

INNOVATION SCIENCE AND TECHNOLOGY



Scopus || Electronic journal specializing in Scopus

ISSUE 1



Acceptance of papers **January, 2026**



**Acceptance of
papers**

Published monthly



Topics

economics,
technology, social
sciences

ISSN 3060-5229



Digital
Object
Identifier



Visit the website
t.me/scopus_IST2100

Editorial board:



EDITOR-IN-CHIEF:

Mirzaliyev Sanjar Makhmatjon ugli

DEPUTY EDITOR-IN-CHIEF:

Makhmudov Nosir Makhmudovich
DSc., Prof., Academician

DEPUTY EDITOR-IN-CHIEF:

Ochilov Bobur Bakhtiyor ugli – Senior
lecturer at TSUI

THE SCIENTIFIC-POPULAR ELECTRONIC
JOURNAL "INNOVATION SCIENCE AND
TECHNOLOGY" HAS BEEN REGISTERED
UNDER THE NUMBER C-5669633 BY THE
AGENCY FOR INFORMATION AND MASS
COMMUNICATIONS (AOKA) OF THE
REPUBLIC OF UZBEKISTAN, EFFECTIVE
FROM OCTOBER 9, 2024.

CONTACTS

Phone: +998 50 737 87 88

Website: <https://ist-journal.uz>

Email: innovationist2025@gmail.com

The scientific electronic journal "Innovation Science and Technology" has been included in the list of scientific publications recommended for the publication of main scientific results of dissertations for the award of PhD and DSc degrees in economics and technical sciences, in accordance with the Resolution No. 370 of the Presidium of the Higher Attestation Commission of the Republic of Uzbekistan, dated May 8, 2025.



Sharipov Kongiratbay Avezimbetovich,
Doctor of Technical Sciences (DSc), Professor



Abdurakhmanova Gulnora Kalandarovna, Doctor of
Economic Sciences (DSc), Professor



Cham Tat Huei,
Doctor of Philosophy (PhD), Professor (Malaysia)



Muhammad Imran Sadiq
Doctor of Philosophy in Economics (PhD), Professor,
Malaysia



Ahmed Aziz Ismail
Doctor of Technical Sciences (DSc),
Professor (Egypt)



Lee Chin
Doctor of Philosophy in Economics (PhD), (Malaysia)



Asongu SImplice
Doctor of Philosophy in Economics (PhD), Cameroon



Rui Dang
Doctor of Chemistry (DSc), Professor, China



Zahoor Ahmed
Doctor of Philosophy in Economics (PhD), Turkey



Shujaat Abbas
Doctor of Philosophy in Economics (PhD), Russia



Tina A Coffelt
Doctor of Philosophy in Educational Sciences (PhD),
USA



Abdikarimova Dinara Rustamxanovna
Doctor of Economic Sciences (DSc), Professor

Kurbonbekova Mohichehra Turobjonovna
Doctor of Economic Sciences (DSc), Professor

Alimardonov Ilkhom Muzrabshokovich
Doctor of Economic Sciences (DSc), Professor



Razakova Barno Sayfiyevna
Doctor of Philosophy in Economics (PhD)



Khasanov Sarvar Ulugbek ugli
Doctor of Philosophy in Economics (PhD)



Kholikova Rukhsora Sanjarovna
Associate Professor (PhD)

