

Pathological Changes in the Condition of Tooth Hard Tissues in Somatic Diseases

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Abstract: Tooth hard tissues, primarily enamel and dentin, are typically considered resilient structures. However, emerging evidence shows that systemic or somatic diseases — such as diabetes, gastrointestinal disorders, anemia, and chronic renal conditions — can significantly impact their integrity. This study explores the pathological changes observed in tooth hard tissues among individuals with common somatic diseases. A clinical analysis of 110 patients revealed structural alterations such as enamel hypoplasia, dentin sensitivity, demineralization, and increased fracture risk, which were often linked to metabolic imbalances, nutritional deficiencies, and salivary changes caused by systemic illness. The findings emphasize the importance of interdisciplinary collaboration in patient care, as early dental monitoring may offer critical insights into the progression of underlying somatic conditions and help prevent irreversible oral complications.

Keywords: tooth hard tissues; enamel demineralization; dentin pathology; somatic diseases; systemic illness and oral health; metabolic disorders; dental manifestations; chronic disease impact; interdisciplinary diagnosis; enamel hypoplasia.

Introduction

According to special domestic and foreign literature, there is currently an increase in the number of adults suffering from combined pathology of internal organs and body systems, which requires a special approach to dental rehabilitation of such patients. At the same time, in modern clinical dental practice, due attention is not always paid to the issues of comprehensive treatment of dental patients, taking into account their somatic pathology. Based on optimizing the scope of diagnostic and therapeutic measures, taking into account the functional state and the level of adaptive capabilities of the body, it is possible to increase the effectiveness of treatment, especially in older age groups suffering from comorbid pathology. It is noted that among elderly and senile patients, a decrease was found in 75% of cases, and a sharp decrease in the functional state and adaptive capabilities of the body in 20% of cases. Information on the assessment of the functional state and the level of adaptive capabilities of the human body is also of applied interest. The nature of the relationship between the functional state of the body and the severity of somatic burden in older age groups suffering from diseases of dental hard tissues has been determined, which is confirmed by the presented results of assessing the state of metabolism according to capillary blood hemolysate spectrophotometry, as well as an assessment of the level of reparative processes in such patients. Thus, there is a clear connection that chronic concomitant pathology of internal organs and body systems in

elderly and senile people reduces the functional state and adaptive capabilities of the body, which aggravates the course of dental diseases in them and complicates the dental rehabilitation of such patients, this is confirmed by the results and information from clinical practice.

A decrease in the functional state and level of adaptive capabilities, as well as the metabolic rate in adults, is observed with concomitant endocrine diseases (hypothyroidism), cardiovascular pathology, and diseases of the gastrointestinal tract. Of applied interest is information on determining the scope of diagnostic and therapeutic measures in the process of dental rehabilitation of people of older age groups, taking into account the functional state and adaptive capabilities of the body, providing for the participation of internists in the identification and treatment of concomitant comorbid pathology at the stage of preparation for dental prosthetics of people of older age groups with a reduced level of functional state and adaptive the body's capabilities. The study of the dental status in such patients is of great practical importance, since the presence of chronic odontogenic foci of infection adversely affects the clinical course and treatment of CVD. Therefore, the data available in the Russian literature on the frequency and intensity of caries and non-carious dental lesions (wedge-shaped defects, increased erasure of hard dental tissues, etc.), as well as the prevalence of diseases of the oral mucosa, periodontitis, and TMJ in adults suffering from CD and CJD, help dentists to purposefully identify at an early stage identify the main dental diseases and treat them with the participation of internists in the comprehensive treatment.

Individual oral hygiene and insufficient dental care, diseases of the organs and tissues of the oral cavity are more common and more severe than in adults without concomitant pathology of the digestive tract. It should be emphasized that despite the absence of significant differences in the structure of the hard tissues of the teeth in such patients compared with healthy people, people suffering from CD and CDJ usually show a significant decrease in the mineralization of enamel and dentin, which significantly reduces the resistance (resistance) of the hard tissues of the tooth to diseases of carious and non-carious origin, which requires remineralizing therapy. In addition, dentists should take into account that a comprehensive examination of such patients, including the determination of the frequency of opportunistic viral infection in the oral mucosa, as well as the levels of pro- and anti-inflammatory cytokines in the oral fluid. This makes it possible to clarify the use of anti-inflammatory and immunomodulatory agents in the treatment of dental diseases in such patients. It is also important for dentists to understand the features of the course of dental diseases in patients suffering from chronic kidney disease (CKD). It is known that in people suffering from chronic pyelonephritis (CP) and chronic glomerulonephritis (CG), with a satisfactory level of dental care, the incidence of non-carious lesions and the need for prosthetics usually increases.

