Chlamydia pneumoniae, Legionella pneumophila, and a variety of anaerobic species are also involved. Oral bacteria may also play a role in the exacerbations of chronic obstructive pulmonary diseases. For example, oral bacteria can be cultured from a significant proportion of the lung fluids obtained from transtracheal aspiration, a technique that avoids contamination with oropharyngeal secretions. Several studies have documented that hospitalized individuals tend to have poorer oral hygiene than matched ambulatory, community-dwelling controls [7,8].

The **purpose** of our study is to compare the periodontal status of healthy population of Belarus with the periodontal status of patients with systemic diseases and to assess the relationship between infection factors and the presence of systemic diseases.

Materials and methods

The clinical study included 52 adults aged 40-55 with coronary artery diseases (CAD), 54 patients with chronic obstructive pulmonary diseases (COPD) and 59 patients without systemic diseases. After adjusting for age, social class, hypertension, education, smoking, we measured oral status using the next criteria:

- simplified oral hygiene index (OHI-S, Green-Vermillion, 1964);
- gingival index (GI, Loe, Silness 1964);
- periodontal index (CPITN, Ainamo et al., 1980);
- tooth mobility (Mobility index, Miller, Fleszar, 1980).

Levels of IgM, IgG antibodies to Chlamydia pneumonia/psittaci, Mycoplasma pneumonia, and Helycobacter pylory were assessed in the blood serum of 32 CAD patients, 10 patients with COPD and 10 patients without systemic diseases.

All data were recorded in the special examination form. Statistical analysis was performed using the methods of variation statistics and ANOVA (SE, SD, t and p criteria).

Results and discussion

All surveyed patients evidenced low and very low levels of oral hygiene. The mean GI in control group was 0.95 0.79, whereas in COPD - 0.98 0.66 and CAD patients - 1.23 0.43* ($p < 0.05$). The results showed difference between CAD patients and the control group in the prevalence of gingivitis (*Table 1*).

In all groups there were no sextants with healthy periodontium.

Table 1. The evaluation of oral hygiene and gingivitis in patients with systemic diseases and healthy subjects (M± SD± SE)

Dental status	CONTROL	COPD	CAD
	n = 59	n = 54	n = 52
OHI-S (±SD, ±SE)	3.15±0.63 0.08	3.17±1.28 0.17	3.20±1.21 0.17
GI (±SD, ±SE)	0.95±0.79 0.10	0.98±0.66 0.09	1.23±0.43 * 0.06

Moderate periodontal diseases with pocket probing depth up to 5 mm are seen in 25.4±5.7% of the control (healthy) group, in 46.3±6.8%* ($p < 0.05$) of patients with COPD and in 59.4± 6.8%* ($p < 0.01$) of CAD patients. CPITN scores, reflecting the shallow periodontal pockets, were the following: in CAD patients - 1.25± 1.15* ($p < 0.05$), in COPD patients - 0.89± 0.87, in controls - 0.80± 0.37.

Deep pockets more than 6 mm were registered in 3.0±2.2% of the healthy group, in 7.3±3.5% of patients with COPD and in 9.4 4.1% of CAD patients. The mean number of CPITN "4" in CAD patients was 0.19 0.58; in COPD patients - 0.15± 0.45, and 0.13±0.65 - in controls (*Table 2*). Tooth mobility was registered only in CAD patients (31.3±6.43%).

Table 2. Comparison of periodontal status of patients with systemic diseases and healthy subjects (M±SD;±SE)

Groups Periodontal status	CONTROL n = 59	COPD n = 54	CAD n = 52
CPITN "3" (±SD±SE)	0.80±0.37 ±0.05	0.89±0.87 ±0.12	1.25±1.15* ±0.16
CPITN "4" (±SD±SE)	0.13±0.65 ±0.09	0.15±0.45 ±0.06	0.19±0.58 ±0.08

* Differences between test and control groups are statistically significant ($p < 0.05$)

Compared with controls, patients with CAD and COPD displayed similar levels of seropositivity to Chlamydophila pneumonia/psittaci and Helycobacter pylory. The percentage of people with antibodies to Helycobacter Pylory was high in all groups (59.4% - 60%).

Serum Mycoplasma pneumonia antibodies were significantly higher in patients with systemic diseases, especially for coronary heart diseases (50% - CAD patients, 10% - in control, $p < 0.05$). The percentage of individuals with CPITN scores (3+4) was significantly higher in the group of chronic respiratory diseases and coronary heart diseases than in subjects without systemic diseases (*Table 3*).

Table 3. Relationships between periodontal diseases and Mycoplasma pneumonia antibodies in blood serum

Groups	% of patients with periodontal pocket CPITN 3 + 4	% of patients with antibodies to M. pneumonia
CAD patients	65.6±6.18% *	50±8.84% *
COPD patients	51.2±6.80% *	30±14.49%
Control (healthy)	27.3±6.18%	10±9.49%

* Differences between test and control groups are statistically significant ($p < 0.05$)

One patient with CAD who had advanced periodontal diseases (deep pockets = 5 mm, multiple periodontal abscesses) was seropositive to Chlamydia pneumonia/psittaci, Mycoplasma pneumonia and Helycobacter pylory.

Conclusions

The evaluation of periodontal status of the population of Belarus reveals the statistically significant low level of periodontal health in patients with systemic diseases as compared to controls.

Serum Mycoplasma pneumonia antibodies were significantly higher in patients with coronary heart diseases.

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