1. The role of antibiotics in treating salivary gland infections
   Romanian Journal of Oral Rehabilitation
   Vol.16, No.4 Octombrie-Decembrie 2024
   Irina Adriana Beuran, Simona Claudia Stefan, Elisabeta Maria Vasca, Robert Marius, Grosu, Marius Petrea, Gabriel-Valeriu Popa, Bogdan Oprisan
   Facultatea de Medicina Dentara, Universitatea de Medicina si Farmacie " Carol Davila ", Bucuresti, Romania
   Facultatea de Medicina si Farmacie, Universitatea " Dunarea de Jos ", Galati, Romania
   Facultatea de Stomatologie, Universitatea de Vest " Vasile Goldis ", Arad, Romania
   Facultatea de Medicina, Universitatea de Medicina si Farmacie " Grigore T. Popa ", Iasi, Romania
   Toti autorii au avut contributie egala

   DOI : 10.6261/RJOR.2024.4.16.91
   https://rjor.ro/the-role-of-antibiotics-in-treating-salivary-gland-infections/

2. The influence of diabetes in pediatric dentistry
   Romanian Journal of Oral Rehabilitation
   Vol.16, No.4 Octombrie-Decembrie 2024
   Oleg Solomon, Irina Adriana Beuran, Iulian Constantin, Razvan Leata, Grosu Robert Marius, Petrea Marius, Alina Calin, Kamel Earar
   Facultatea de Stomatologie " Nicolae Testemitanu ", Universitatea de Medicina si Farmacie, Chisinau, Rep. Moldova
   Facultatea de Medicina Dentara, Universitatea de Medicina si Farmacie " Carol Davila ", Bucuresti, Romania
   Facultatea de Medicina si Farmacie, Universitatea " Dunarea de Jos ", Galati, Romania

   Toti autorii au avut contributie egala

   DOI : 10.6261/RJOR.2024.4.16.90
   https://rjor.ro/the-influence-of-diabetes-in-pediatric-dentistry/

THE ROLE OF ANTIBIOTICS IN TREATING SALIVARY GLAND INFECTIONS

Irina Adriana Beuran[1], Simona Claudia Stefan[2]*, Elisabeta Maria Vasca[3]*, Robert Marius Grosu[2], Marius Petrea[2], Gabriel-Valeriu Popa[2], Bogdan Oprisan[4]

[1]Faculty of Dental Medicine, Carol Davila University of Medicine and Pharmacy, Bucharest, Romania
[2]Faculty of Medicine and Pharmacy, University "Dunarea de Jos" Galati, Romania
[3]Faculty of Dentistry, Vasile Goldis Western University in Arad, Romania
[4] Faculty of Medicine, University of Medicine and Pharmacy Grigore T. Popa Iasi, Romania

Corresponding authors: claudia.stefan@ugal.ro , elisabeta.vasca@yahoo.com

All authors have the same contributions.

Abstract

Salivary gland infections, called sialadenitis, are mainly caused by bacteria such as Staphylococcus aureus and Streptococcus species, but they can also result from mechanical blockages or viral infections. Complications of untreated or inadequately treated salivary gland infections can be severe, including the formation of abscesses, extension of the infection to neighboring structures, and permanent impairment of salivary gland functionality. In severe cases, surgery may be necessary to drain abscesses or remove obstructions such as salivary stones. Also, in the case of chronic infections, management may include long-term treatments and preventive measures, such as adequate hydration and maintaining rigorous oral hygiene. Integrated management of patients with systemic conditions, such as Sjogren's syndrome, is crucial for controlling symptoms and preventing complications. Antibiotics work through various mechanisms, including inhibiting bacterial cell wall synthesis, inhibiting protein synthesis, or interfering with essential bacterial functions. The effectiveness of antibiotic treatment is well documented in the medical literature, with clinical trials indicating a significant reduction in symptoms and prevention of severe complications when treatment is administered correctly. For example, bacteria such as Staphylococcus aureus and Streptococcus, commonly involved in salivary gland infections, respond well to antibiotic therapy, which reduces inflammation and associated pain.

Keywords: sialadenitis, salivary glands, antibiotics, antibiotic resistance, complications.

Introduction

Salivary gland infections, known as sialadenitis, can be caused by bacteria, viruses, or mechanical blockages. The use of antibiotics is essential in treating bacterial infections, playing a crucial role in preventing severe complications [1-3].