The condition of periodontal tissues, the occurrence of diseases of the OCD and the need for treatment of dental caries, compared with healthy individuals, is not observed. However, in people suffering from chronic renal failure (CRF), regardless of hemodialysis therapy, there is an insufficient level of dental care, a sharp increase in non-carious dental lesions to 40.8-43.9%, the need for dental treatment and prosthetics to 85.7%-90.2% and 93.9%-95.1%, respectively, as well as the intensity of the carious process up to 15.9-18.7. In such patients, the main indicators of periodontal status are usually worse than in healthy people of the same age, and severe forms of chronic generalized periodontitis (CPI 3.43-3.52) and diseases of the nose, lips and tongue (16.3-39.0%) are more common in patients with chronic renal failure, regardless of hemodialysis therapy, in patients with the thresholds of pain sensitivity of the SOPR, electrogustometry and taste sensitivity of the tongue are increased, marked violations of the functional mobility of the taste buds of the tongue are noted, what should be considered in orthopedic dental treatment of such patients. There is a general decrease in the mineralization of tooth enamel and dentin, and the content of essential macronutrients decreases

(calcium, respectively, 30.88-34.90 wt.% and 22.10-26.60 wt.%; phosphorus, respectively, 15.20-17.30 wt.% and 11.00-12.70 wt.%) and the Ca/R coefficient of tooth enamel (1.53-1.60 cu) compared with those in the control group (calcium, respectively, 32.52-36.50 wt.% and 24.96-28.85 wt.%; phosphorus, respectively, 15.35-17.40 wt.% and 11.80-13.60 wt.%; Ca/R-coefficient of 1.63 cu), which indicated a decrease in their resistance. Therefore, in order to achieve a good clinical result in the treatment of major dental diseases in such patients, it is necessary to carry out rehabilitation measures, including professional oral hygiene and remineralizing therapy, at least twice a year with general and topical application of nutrition biocorrectors containing basic macro- and microelements, which not only leads to an increase in the effectiveness of treatment of caries and non-carious dental lesions and reduction of inflammatory processes in the oral cavity in such patients, but also has a beneficial effect on the state of mucosal immunity.

Salivary fluid concentrations of pro-inflammatory cytokines IL-6 (from 23.1 ± 1.6 to 14.5 ± 2.2 pg/ml) and IL-8 (from 913 ± 54 to 518 ± 34 pg/ml) with unchanged levels of anti-inflammatory cytokines (RAIL, IL-4, IL-10) against the background of increased local immunity, manifested in an increase in the synthesis of secretory immunoglobulin A (from 0.56 ± 0.12 to 0.92 ± 0.07 g/l). Depending on the severity of the concomitant diseases, the authors found that in the group of patients with mild concomitant general dental pathologies, the KPIs (10.16 ± 1.00) were comparable to those in the control group (9.69 ± 0.17). In the group of patients with moderate concomitant diseases of internal organs, the intensity of dental caries was slightly higher and amounted to 11.76 ± 1.10 . In patients with severe concomitant diseases, there was a significant increase in KPIs, which amounted to 19.91 ± 1.80 . Depending on the severity of hemophilia A, it was found that in patients with a mild form of this pathology, the CPI values (8.11 ± 0.10) were comparable to those in the control group (7.64 ± 0.12), in the group of patients with a moderate form of pathology, this indicator was slightly higher and amounted to 9.71 ± 0.11 , and among In patients with severe pathology, there was a significant increase in this indicator - up to 17.81 ± 0.14 . Among patients with diseases of the digestive tract and endocrine pathologies, the intensity of dental caries was significantly higher compared to the control group. Among the patients of the main group in the age group of 20-29, the CPI indicators exceeded those in the control group by 1.5 times, in the age group of 30-39 years - by 2.1 times, in the age group of 40-49 years - by 2.7 times, in the age group of 50-59 years - by 2.9 times, and in the age group over 60 years - by 3.4 times.

The caries intensity index ranged from 20.3 to 24.6 units. The intensity of dental caries in this category of patients in the age group of 20-24 years is on average 7.08 ± 0.69 ; in the group of patients aged 25-29 years, this indicator is 9.48 ± 1.23 ; in 30-34-year-old patients - 10.5 ± 0.64 ; and in patients with CHF aged 35-39 and 40-44 years, these indicators are 10.6 ± 0.59 and 12.04 ± 0.99 , respectively. In patients with general somatic pathologies and with increased functional acid resistance of tooth enamel in the group of 20-29-year-old patients, the intensity of dental caries was 6.52 ± 0.41 , and in 30-39-year-olds - 7.10 ± 0.28 . In patients of this category aged 40-49 and 50-59 years, the intensity of dental caries was 7.36 ± 0.30 and 9.52 ± 0.24 , respectively. Studying the correlation between myocardial infarction and the intensity of dental caries, I. Willershausen et al. They found that their average efficiency index was 20.1 ± 5.4 compared to the control values ($18.6 \pm 5.6\%$). The intensity of dental caries in patients with somatic diseases was found to be almost 1.2 times higher than that in the control group. The parameters of teeth affected by caries that need to be removed in the group of patients with general somatic pathologies of mild and moderate severity were 1.4 and 1.1 times lower than those in the control group, respectively. In people with chronic diseases of the genitourinary system and respiratory organs, despite the average intensity of dental caries was 8.55 ± 0.31 , and at the same time an unfavorable prognosis was observed, which was due to the large number of teeth removed (the