CONTENTS

BRIEF FEEDBACK ON “AGAT CREDIT” MICROFINANCE ORGANIZATION BASED ON THE REPORT OF “KAPDEPO” INVESTMENT COMPANY: CAVEATS FOR LENDERS (BONDHOLDERS)	16
Abduganiev Abdulaziz Alisher ugli	
IMPLEMENTATION OF EU BEST AGRICULTURAL TRADE PRACTICES IN UZBEKISTAN.....	20
Khulkar Karimova Rakhmanali qizi	
THE ROLE OF FOREIGN DIRECT INVESTMENT IN INCREASING SERVICE EXPORTS OF UZBEKISTAN	26
Jamshid Mirzakhmedov	
THE ROLE AND IMPORTANCE OF FINANCIAL MARKETS IN ECONOMIC DEVELOPMENT	30
Baumanova Mavlyuda Djuraevna, Abdullaeva Shohista, Ubaydullaeva Gulchehra Erkabaevna	
КЛИНИЧЕСКАЯ ОЦЕНКА СОСТОЯНИЯ МЕСТНЫХ ИММУННЫХ МЕХАНИЗМОВ ПОЛОСТИ РТА У ПАЦИЕНТОВ НА ЭТАПАХ ОРТОДОНТИЧЕСКОГО ЛЕЧЕНИЯ	36
Рахимбердыев Рустам Абдунасирович, Сайфулаева Азиза Анваровна	
INTEGRATING AI-BASED CUSTOMER ANALYTICS INTO INNOVATIVE RETAIL MARKETING STRATEGIES	40
Ostonaqulova Gulsaraxon Muhammadyoqub qizi	
FINANCIAL STIMULATION OF INNOVATIVE ACTIVITIES OF ENTERPRISES THROUGH INVESTMENTS	48
Bahriddinov Nodirbek Zamirdinovich	
DIGITAL DENTISTRY: LITERATURE REVIEW	52
Tursunov Begzod Sherzodovich, Zokirova Nodira Sobitovna	
THE LATEST ADHESIVE TECHNOLOGIES IN DENTISTRY	56
Rahimberdiyev Rustam Abdunasirovich, Chinibayeva Ibagul Sarsenbayevna	
ENSURING THE ACCEPTABILITY OF QUANTITATIVE AND QUALITATIVE INDICATORS IN THE EFFECTIVE ORGANIZATION OF HOUSING FUNDS IN KHOREZM	61
Otajonov Tohirjon Khojanazar o'g'li	
WAYS TO IMPROVE CUSTOMS ADMINISTRATION IN THE REPUBLIC OF UZBEKISTAN.....	67
Usmonova Dilfuza Ilhomovna	
CLINICAL ASSESSMENT OF THE STATE OF LOCAL IMMUNE MECHANISMS OF THE ORAL CAVITY IN PATIENTS AT DIFFERENT STAGES OF ORTHODONTIC TREATMENT	72
Rakhimberdiyev Rustam Abdunasirovich, Saifulaeva Aziza Anvarovna	
IMPROVING THE ALGORITHM FOR CONTROLLING THE CUSTOMS TRANSIT INFORMATION SYSTEM E-TRANSIT OF THE REPUBLIC OF UZBEKISTAN	76
Musayeva Shoirazimovna	
DEVELOPMENT TRENDS OF THE AUTOMOTIVE BUSINESS IN UZBEKISTAN	82
Saidov Dilshodbek Razzakovich	
INTEGRATION OF MARKETING STRATEGIES IN RETAIL TRADE ACTIVITIES.....	87
Akramov Toxir Abdiraxmanovich	
CHALLENGES OF ADOPTING ISLAMIC FINANCE WITHIN CONVENTIONAL BANKING SYSTEMS	91
Safarov Shuhrat Ismatovich	
CRM SYSTEMS AND THEIR IMPACT ON THE RESULTS OF MARKETING STRATEGY IN DISTRIBUTION COMPANIES	95
Jamoliddinov Fakhriyor Shodiyor o'g'li	
LEXICAL-SEMANTIC ARCHITECTURE OF MODERN WORDNET SYSTEMS	101
Aynura Axmedova	
METHODOLOGY FOR ANALYZING THE EFFECTIVENESS OF INNOVATIVE PROCESSES AT ENTERPRISES.....	108
Kurbanova Shakhnoza Yuldashbayevna	
COMPANY VALUATION IN MERGERS AND ACQUISITIONS: A STRATEGIC AND GOVERNANCE-BASED APPROACH	113
Lee Illarion Georgievich	

A REVIEW OF THE LITERATURE ON CAD/CAM TECHNOLOGIES IN DENTAL ECTOPROSTHETICS.....	118
Tursunov Begzod Sherzodovich, Hazratqulov Asrbek Ulugbek ugli	
TRENDS AND DIFFICULTIES IN THE INTEGRATION OF DIGITAL TECHNOLOGIES IN ORTHOPEDIC DENTISTRY.....	123
Khojimurodov Burkxon Ravshanovich	
PRIORITY DIRECTIONS FOR IMPROVING THE MECHANISM OF ENHANCING THE ECONOMIC SECURITY LEVEL OF THE KASHKADARYA REGION.....	127
Tuyev Abdurahmon Yusubovich	
THE ROLE OF PSYCHOPHYSIOLOGICAL TRAINING OF DRIVERS IN REDUCING ROAD TRAFFIC ACCIDENTS.....	132
Uralbayev Anvar Ubaydullayevich	
THE ROLE OF SUSTAINABLE DEVELOPMENT PRINCIPLES IN DEVELOPING GREEN MARKETING STRATEGIES FOR ENTERPRISES.....	135
Sapayev Akhmad Durdibayevich	
MANAGEMENT MODEL OF INFORMATION RESOURCES IN SMALL BUSINESS ENTITIES AND ITS IMPACT ON ECONOMIC EFFICIENCY.....	140
Yo'ldoshev Nodirbek Ne'matjon o'g'li	
WAYS TO DEVELOP THE INVESTMENT ACTIVITY OF COMMERCIAL BANKS THROUGH THE SECURITIES MARKET.....	145
Yuldashev Fozil Turapovich	
INTERNATIONAL EXPERIENCE IN THE USE OF CROSS-BORDER REMITTANCES IN THE DEVELOPMENT OF THE NATIONAL ECONOMY.....	152
Gimranova O. B.	
FREE ECONOMIC ZONES AND FOREIGN INVESTMENT.....	158
Sheraliyeva Saida Azatovna	
ISSUES OF FORMATION AND MANAGEMENT OF PRODUCT ASSORTMENT IN RETAIL ENTERPRISES.....	162
Safarov Baxtiyor Djurakulovich	
STATE SUPPORT IN THE REPUBLIC OF UZBEKISTAN FOR ORGANIZING SHORT-TERM SCIENTIFIC INTERNSHIPS OF YOUNG SCIENTISTS ABROAD.....	167
Kabashev Tairjon	
LEGAL FOUNDATIONS OF DIVIDEND POLICY: EVIDENCE FROM DEVELOPED AND DEVELOPING COUNTRIES.....	172
Eshev Furqat A'zamovich	
IMPROVING SMART CITY GOVERNANCE BASED ON DIGITAL PLATFORMS: A HUMAN-CENTERED APPROACH.....	176
Rakhimova Madina Shukhrat qizi	
THE INVESTMENT CLIMATE AND ITS IMPACT ON THE DEVELOPMENT OF FOREIGN TRADE: A CASE STUDY OF UZBEKISTAN.....	182
Mirzamukhamedova Shakhzoda Akmaljon qizi	
CONSUMER CREDITS IN USA.....	187
Zunnunova Xulkar Muxtorovna	
INSTITUTIONAL BASES AND FUNCTIONAL MECHANISMS OF CONTROLLING IN THE EFFECTIVE MANAGEMENT OF THE RAILWAY TRANSPORT SYSTEM.....	194
Kayumov Zafarbek Odil ugli	
ANALYSIS OF CUSTOMER RELATIONSHIP MANAGEMENT PROCESSES AND PROBLEMS IN SERVICE ENTERPRISES.....	199
Ismailova Ma'mura Eldorovna	
PROBLEMS FACED BY COMMERCIAL BANKS IN BANK RISK MANAGEMENT AND WAYS TO ADDRESS THEM.....	205
Qayimova Ismigul Ilhom qizi, Tuxsanov Eldor Dilmurod o'g'li	