Salivary gland infections are a common clinical problem, which can affect the quality of life of patients through symptoms such as pain, inflammation, and difficulty chewing and swallowing. The salivary glands, which include the parotid, submandibular, and sublingual glands, are essential for the production of saliva, a fluid that plays a crucial role in digestion, oral hygiene, and the protection of the oral mucous membranes. Sialadenitis, the medical term for salivary gland infection, can have various causes, but bacterial infections are among the most common [1-3].

Prompt diagnosis and proper treatment of salivary gland infections are essential to prevent complications and ensure a speedy recovery. Clinical examination is the first step in identifying sialadenitis, but medical imaging, such as

DOI : 10.6261/RJOR.2024.4.16.91

computed tomography (CT), magnetic resonance imaging (MRI), or ultrasound, may also be necessary to assess the severity of the infection and identify any obstructions or abscesses [4-9].

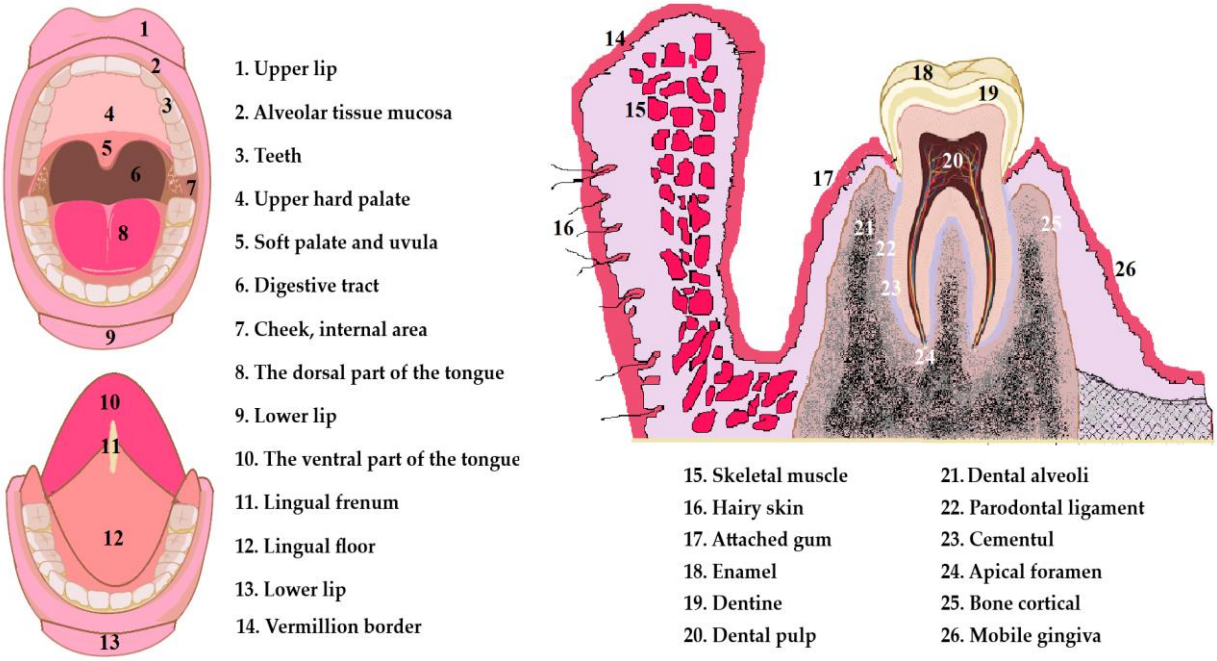

Image 1. Anatomy of the oral cavity of patients [9]

Antibiotics are fundamental in the management of bacterial sialadenitis. The choice of antibiotics is based on their spectrum of action, bacterial susceptibility, and antibiogram results. In cases of acute infections, broad-spectrum antibiotics such as amoxicillin-clavulanate are often used initially. After obtaining the results of the antibiogram, the treatment can be adjusted to include more specific antibiotics, such as clindamycin or metronidazole, which are effective against resistant bacteria [10-13].

Antibiotics work through various mechanisms, including inhibiting bacterial cell wall synthesis, inhibiting protein synthesis, or interfering with essential bacterial functions. The efficacy of antibiotic treatment is well documented in the medical literature, with clinical trials indicating a significant reduction in symptoms and prevention of severe complications when the treatment is administered correctly [10-13].

