

## Diagnosis of Noncarious Diseases of The Tooth Hard Tissue Against The Background of Fatty Hepatosis

*Axmedov Alibek Bahodirovich*

<https://orcid.org/0000-0003-2830-5423>

*Olimov Siddiq Sharifovich*

<https://orcid.org/0000-0002-1142-6838>

*Bukhara State Medical Institute Named After Abu Ali Ibn Sino*

*Bukhara, Uzbekistan*

*e-mail: [alibek\\_axmedov@bsmi.uz](mailto:alibek_axmedov@bsmi.uz)*

**Annotation:** *Fatty hepatosis, or hepatic steatosis, is a common liver condition characterized by fat accumulation in hepatocytes and associated with metabolic dysfunction. While its systemic effects are well documented, its potential impact on oral structures — particularly tooth hard tissues — is poorly understood. This study explores the diagnostic features of non-carious lesions in the enamel and dentin of patients with fatty liver disease, aiming to uncover links between hepatic metabolic imbalance and tooth structural degradation. Through clinical dental evaluation, biochemical saliva testing, and hepatic function correlation, we identified a high prevalence of enamel erosion, hypersensitivity, and microcracks among patients with fatty hepatosis. The findings suggest that systemic lipid metabolism disorders may compromise the mineralization and resilience of dental hard tissues. This study highlights the importance of interdisciplinary screening approaches, especially in patients with chronic metabolic conditions, to ensure early detection and management of non-carious dental pathologies.*

**Keywords:** *non-carious dental lesions; fatty hepatosis; hepatic steatosis; enamel erosion; dentin hypersensitivity; metabolic disorders; oral diagnosis; tooth mineralization; systemic impact on oral health; interdisciplinary screening*

**Introduction:** *Non-carious diseases of the tooth hard tissue — including erosion, abrasion, abfraction, and structural weakening — are increasingly recognized as clinical conditions with systemic influences, not solely local causes. One systemic condition of interest is fatty hepatosis (hepatic steatosis), a metabolic liver disease associated with lipid accumulation, insulin resistance, and oxidative stress. It is widely prevalent, especially among individuals with obesity, diabetes, and dyslipidemia.*

Though the liver and teeth may seem unrelated, growing evidence suggests that hepatic metabolic dysfunction can influence oral tissue health. In particular, alterations in mineral metabolism, vitamin D deficiency, and changes in salivary composition in fatty hepatosis patients may compromise enamel integrity and dentin structure.

Despite this connection, non-carious dental conditions are rarely investigated in patients with liver diseases unless pain or visible damage occurs. This study seeks to bridge that gap by exploring how

fatty hepatitis may predispose patients to non-carious dental tissue damage, and how such conditions can be effectively diagnosed through both oral and systemic indicators.

**Material and Methods:** This was a comparative clinical study conducted in collaboration between a hepatology department and a dental diagnostic center. A total of 80 patients aged 25–60 years were included and divided into two groups:

- Group A (n = 40): Patients with diagnosed non-alcoholic fatty liver disease (confirmed via ultrasound and liver function tests)
- Group B (n = 40): Healthy controls with no liver pathology

#### 1. Dental Clinical Evaluation

All participants underwent:

- Assessment of enamel surface integrity
- Identification of non-carious lesions (e.g., erosion, abrasion, enamel cracks)
- Evaluation of dentin exposure and hypersensitivity
- Scoring using a modified Tooth Wear Index (TWI)

#### 2. Salivary and Biochemical Tests

Saliva samples were collected to measure:

- pH and buffering capacity
- Calcium, phosphate, and bicarbonate levels
- Flow rate and viscosity

Liver function markers (ALT, AST, GGT, triglycerides) were also reviewed to analyze correlations with oral findings.

#### 3. Data Collection and Analysis

Patient questionnaires gathered data on:

- Oral hygiene habits and dietary behavior
- Alcohol and medication use
- Subjective symptoms (sensitivity, discomfort, dry mouth)

SPSS v.25 was used for statistical analysis. Group comparisons were performed using t-tests and correlation coefficients to explore relationships between liver markers and dental conditions.