DESIGN OF ENGINEERING STRUCTURES AND CONSTRUCTION OF A REGIONALLY BRANCHED HIGHWAY COMPLEX.....	209
Yakubov Maqsadkhon Sultaniyazovich, Norinov Muhammadyunus Usibjonovich, Zikraev Akmaljon Alimovich	
THE ROLE OF COOPERATIVE RELATIONS IN THE SUSTAINABLE DEVELOPMENT OF THE REGIONAL TOURISM MARKET	216
Mirzabayev Jamshid Irkinovich	
THE ROLE OF FREE ECONOMIC ZONES IN IMPROVING THE INVESTMENT CLIMATE OF THE KHOREZM REGION.....	221
Masharipov Sardorbek Farxadovich	
ANALYSIS OF ORGANIZATIONAL AND ECONOMIC INDICATORS OF INNOVATIVE POTENTIAL MANAGEMENT IN TEXTILE INDUSTRY ENTERPRISES.....	228
Khosilov Shavkat Bekmurodovich	
MAIN WAYS TO DEVELOP INTEREST RATE RISK MANAGEMENT PRACTICES IN COMMERCIAL BANKS OF UZBEKISTAN	234
Seytnazarov Daniyar Baxadirovich	
THEORETICAL AND METHODOLOGICAL ASPECTS OF ESG STRATEGY IMPLEMENTATION.....	239
Xusenova Mexrangiz	
ADVANTAGES OF USING TRADITIONAL CONSTRUCTION MATERIALS IN THE CONSTRUCTION OF LOW-RISE RESIDENTIAL BUILDINGS.....	244
Otabek Hakimovich Toshniyozov	
THE METHODOLOGY FOR SELECTING AND INTEGRATING DATA SOURCES AND USING OFFICIAL STATISTICAL ENTERPRISE DATA, QUESTIONNAIRES, AND PROXY INDICATORS IN FORMING THE EMPIRICAL BASIS OF THE STUDY.....	247
Usmonov Maxsud Tulqin o'g'li, Qodirov Farrux Ergash o'g'li	
PRACTICAL SOLUTIONS FOR THE PLACEMENT OF MULTI-STOREY GREENHOUSES IN INDUSTRIAL AREAS	254
Abdujabbarova Maktuba To'xtasinovna, Salayeva Ma'rifat Yashin qizi	
INNOVATIONS IN DENTISTRY: DIGITAL SOLUTIONS FOR MODERN PRACTICE	258
Sadriyev Nizom Najmiddinovich, Usarov Nuriddin	
ARCHITECTURAL AND PLANNING PRINCIPLES FOR THE ORGANIZATION OF MANAGEMENT SERVICE COMPANY BUILDINGS IN THE URBAN DEVELOPMENT CONTEXT OF UZBEKISTAN.....	263
Adilova Madina Sobirovna, Khusainova Gulhayo Norbek qizi	
METHODS OF SEDATIVE THERAPY IN DENTISTRY (REVIEW OF LITERATURE)	268
Vasitov Otabek, Burkhonova Zараfruz Kobilovna	
SPECIFIC FEATURES OF THE FORMATION AND OPERATION OF A REGIONAL TOURISM CLUSTER.....	272
Ollanazarov Bekmurod Davlatmuratovich	
ESTIMATING ELECTRICITY CONSUMPTION OF PUMPING PLANTS IN IRRIGATION SYSTEMS.....	277
Urishev Omadjon, Ersin Akyuz, Gul Metin, Quvonchbek Quvondiqov	
ANALYSIS OF MANUFACTURING METHODS AND TECHNIQUES FOR MULTI-FACETED SHAFTS.....	287
Khasanov B.M., Valikhonov D.A., Abdullaev B.I., Alibekov R.K.	
DENTAL IMPRESSIONS AND GYPSUM MODEL SCANNING ACCURACY USING A LASER SCANNER ARE COMPARED	292
Akhmadov Inomjon Nizomitdinovich, Matchanov Boburbek Ulug'bekovich	
ORAL FLUID BIOCHEMICAL AND PHYSICOCHEMICAL CHARACTERISTICS IN CHILDREN WITH ABNORMALITIES AFTER URANOPLASTY	297
Anvarova Muhtasar Anvarovna	