Complications of untreated or inadequately treated salivary gland infections can be severe, including the formation of abscesses, extension of the infection to neighboring structures, and permanent impairment of salivary gland functionality. In severe cases, surgery may be necessary to drain abscesses or remove obstructions such as salivary stones. [10-13].

Sialadenitis

Sialadenitis is inflammation of the salivary glands, usually caused by bacterial or viral infections, but can also occur due to mechanical obstructions such as salivary stones. The main salivary glands involved are the parotids, submandibular, and sublingual, responsible for the production

DOI : 10.6261/RJOR.2024.4.16.91

of saliva, which has a crucial role in digestion, oral hygiene, and protection of the oral mucous membranes [10-14].

Bacterial infections are most commonly caused by Staphylococcus aureus and Streptococcus species, but they can also occur due to salivary stones that block the salivary ducts, dehydration, systemic conditions such as Sjogren's syndrome or viral infections such as mumps. Bacteria take advantage of duct blockages to thrive in a stagnant, infection-friendly environment [11-14].

Diagnosis is based on detailed clinical examination, complemented by medical imaging such as ultrasound, CT, or MRI to assess the structure of the gland and identify abscesses or stones, and bacteriological tests such as cultures and antibiograms to identify the pathogen and determine its sensitivity to antibiotics, thus ensuring optimal treatment and preventing the development of bacterial resistance [11-14].

Causes	*Details*	*Treatment*
Bacterial Infections	Staphylococcus aureus, Streptococcus species	Broad-spectrum antibiotics (amoxicillin-clavulanate), adjusted after antibiogram, clindamycin, metronidazole
Salivary Stones	Mechanical blockages in the salivary ducts	Stone removal, adequate hydration, minimally invasive procedures (sialendoscopy)
Viral Infections	Mumps	Symptomatic treatment, hydration, analgesics
Dehydration	Reduced saliva flow	Adequate hydration, stimulation of saliva flow
Systemic Conditions	Sjogren's syndrome	Integrated management of symptoms, hydration, rigorous oral hygiene

Table 1. Causes and treatment for sialadenitis.

Symptoms of sialadenitis include pain and inflammation in the affected gland, fever and malaise, purulent discharge from the duct of the gland, and dry mouth due to reduced saliva production. These clinical manifestations are often accentuated during chewing and can lead to difficulties in opening the mouth or speaking [11-15].

The treatment of sialadenitis depends on the cause and severity of the infection; In bacterial cases, antibiotics are essential. Amoxicillin-clavulanate is commonly used initially due to its broad spectrum of action, and once the pathogen has been identified, treatment can be adjusted to include more specific antibiotics, such as clindamycin for anaerobic and Gram-positive bacteria or metronidazole for anaerobic bacteria [12-15].

DOI : 10.6261/RJOR.2024.4.16.91

To prevent relapses, rigorous oral hygiene measures, and adequate hydration are essential, and patients with chronic conditions such as Sjogren's syndrome require regular monitoring and continuous management to prevent complications and ensure normal salivary gland function [12-15].

Delayed-release essential oil-laden nanoparticle treatments are an innovation in sialadenitis management. These nanoparticles allow for the controlled and prolonged release of active compounds from essential oils directly to the site of infection, maximizing antimicrobial and anti-inflammatory effects [16-20]. They can penetrate bacterial biofilms and reduce inflammation effectively, providing an advantage over traditional therapies. Studies show that these nanoparticles can significantly reduce the symptoms and duration of infection, minimizing the need for frequent drug administration and reducing the risk of bacterial resistance [18-23].

Orthodontic treatments play an essential role in the prevention and management of sialadenitis by correcting malocclusions and improving oral hygiene. Dental biomaterials, such as ceramic braces and biocompatible alloys, are crucial for the success of these treatments [24-30]. These materials ensure the durability and comfort of orthodontic devices, reducing the risk of irritation and inflammation. In addition, the use of advanced biomaterials can minimize the accumulation of bacteria, thus preventing salivary gland infections. Thus, effective orthodontic treatments and quality biomaterials contribute significantly to overall oral health and the prevention of sialadenitis [28-36].