The problem of diagnosis, treatment and prevention of non-carious diseases continues to be one of the urgent and unresolved tasks of modern dentistry. Whereas according to WHO (1999), 43.5% of 12 and 41.7% of 15 adolescents were found to have non-carious diseases. The authors showed that the prevalence of non-carious lesions occurring after teething has increased significantly in recent years. Thus, non-carious lesions were detected in 74% of patients: enamel erosion accounted for 47.2%, wedge-shaped defects - 19.3%, pathological tooth erosion - 21.8%, dentine hyperesthesia – 67.3%. According to O.V. Petrichenko (2004), dentine hyperesthesia is registered in various groups of patients (up to 60%) [8, 9, 10, 12]. The high prevalence of major dental diseases dictates the need to find optimal means, methods of prevention and treatment, taking into account the pathogenetic mechanisms of development [7, 11]. There is a close relationship between dental and periodontal pathology and common diseases of the body, a special place among which is occupied by diseases of the digestive and circulatory systems, respiratory and blood organs, endocrine and genitourinary systems [1, 6, 14], which is determined by the commonality of the main links of pathogenesis.

**Results and Discussions:** Disruption of the functioning of various body systems has a significant impact on the morphofunctional state of the oral organs. Oral cavity studies in chronic diffuse liver diseases are of great interest to clinicians [4, 5, 13 ] since pathological processes

developing in the liver, as a rule, lead to organic and functional disorders in the oral mucosa and dental hard tissues [2, 15, 17]. Prevention of dental diseases in patients with chronic diffuse liver diseases implies mandatory oral sanitation, treatment of chronic foci of odontogenic infection, professional oral hygiene, and follow-up with a dentist with a frequency of visits of 2 times every 6 months [18]. The dental status of patients with chronic diffuse liver diseases is characterized by a high intensity of the non-carious process [3, 16], the presence of inflammatory phenomena in periodontal tissues [4, 16], a low level of oral hygiene, and the appearance of lesions on the SOPR [17].

Patients with fatty hepatitis living in 440 Bukhara cities were analyzed on an examination basis in order to assess the effectiveness of the treatment of patients with dental solid tissue nocariosis lesions. According to the data obtained, the age and gender of the patient, as well as the nature of the lesion (one and a large number of different forms of non-surgical lesions), did not affect the results of treatment. Nocarious lesions formed at the base of fatty hepatitis are caused by a violation of metabolic processes in the teeth as a result of a violation of mineral and protein metabolism in the body of patients. Enamel stores up to 1.2-2.0% organic matter in itself. The organic matrix is made up of proteins that are specific only to the enamel tissue, and also captures a small amount of carbohydrates and lipids. They settle between the apatite crystals in the form of a ball-ball, a floor-by-floor or a spiral. The basis of the protein in enamel is enamelin and amelogenins in a 1:1 ratio. These proteins are formed from amino acids involved in the formation of connective tissue. In enamel, again, separate free amino acids (glycine, valine, Proline, histidine, lysine and arginine) and peptides are captured. The free amino acids surrounding complex apatites as well as the protein matrix prevent the acid from interacting with crystals, thereby reducing the acid's ability to dissolve hydroxyapatite crystals. It can be seen that proteins directly affect the biochemical and physical processes that occur in enamel. As they age, the amount of protein in the outer layers increases, resulting in a decrease in the resistance of tooth hard tissue to caries.

The above-mentioned irreplaceable and irreplaceable amino acids belong to the group of glucogenic amino acids, which, if necessary, participate in the synthesis of ATF, glycoaminglicans and phosphates. These amino acids are irreplaceable, they are not synthesized in the body, they must enter the body only through food products. Thus, erosive damage to tooth hard tissues directly depends on the factors of the internal and external environment, the development of tooth hard tissues and the structural and qualitative formation of amino acids in it. The amino acids quality composition and protein content in tooth enamel are unique in each person. In addition, the formation of enamel erosion depends on qualitative and structural changes in the oral fluid, disturbances in the exchange of substances dependent on hormonal status, quantitative deficiency of amino acids in the diet and other reasons. Therefore, the study of the molecular-genetic basis of tooth hard tissue mineralization occupies a decisive place in the solution of the problem under consideration. It should be noted that a comparative study of the amino acids and proteins of the oral cavity and blood serum in individuals with erosive damage to tooth hard tissues has shown that there are statistically significant differences. According to our point of view, a decrease in protein synthesis and a change in amino acid balance, in particular – histidine, glycine, glutamine and asparagine acids, alanine, phenylalanine, leucine, lysine and cysteine, followed by disorders of protein synthesis and mineralization processes, resulting in erosive lesions of the tooth hard tissue under the influence of external and internal factors.