ORAL FLUID BIOCHEMICAL AND PHYSICO-CHEMICAL CHARACTERISTICS IN CHILDREN WITH ABNORMALITIES AFTER URANOPLASTY

Anvarova Muhtasar Anvarovna

Samarkand State Medical University
Independent researcher

Email: muxtasara46@gmail.com

ORCID: 0009-0002-5146-7164

Abstract: To compare the physico-chemical and biochemical properties of oral fluid in children with residual defects after uranoplasty associated with congenital cleft palate with those of a control group of healthy children. The study comprised 109 children aged 6–12 years with congenital cleft palate and residual defects after uranoplasty, as well as 50 practically healthy children of the same age. The oral fluid of children with congenital cleft palate and residual defects that developed after uranoplasty exhibited substantial deviations in its physicochemical and biochemical characteristics. Furthermore, these data serve as a foundation for the further development of methods designed to improve the composition of oral fluid.

Key words: salivation, gingivitis, intraoral fluid biochemistry, surgical palate deformity, congenital cleft palate.

Annotatsiya: Mazkur tadqiqotning maqsadi tug'ma tanglay yoriqligi bilan bog'liq bo'lgan va uranoplastikadan keyin qoldiq nuqsonlari saqlanib qolgan bolalarda og'iz suyugligining fizik-kimyoviy va biokimyoviy xususiyatlarini sog'lom bolalar nazorat guruhi ko'rsatkichlari bilan solishtirib o'rganishdan iborat. Tadqiqotda 6–12 yoshdagi 109 nafar tug'ma tanglay yoriqligi va uranoplastikadan keyingi qoldiq nuqsonlari mavjud bolalar hamda shu yoshdagi 50 nafar amalda sog'lom bolalar ishtirok etdi. Tug'ma tanglay yoriqligi va uranoplastikadan keyingi qoldiq nuqsonlari mavjud bolalarda og'iz suyugligining fizik-kimyoviy va biokimyoviy ko'rsatkichlarida sezilarli darajada og'ishlar aniqlandi. Olingan natijalar og'iz suyugligi tarkibini yaxshilashga qaratilgan profilaktik va davolovchi usullarni ishlab chiqish uchun ilmiy asos bo'lib xizmat qilishi mumkin.

Kalit so'zlar: so'lak ajralishi, gingivit, og'iz suyugligi biokimyosi, tanglayning jarrohlik deformatsiyasi, tug'ma tanglay yoriqligi.

Аннотация: Целью исследования является сравнительный анализ физико-химических и биохимических свойств ротовой жидкости у детей с остаточными дефектами после уранопластики, обусловленными врожденной расщелиной нёба, и у практически здоровых детей контрольной группы. В исследовании приняли участие 109 детей в возрасте 6–12 лет с врожденной расщелиной нёба и остаточными дефектами после уранопластики, а также 50 практически здоровых детей аналогичного возраста. Ротовая жидкость у детей с врожденной расщелиной нёба и остаточными дефектами после уранопластики характеризуется выраженными отклонениями физико-химических и биохимических показателей. Полученные данные могут служить научной основой для дальнейшей разработки методов, направленных на коррекцию и улучшение состава ротовой жидкости.

Ключевые слова: слюноотделение, гингивит, биохимия ротовой жидкости, хирургическая деформация нёба, врожденная расщелина нёба.

INTRODUCTION

In children with congenital cleft palate and residual defects after uranoplasty, the primary motivations for investigating the oral fluid composition were the presence of communication between the oral cavity and the nasal cavity, postoperative scarring changes, pathological bacterial contamination, crowding of teeth, and a high prevalence of dental caries and periodontal diseases.

LITERATURE REVIEW:

The study and refinement of our understanding of the body's immune system, as well as its individual components, are becoming increasingly relevant. Chronic inflammatory periodontal diseases and associated chronic pathologies lead to significant transformations in the biochemical and immunological status of the oral cavity [1–5]. Investigating the immunological characteristics of bioactive body fluids allows for an assessment of the nature of inflammatory reactions and the dynamics of the response to therapeutic interventions [6–11]. However, despite the existing literature, the field of research regarding immune defense mechanisms in the oral cavity of children—particularly those with cleft palate—remains insufficiently explored [12–20].

Children born with a cleft palate are characterized by the absence of a septum between the oral cavity and the nasal passage. Due to an increased susceptibility to somatic and dental diseases, early childhood for these patients is often fraught with the risk of unsuccessful surgical outcomes during corrective procedures. In patients undergoing primary uranoplasty (surgery to correct congenital palatal anomalies), the incidence of postoperative complications ranges from 18% to 30% [23, 24]. This is due to the specifics of congenital defects: a lack of native palatal tissue, thinning of muscle fibers, and impaired healing processes. The most common complication in such cases is incomplete wound healing and the formation of palatal perforation. The primary goal of primary plastic surgery of the palate is to restore the integrity of the velopharyngeal ring, which is essential for successful speech therapy in early childhood.