Mechanisms and diagnostics in the treatment of salivary gland infections

Salivary gland infections, or sialadenitis, are caused by bacterial, viral pathogens or mechanical blockages. The most common bacteria involved are Staphylococcus aureus and Streptococcus species. Bacterial infections frequently occur due to blockages in the salivary ducts that lead to saliva stagnation and the creation of an environment conducive to bacterial growth [37-39].

Acute sialadenitis is manifested by: pain and swelling in the affected gland, fever and malaise, and purulent discharge in the affected duct [37-39].

The diagnosis begins with a thorough clinical examination. The doctor will evaluate the glands for signs of inflammation, swelling, and pain. Palpation may also reveal the presence of an abscess or mechanical blockage [37-40].

Medical imaging such as ultrasound: is used to visualize the structure of the glands and detect abscesses or salivary stones (stones). Computed Tomography (CT): Helps in a more detailed evaluation of glands and surrounding tissues, being useful in complicated cases Magnetic Resonance Imaging (MRI): Used for a detailed evaluation of glands and neighboring structures, being very useful in cases of chronic or recurrent infections [37-40].

Antibiotic treatment

Broad-spectrum antibiotics used in acute cases, treatment usually begins with broad-spectrum antibiotics, such as amoxicillin-clavulanate, to cover a wide range of potentially pathogenic bacteria [37-41].

Once the results of the antibiogram are available, the treatment can be adjusted

DOI : 10.6261/RJOR.2024.4.16.91

to use specific antibiotics to which the bacteria are sensitive, such as clindamycin or metronidazole [37-41].

The duration of antibiotic treatment depends on the severity of the infection and the patient's response to treatment. In general, a course of 10-14 days is recommended for acute infections [38-41].

Chronic salivary gland infections may require longer-term treatments and additional measures, such as drainage of abscesses or surgery to remove salivary stones. Rigorous oral hygiene and adequate hydration are essential for preventing relapses [38-42].

Preventing antibiotic resistance is a crucial aspect of the treatment of salivary gland infections. Patients need to follow their doctor's instructions and complete the full course of antibiotics, even if symptoms improve before treatment is completed [38-42].

Broad-spectrum antibiotics, such as amoxicillin-clavulanate, are commonly used initially. After obtaining the results of the antibiogram, the treatment can be adjusted to use more specific antibiotics, such as clindamycin or metronidazole [38-42].

Reference	*AB and Dose*	*Number of Probands*	*Mean Proband Age (yr)*	*Tested Saliva*	*Mean Saliva AB Concentration (mg/L)*	*Time From AB Administration to Peak Salivary Concentration (hours)*	*Biochemical Testing Method*
Strömberg et al 1987	cefadroxil 1,000 mg	15	N/A	mixed	1.2 ± 0.41	1.5	bioassay
Najjar et al 2009	cefixime 400 mg	5	N/A	mixed	0.56 ± 0.1	2.6	HPLC
Najjar et al 2009	cephalexin 1,000 mg	5	N/A	mixed	3.34 ± 0.89	1.15	HPLC
Total		20			1.7	1.75	

Table 2. Investigation of the efficacy and safety of orally administered cephalosporins for various bacterial infections [42].

Effectiveness of antibiotic therapy in salivary gland pathology

Salivary gland infections, known as sialadenitis, are a common but often complex pathology due to the diversity of pathogens involved and the variation in individual responses to treatment. Antibiotic therapy is fundamental in the management of these infections, especially those of a bacterial nature, ensuring the rapid reduction of symptoms and prevention of serious complications [38-42].

Clinical studies indicate a significant reduction in symptoms and prevention of complications with appropriate antibiotic treatment. Bacterial infections, such as those caused by Staphylococcus aureus or Streptococcus,

DOI : 10.6261/RJOR.2024.4.16.91

respond well to antibiotic therapy, reducing inflammation and pain [38-42].

Sialadenitis is usually caused by bacteria such as Staphylococcus aureus and Streptococcus species but can be the result of mechanical obstructions (salivary stones) or viral infections (mumps). The diagnosis is based on detailed clinical examination and imaging investigations (ultrasound, CT, MRI), supplemented by bacteriological tests that include cultures and antibiograms. The latter is essential for identifying the pathogen and determining its sensitivity to antibiotics, thus guiding the choice of the optimal treatment [38-42].