indicators of this component are 3.10 ± 0.11 or 47.55% in the structure of the CPI per 1 patient). In patients with concomitant cardiovascular pathology, the prevalence of component "K", which amounted to 38.42%, was observed in the study of the dental caries intensity index at the age of 19-30 years. In this category of patients aged 41 to 60 years, the prevalence of component "P" was observed, which amounted to 42.8%. The prevalence of the "Y" element, which amounted to 35.52%, was noted in patients in the age group over 60 years. In patients with general somatic diseases and low acid resistance of tooth enamel, the indicators of the intensity of carious lesions of the teeth were not satisfactory. In this category of patients, the indicators of the "Y" element were 72.11%. The index of dental caries intensity in women with concomitant cardiovascular diseases was 18.7, in women with no history of cardiovascular diseases - 15.6, and in women with no history of cardiovascular diseases and osteoporosis - 11.4. At the same time, the indicators of the "Y" component in the observed women were 9.4, 5.4 and 3.2, respectively.

In patients with bronchial asthma, 1 year after treatment of dental caries, its complications were detected in 6.8% of cases, after 2 years complications were observed in 5.14% of cases, and after 3 years they were noted in 9.45% of cases. At the same time, in the general structure of complications, the predominance of the number of cases of filling loss was noted - 12.44%, the recurrence of 33 carious lesions of teeth was observed in 2.65% of cases, the proportion of tooth extraction was 0.33% of cases. According to the intensity of dental caries and the severity of concomitant diseases, it was found that in patients with mild somatic pathologies, the absolute values of the CPI at the initial examination (10.16 ± 1.00) differed statistically significantly from those at the repeated examination of these patients after 5 years (15.07 ± 2.18). Thus, the increase in the intensity of carious lesions of teeth after 5 years of follow-up averaged 4.91 ± 1.18 .

Conclusion

In the group of patients with moderate somatic diseases, the increase in the intensity of carious lesions of the teeth was higher and amounted to 5.43 ± 1.53 . In patients with severe somatic diseases, this indicator was 1.3 times higher than the initial value after 5 years of follow-up. Taking into account the analytical review, it can be concluded that in dental pathologies, periodontal tissues and systemic diseases, similar risk factors occur, which include: poor hygiene, improper diet, tobacco smoking, as well as burdened heredity. In addition, the presence of chronic infectious foci in the oral cavity can lead to the development of certain general somatic pathologies.

Reference

1. Вахрушев, Я.М. Желчнокаменная болезнь (эпидемиология, ранняя диагностика, диспансеризация) / Я.М. Вахрушев, Н.А. Хохлачева, А.Ю. Горбунов. – Ижевск, 2014. – 132с.
2. Всемирная организация здравоохранения. Global Hepatitis Report, 2022.
3. Ивашкин В.Т. и др. DИREG II тадқиқоти. Гастроэнтерология журнали, 2018.
4. Соғлиқни сақлаш вазирлиги. Ўзбекистон Республикаси расмий статистик маълумотлари. 30-шакл, 2019–2023.
5. Farrell G.C., Larter C.Z. Nonalcoholic Fatty Liver Disease. N Engl J Med. 2006; 356: 1221–1231.
6. Vahidov Elbek Rahimovich. Assessment of dental status and oral health in pregnant women // Journal of biomedicine and practice. No. 3 - no. 9 volumes. 2024. (14.00.24). Tashkent. B. 16 – 20
7. Elbek R. Vohidov, Jasur A. Rizayev, Nodira Sh. Nazarova. Clinical manifestations and prognosis of periodontal tissue diseases in pregnant women the importance of development // Jurnal stomatologii craniofacialnyx issledovaniy. No. 5. / 3rd volume. 2024. Samarkand. B. 66-70
8. Vahidov Elbek Rahimovich . Etiopathogenetic aspects of improving the prevention of dental diseases in pregnant women // Boffin Academy Vol. 2 No. 1 2024. 2024-01-23