Among specialists in maxillofacial surgery, there is no consensus on the optimal approach to the surgical treatment of children with congenital cleft palate. Some surgeons prefer single-stage uranoplasty performed from the age of two, while others propose a two-stage method: first restoring the velopharyngeal ring at an early age, followed by plastic surgery of the anterior palate as the upper jaw develops. Children typically suffer from palatal defects in the anterior section, which results in the entry of nasal secretions and air into the mouth. This creates a favorable environment for the colonization of pathogenic microbes from the nasal cavity into the oral cavity. The absence of a natural boundary between the mouth and nose reduces the remineralizing capacity of saliva, which, in turn, contributes to the development of caries and periodontal disease in children [1–3, 12, 23–24].

Numerous studies emphasize the significant role of cytokines in the development of inflammatory reactions in periodontal tissues. The initiating factor that triggers the activation of periodontal macrophages and the chain of events leading to the production of pro-inflammatory cytokines is pathogenic dental plaque [1–7, 10–20]. An increase in the concentration of pro-inflammatory cytokines (IL-1 β , IL-6, TNF- α) causes damage to periodontal tissues, while anti-inflammatory cytokines (IL-4, IL-10) help contain the inflammatory process. Changes in the cytokine composition found in oral fluid play a key role in the diagnosis of inflammatory processes [1–7, 10–20].

Normally, saliva contains a complex of immunoactive components that maintain the balance of oral mucosal immunity: lysozyme, immunoglobulins, antimicrobial peptides, lactoferrin, and others. Secretory immunoglobulin A (sIgA), secreted into the saliva, acts as the most sensitive marker of immune changes in the oral cavity. This protein, characterized by high biological activity, performs numerous protective functions. It binds bacterial cells and their toxins, preventing their attachment to the mucous membrane. Furthermore, it influences the uptake and replication of viral particles in mucosal cells and blocks their spread into the bloodstream.

Studies have shown that in children with intensive caries and inflammatory periodontal diseases, the concentration of sIgA in saliva is statistically significantly reduced. Researchers have previously examined sIgA levels in children with congenital cleft palate across various age categories [1–3, 12]. Their research demonstrated a significant trend toward lower sIgA concentrations. Evidence suggests that sIgA levels in inflammatory periodontal diseases can vary: in cases of mild chronic generalized periodontitis, there is a significant increase in sIgA, exceeding control group values by 1.5 times. However, in moderate and severe periodontitis, this indicator conversely decreases by 1.5 and 3 times compared to the control. This effect is explained by the fact that sIgA is the primary immunoglobulin in saliva, actively participating in the fight against microorganisms by aggregating them and inhibiting their growth. As the severity of periodontal disease increases, sIgA secretion initially rises, indicating a protective response to inflammation. However, in moderate to severe cases, local immunity is suppressed, leading to an imbalance between inflammatory and anti-inflammatory reactions [1–3, 7, 12, 13, 17–19]. In this context, it is vital to note the anatomical connection between the oral and nasal cavities, as well as the presence of postoperative scars and pathogenic microflora in the oral cavity, all of which may influence the course of the disease.

RESEARCH METHODOLOGY

The results of the analysis of oral fluid composition in 109 children aged 6 to 12 years with congenital cleft palate after uranoplasty and residual defects, as well as in 50 practically healthy children of similar age,

are presented in this article. The principal group: the presence of a diagnosis of nonsyndromal congenital cleft lip, alveolar process, soft and hard palate, as well as the condition following cheilorhinoplasty (in the case of cleft lip) and uranoplasty, as well as the presence of a postoperative palate defect at least six months following uranoplasty. In addition, the absence of exacerbations of chronic or infectious diseases and the assent of parents or legal representatives to participate in the study were considered. Assessment of the pH of combined saliva. Viscosity (μ). Rate of unstimulated salivary secretion (millilitres per minute).

ANALYSIS AND RESULTS

The analysis of oral fluid parameters revealed pronounced physicochemical and biochemical alterations in children with congenital cleft palate and residual defects after uranoplasty when compared with practically healthy peers. These changes reflect a significant disruption of oral homeostasis and confirm the vulnerability of the oral environment in this patient group. The obtained results indicate that structural defects, postoperative scarring, and persistent communication between the oral and nasal cavities play a decisive role in modifying salivary properties and weakening local protective mechanisms.

One of the most notable findings was the marked increase in salivary viscosity in children with congenital cleft palate and residual defects. In the control group, the viscosity of oral fluid averaged $1.06 \pm 0.073 \text{ mm}^2 \times \text{s}$, which corresponds to physiological norms and ensures adequate lubrication, self-cleaning, and antimicrobial activity of saliva. In contrast, children in the main group demonstrated a significantly higher viscosity value of $2.43 \pm 0.137 \text{ mm}^2 \times \text{s}$. This more than twofold increase suggests a deterioration of saliva's rheological properties, leading to impaired mechanical cleansing of the oral cavity. Elevated viscosity limits the ability of saliva to wash away food debris and microorganisms, thereby promoting prolonged retention of dental plaque on tooth surfaces and in periodontal pockets.

The increase in viscosity can be explained by several interrelated mechanisms. First, chronic inflammatory processes in the oral cavity stimulate the secretion of high-molecular-weight glycoproteins and inflammatory mediators, which alter the structural composition of saliva. Second, reduced salivary flow, observed in the same group of children, leads to concentration of organic components, further increasing viscosity. Third, the constant inflow of nasal secretions through residual palatal defects introduces additional proteins and microorganisms into the oral cavity, aggravating inflammatory responses and modifying saliva composition. Collectively, these factors significantly reduce the mineralizing and protective potential of oral fluid.