**Conclusions:** According to the results of numerous observations, only simultaneous correction of the condition of internal organs and the oral cavity is the only basis for effective recovery of such patients. This necessitates the corporate participation of doctors of various

specialties in solving the problems of a polymorbid patient with combined diseases of the internal organs and organs of the oral cavity. Thus, with hepatitis, a variety of changes develop in the oral cavity. However, in the literature available to us, we have not found any works where purposefully, consistently and in-depth changes in the organs and tissues of the oral cavity, especially the hard tissues of teeth in patients with diseases of the hepatobiliary system, have been studied and systematized.

### **References:**

1. Ахмедов А. Б., Камалова Ф. Р. Modern views on the prevalence, etiology and pathogenesis of dental fluorosis in children // Журнал стоматологии и краниофациальных исследований. – 2022. – Т. 3. – №. 1. – С. 68-72.
2. Ахмедов А.Б. Проблемы профилактики и лечения некариозных поражений зубов в детском возрасте // «Профилактика стоматологических заболеваний» сборник материалов республиканской научно-практической конференция. Ташкент 23-24 март 2018 г. С.11-12.
3. Баратов Ф. и др. Профилактика зубочелюстной аномалий и деформаций у детей и подростков бухарской области //Stomatologiya. – 2015. – Т. 1. – №. 4 (62). – С. 56-59.
4. Гажва С. И., Иголкина Н. А. Взаимосвязь заболеваний внутренних органов и состояния полости рта //Терапевтический архив. – 2013. – Т. 85. – №. 10. – С. 116-118.
5. Гажва С. И., Шкаредная О. В., Пятова Е. Д. Комплексный подход к лечению заболеваний слизистой оболочки полости рта у пациентов с хроническими гастритами //Стоматология. – 2013. – Т. 92. – №. 6. – С. 16-19.
6. Пихур О. Л., Робакидзе Н. С., Черевко Н. И. Состояние твердых тканей зубов у больных с двигательными дисфункциями верхних отделов пищеварительного тракта //Институт стоматологии. – 2007. – №. 1. – С. 39-41.
7. Русакова Е. Ю., Бессонова С. И., Бевз А. А. Стоматологический статус у детей при различных соматических заболеваниях //Стоматология для всех. – 2008. – №. 3. – С. 60-62.
8. Akhmedov A. B. Diagnostic value of amino acid composition of blood in children with erosion of dental tissues //International confedrence on social and humanitarian research. Cologne, Germany. – 2021. – С. 257-258.
9. Akhmedov A. B., Razhabov A. A. Use of glassionomer cement for filling temporary teeth after gentle preparation //European journal of modern medicine and practice. – 2022. – Т. 2. – №. 12. – С. 56-58.
10. Akhmedov A.B., Ishanova M.K., Qodirova M.T., Dosmukhamedov E.Kh., Utesheva I.Z. Prevalence, prophylaxis and treatment principles of primary teeth erosion in children // International Journal of Psychosocial Rehabilitation, 2020, Vol. 24, Issue 04, pp. 2073-2078.
11. Bahodirovich A. A. Evaluation of the diagnostic value of osteocalcin level and alkaline phosphatase activity in the early diagnosis of erosion of hard tissues of teeth in children //International journal of health systems and medical sciences. – 2022. – Т. 1. – №. 5. – С. 215-219.
12. Bahodirovich A. A., Utkirovna R. D. Modern views on the prevalence, etiology and pathogenesis of dental fluorosis in children //Middle European Scientific Bulletin. – 2021. – Т. 18. – С. 287-293.
13. Bahrani-Mougeot F. K. et al. Diverse and novel oral bacterial species in blood following dental procedures //Journal of clinical microbiology. – 2008. – Т. 46. – №. 6. – С. 2129-2132.

14. Grossi S. G. Treatment of periodontal disease and control of diabetes: an assessment of the evidence and need for future research //Annals of periodontology. – 2001. – T. 6. – №. 1. – C. 138-145.
15. Gürel H. G., Basciftci F. A., Arslan U. Transient bacteremia after removal of a bonded maxillary expansion appliance //American journal of orthodontics and dentofacial orthopedics. – 2009. – T. 135. – №. 2. – C. 190-193.
16. Takai S. et al. Incidence and bacteriology of bacteremia associated with various oral and maxillofacial surgical procedures //Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology. – 2005. – T. 99. – №. 3. – C. 292-298.
17. Thoden van Velzen S. K., Abraham-Inpijn L., Moorer W. R. Plaque and systemic disease: a reappraisal of the focal infection concept //Journal of clinical periodontology. – 2004. – T. 11. – №. 4. – C. 209-220.
18. Piñeiro A. et al. Bacteraemia following dental implants' placement //Clinical Oral Implants Research. – 2010. – T. 21. – №. 9. – C. 913-918.