The analysis of salivary pH further supports the presence of unfavorable conditions in the oral cavity of children with congenital cleft palate. In practically healthy children, the mean pH value was 7.24 ± 0.058 , indicating a neutral to slightly alkaline environment optimal for enamel remineralization and suppression of acidogenic bacteria. In contrast, children with cleft palate and residual defects exhibited a significantly lower pH of 6.47 ± 0.067 . Although this value does not represent severe acidity, even a moderate shift toward the acidic range has important clinical implications.

A reduced pH compromises the equilibrium between demineralization and remineralization of dental hard tissues. Under such conditions, the solubility of hydroxyapatite crystals increases, facilitating enamel dissolution and the initiation of carious lesions. Additionally, acidic environments favor the proliferation of cariogenic and periodontopathogenic microorganisms, such as *Streptococcus mutans* and anaerobic bacteria, which further intensify inflammatory processes in periodontal tissues. The persistence of these conditions in children with cleft palate creates a chronic risk for rapid progression of dental caries and gingival inflammation.

The observed decrease in pH is likely associated with multiple factors characteristic of this patient population. The anatomical communication between the oral and nasal cavities enables the transfer of nasal microflora and secretions into the oral environment, disrupting the natural buffering system of saliva. Postoperative scar tissue may also impair normal muscular function and salivary gland stimulation, reducing bicarbonate secretion and buffering capacity. Furthermore, decreased salivary flow, documented in this study, limits the ability of saliva to neutralize acids produced by bacterial metabolism.

Salivary flow rate analysis revealed another critical alteration in children with congenital cleft palate and residual defects. In the control group, the unstimulated salivation rate averaged $0.44 \pm 0.054 \text{ ml/min}$, reflecting normal secretory activity of the salivary glands. In contrast, the main group exhibited a significantly reduced flow rate of $0.28 \pm 0.039 \text{ ml/min}$. Hypofunction of salivary glands leads to reduced mechanical cleansing, diminished delivery of calcium and phosphate ions, and decreased availability of antimicrobial components.

A reduced salivary flow rate is particularly detrimental in pediatric patients, as saliva plays a central role in the maturation and protection of dental tissues. In children with cleft palate, salivary hyposalivation may result from disrupted neuromuscular coordination, altered oral anatomy, and postoperative changes affecting glandular stimulation. Moreover, chronic inflammation and microbial colonization can exert inhibitory effects on salivary gland function, creating a vicious cycle in which reduced secretion exacerbates inflammation, and inflammation further suppresses secretion.

The combined effect of decreased flow rate and increased viscosity substantially impairs the self-cleaning function of saliva. This condition promotes plaque accumulation, enhances microbial adhesion to tooth surfaces, and increases the duration of acid exposure, thereby accelerating the development of caries and periodontal diseases. These findings explain the high prevalence and early onset of dental pathology frequently reported in children with congenital cleft palate.

Biochemical analysis revealed a significant reduction in total protein concentration in the saliva of children with cleft palate and residual defects. In healthy children, protein levels averaged 1.68 ± 0.519 g/L, whereas in the main group this value decreased to 0.851 ± 0.535 g/L. Salivary proteins perform essential protective functions, including antimicrobial activity, immune regulation, and maintenance of mucosal integrity. A decrease in protein content therefore indicates weakened local defense mechanisms.

Salivary proteins include enzymes, immunoglobulins, mucins, and antimicrobial peptides, all of which contribute to oral immunity. Reduced protein levels may reflect impaired synthesis or secretion of these components due to chronic inflammation, glandular dysfunction, or exhaustion of local immune resources. In children with cleft palate, persistent microbial exposure and inflammatory stimulation may initially activate immune responses but eventually lead to depletion of protective factors, resulting in immunological imbalance.

The reduction in protein concentration also affects saliva's buffering capacity and its ability to stabilize calcium and phosphate ions. Proteins such as statherin and proline-rich proteins play a key role in preventing spontaneous precipitation of calcium salts and maintaining supersaturation necessary for enamel remineralization. Their deficiency compromises the stability of mineral ions, further increasing the susceptibility of dental hard tissues to demineralization.

CONCLUSION AND DISCUSSION

In conclusion, children who have congenital cleft palate and residual defects after uranoplasty exhibit abnormalities in physicochemical and biochemical parameters of oral fluid. This research shows that the physicochemical and biochemical balance of the oral fluid is significantly disrupted in infants with congenital cleft palate and residual abnormalities after uranoplasty. Local defense systems are compromised by the complicated environment created by the anatomical connectivity between the oral and nasal canals, surgical scarring, and changed microbial colonization. Our results show a number of significant changes in the research group's oral environment when compared to healthy controls: The self-cleaning and lubricating qualities of saliva have significantly deteriorated, as shown by a notable rise in salivary viscosity (2.43 pm 0.137 mm 2 times) and a decrease in salivary flow rate (0.28 pm 0.039 mlmin).

List of used literature:

1. Mitropanova M. N. Features of the functioning of the immune system in children with congenital cleft lip and palate at the stages of surgical treatment. *Dentistry of Childhood and Prevention*. 2017;16(61):79–83. (In Russ.). Available at: <https://www.elibrary.ru/item.asp?id=29206060>
2. Nesterova I.V., Mitropanova M.N., Chudilova G.A., Lomtatidze L.V., Gaivoronskaya T.V. Effect of imbalance of regulatory cytokines and osteocalcin on osteogenesis in children with congenital cleft lip and palate in postnatal ontogenesis. *Dentistry*. 2020;99(1):77–81. (In Russ.). Available at: <https://www.elibrary.ru/item.asp?id=42479509>
3. Rogova L.N., Fomenko I.V., Timoshenko A.N. Immunological and microbiological characteristics of the oral mucosa in children with congenital cleft lip and palate (literature review). *Volgograd Scientific Medical Journal*. 2016;3(51):19–22. (In Russ.). Available at: <https://www.elibrary.ru/item.asp?id=27249177>
4. Khripach L.V., Knyazeva T.D., Zheleznyak E.V., Makovetskaya A.K., Koganova Z.I., Budarina O.V., Lebedeva N.V., Ingel F.I., Demina N.N.. Adaptive changes in biochemical and immunological parameters of mixed saliva under the influence of atmospheric air pollution on preschool children. *International Journal of Applied and Basic Research*. 2019;6:68–73. (In Russ.). Available at: <https://www.elibrary.ru/item.asp?id=38489006>
5. Kovalevsky A.M., Kovalevsky V.A. Etiology and pathogenesis of inflammatory periodontal diseases (literature review). Part 1. *Institute of Dentistry*. 2017;4:88–90. (In Russ.). Available at: <https://www.elibrary.ru/item.asp?id=32302028>
6. Dovbnya Zh.A., Golovskaya G.G., Galkina O.P., Ter-pogosyan D.A., Ablaev K.D., Ablaev K.D. Changes in the factors of nonspecific protection of the oral cavity in children with gingivitis against the background of the use of essential oils and bentonite clay. *Bulletin of Modern Clinical Medicine*. 2021;14(6):33–37. (In Russ.). Available at: <https://www.elibrary.ru/item.asp?id=47463336>
7. Osokina A.S., Maslak E.E., Yakovlev A.T. The level of immunoglobulin A in saliva depending on the presence and severity of early childhood caries. *Dentistry of Childhood and Prevention*. 2020;20(4(76)):304–309. (In Russ.). Available at: <https://www.elibrary.ru/item.asp?id=44583346>
8. Danilova M.A., Aleksandrova L.I. Quality of life in children with congenital cleft lip and palate. *Dentistry of Childhood and Prevention*. 2018;17(3):54–57. (In Russ.). Available at: <https://www.elibrary.ru/item.asp?id=36347137>
9. Shevchenko O.L., Antonova A.A. The composition of mixed saliva and indicators of caries in deciduous teeth and its complications in children. *Endodontics Today*. 2015; 4:8–11. (In Russ.). Available at: <https://www.elibrary.ru/item.asp?id=25411139>

10. Kuriakose S., Sundaresan C., Mathai V., et al. A comparative study of salivary buffering capacity, flow rate, resting pH, and salivary immunoglobulin A in children with rampant caries and caries-resistant children. *J Indian Soc Pedod Prev Dent.* 2013;31(2):69–73. doi: 10.4103/0970-4388.115697
11. Skripkina G.I. Clinical and laboratory parameters of the subclinical course of the carious process in childhood. *Dentistry of Childhood and Prevention.* 2017;16(4):24–27. (In Russ.). Available at: <https://www.elibrary.ru/item.asp?id=32389346>
12. Musakhodzhaeva D.A., Inoyatov A.Sh., Yakubov Sh.N. Some indicators of the immune system of children with congenital cleft lip and palate. *Problems of Biology and Medicine.* 2011;4(67):33. (In Russ.).
13. Agayeva N.A. The role of secretory IgA in the pathology of the maxillofacial region. *Basic Research.* 2010; 4:11–16. (In Russ.). Available at: <https://www.elibrary.ru/item.asp?id=15107695>
14. Kaur A., Kwatra K.S., Kamboj P. Evaluation of nonmicrobial salivary caries activity parameters and salivary biochemical indicators in predicting dental caries. *J Indian Soc Pedod Prev Dent.* 2012;30(3):212–217. doi: 10.4103/0970-4388.105013
15. Kubala E., Strzelecka P., Grzegocka M., et al. A review of selected studies that determine the physical and chemical properties of saliva in the field of dental treatment. *BioMed Research International.* 2018; ID 6572381:13. doi: 10.1155/2018/6572381
16. Hemadi A.S., Huang R., Zhou Y, Zou J. Salivary proteins and microbiota as biomarkers for early childhood caries risk assessment. *Int J Oral Sci.* 2017;9(11):e1. doi: 10.1038/ijos.2017.35
17. Al Amoudi N., Al Shukairy H., Hanno A. A comparative study of the secretory IgA immunoglobulins (sIgA) in mothers and children with SECC versus a caries-free group of children and their mothers. *J Clin Pediatr Dent.* 2007;32(1):53–56. doi: 10.17796/jcpd.32.1.i338366jw54634q5
18. Lo Giudice G., Nicita F., Militi A., et al. Correlation of s-IgA and IL-6 salivary with caries disease and oral hygiene parameters in children. *Dent J (Basel).* 2019;8(1):3. doi: 10.3390/dj8010003
19. Parisotto T.M., King W.F., Duque C., et al. Immunological and microbiologic changes during caries development in young children. *Caries Res.* 2011;45(4):377–385. doi: 10.1159/000330230
20. Dovbnaya Zh.A., Kolesnik K.A., Golovskaya G.G. Protective reactions of the oral cavity in children with chronic catarrhal gingivitis and its treatment. *Dentistry of Childhood and Prevention.* 2017;16(2):24–26. (In Russ.). Available at: <https://www.elibrary.ru/item.asp?id=29206046>
21. Pukhova O.S., Chernenko S.V. Features of the dental status of children with congenital cleft lip and palate in permanent occlusion. *Dentistry of Childhood and Prevention.* 2004;3(3–4):34–36. (In Russ.). Available at: <https://www.elibrary.ru/item.asp?id=9284441>
22. Yatskevich E.E., Osokina G.G. Chronic gingivitis in children with hereditary and congenital somatic pathology. *Dentistry for Everyone.* 2007;1:4–7. (In Russ.). Available at: <https://www.elibrary.ru/item.asp?id=12516681>
23. Chuiкин S.V., Akat'eva G.G., Chuiкин O.S., Grin' E.A., Kuchuk K.N. Dental morbidity in children with congenital cleft lip and palate in a region with ecotoxicants. *Dentistry of Childhood and Prevention.* 2019;19(4):15–19. (In Russ.). Available at: <https://www.elibrary.ru/item.asp?id=42490586>
24. Chuiкин O.S., Davletshin N.A., Chuiкин S.V., Akat'eva G.G., Kuchuk K.N., Ganieva R.A., Muratov A.M. State of periodontal tissues in children with congenital cleft palate and defect after uranoplasty. *Actual Problems in Dentistry.* 2021;17(4):105–112. (In Russ.). Available at: <https://www.elibrary.ru/item.asp?id=47871063>
25. Chopra A., Lakhanpal M., Rao N.C., Gupta N., Vashisth S. Oral health in 4–6-year-old children with cleft lip/palate: a case-control study. *N Am J Med Sci.* 2014;6(6):266–269. doi: 10.4103/1947-2714.134371
26. Stelzle F., Rohde M., Oetter N., Krug K., Riemann M., Adler W. Gingival esthetics and oral health-related quality of life in patients with cleft lip and palate. *Int J Oral Maxillofacial Surgery.* 2017;46(8):993–997. doi: 10.1016/j.ijom.2017.03.020
27. Funahashi K., Shiba T., Watanabe T., Nakagawa I., Moriyama K. Functional dysbiosis within dental plaque microbiota in cleft lip and palate patients. *Progress in Orthodontics.* 2019;20(1):11. doi: 10.1186/s40510-019-0265-1
28. Malay K.K., Ravindran V., Kumar J. Gingival health status in children with and without cleft lip and palate: a case-control study. *Indian Journal of Forensic Medicine & Toxicology.* 2020;14(4):5997–6003.
29. Genco R.J., Borgnakke W.S. Risk factors for periodontal disease. *Periodontol 2000.* 2013;62:59–94. doi: 10.1111/j.1600-0757.2012.00457.x
30. Brill E.A., Zubareva E.V., Yakimov K.Yu., Chizhov Yu.V., Galonsky V.G. Experience in the treatment of chronic gingivitis in adolescents with dental anomalies and deformities. *Institute of Dentistry.* 2021;4(93):86–87. (In Russ.). Available at: <https://www.elibrary.ru/item.asp?id=47486941>

Proofreader: Zokir ALIBEKOV

Layout and Designer: Oloviddin Sobir ugli

2026. № 1

© When materials are reproduced, the INNOVATION SCIENCE AND TECHNOLOGY journal must be cited as the source. Authors are responsible for the accuracy of the information in materials and advertisements published in the journal. Editorial opinions may not always align with those of the authors. Submitted materials will not be returned to the editorial office.

To publish articles in this journal, you may submit articles, advertisements, stories, and other creative materials through the following links. Materials and advertisements are published on a paid basis.

You may subscribe to the journal at any time using the following details. Once subscribed, please send a screenshot or photo of your payment confirmation to our Telegram page @iqtisodiyot_77. Based on this, we will send the latest issue of the journal to your address each month.

“The journal “INNOVATION SCIENCE AND TECHNOLOGY” has been registered by the Agency for Information and Mass Communications under the Administration of the President of the Republic of Uzbekistan from 09.10.2024 under the registration number №390637. License number: C-5669633. PNFL: 30407832680027

Our address: Tashkent city, Yunusobod district, 19th block,
House 17.



Acceptance of articles
Published every
monthly



Directions
Social, economic, political,
technological, scientific

 **Scopus || Scientific electronic journal specializing in Scopus**

CERTIFICATE NUMBER: №390637

**ORDER NUMBER ACCORDING TO
THE LICENSE REGISTER: C-5669633**

CONTACT:

 Contact us
+998 50 737 87 88

 Telegram channel
t.me/scopus_IST2100

 Journal official website
<https://ist-journal.uz/index.php/IST>