In the initial phases of treatment, broad-spectrum antibiotics are preferred, capable of covering a wide range of Gram-positive and Gram-negative bacteria. Among them, amoxicillin-clavulanate is often the first choice due to its efficacy and ability to inhibit beta-lactamase enzymes produced by resistant bacteria [38-42].

As antibiogram results become available, treatment may be adjusted to use more specific antibiotics. Clindamycin is effective against anaerobic and Gram-positive bacteria, including resistant strains, while metronidazole is preferred for infections caused by anaerobic bacteria [38-42].

In severe or resistant cases, stronger antibiotics such as Vancomycin are needed, which is particularly effective against resistant Gram-positive bacteria, including MRSA (methicillin-resistant Staphylococcus aureus). Also, third- and fourth-generation cephalosporins (e.g., ceftriaxone, cefepime) provide broad coverage against Gram-positive and Gram-negative bacteria and are used for complicated infections [38-42].

Antibiotic therapy is an essential pillar in the treatment of bacterial sialadenitis, ensuring a quick recovery and preventing complications. Accurate diagnosis and responsible use of antibiotics, guided by bacteriological tests and antibiograms, are imperative for successful treatment. In addition, preventing the development of bacterial resistance through the appropriate use of antibiotics is essential to maintain their effectiveness in treating salivary gland infections and to ensure the long-term health of patients [38-42].

Considerations for chronic infections

Chronic salivary gland infections require long-term treatments, often combining broad-spectrum antibiotics and preventive measures to prevent recurrence. Proper management includes rigorous oral hygiene, proper hydration, and regular monitoring. In severe cases, surgery may be necessary to remove stones or drain abscesses, and patients with systemic conditions such as Sjogren's syndrome require an integrated approach to control symptoms and prevent complications [38-43].

Complications and their management

Untreated or inadequately treated salivary gland infections can lead to various severe complications. Abscesses are a buildup of pus that can cause intense pain and swelling and often require surgical drainage. Cellulitis, an infection of the subcutaneous connective tissue, can result from the spread of the infection, posing the risk of sepsis. In severe cases, the infection can spread to nearby structures, including bone (osteomyelitis) or other organs, causing systemic complications. Chronic infections can lead to persistent obstruction of the salivary ducts, affecting gland

DOI : 10.6261/RJOR.2024.4.16.91

function in the long term, and may be associated with the formation of recurrent salivary stones [39-44].

Complication	*Description*	*Management*
Abscesses	Accumulation of pus, intense pain, swelling	Systemic antibiotics, surgical drainage
Cellulitis	Infection of the subcutaneous tissue	Systemic antibiotics, surgical intervention to remove infected tissue
Osteomyelitis	Bone infection	Strong antibiotics, prolonged treatment, surgical interventions if necessary
Recurrent Stones	Frequent blockages in the salivary ducts	Stone removal, hydration, minimally invasive procedures (sialendoscopy)
Systemic Infections	Spread of infection to other organs	Strong systemic antibiotics, intensive monitoring, and treatment

Table 3. Complications and their management in sialadenitis

The management of sialadenitis complications involves both medical and surgical interventions. Initial treatment with appropriate antibiotics, based on the results of the antibiogram, is essential for infection control and prevention of complications. In cases of abscess, surgical drainage is necessary to remove pus and reduce pressure. To manage cellulite, strong systemic antibiotics and sometimes surgery are needed to remove infected tissue [39-44].

For chronic or recurrent infections, rigorous oral hygiene and adequate hydration are essential to prevent saliva stagnation and stone formation. Minimally invasive interventions, such as sial endoscopy, allow stones to be removed and ducts to dilate without the need for large incisions. In severe cases, surgical removal of the affected gland may be necessary [39-56].

Conclusions

Antibiotics play a crucial role in treating bacterial salivary gland infections, ensuring a quick recovery and preventing severe complications. Early diagnosis and appropriate treatment, based on antibiogram results and bacterial susceptibility, are essential for the success of therapy. In addition, the responsible use of antibiotics is imperative to prevent the development of bacterial resistance, thus ensuring the continued effectiveness of these essential drugs.

Accurate diagnosis and proper treatment of salivary gland infections are essential for preventing complications and ensuring a complete recovery. The responsible use of antibiotics, based on the

DOI : 10.6261/RJOR.2024.4.16.91

results of the antibiogram, is imperative to avoid the development of bacterial resistance and to ensure the effectiveness of the treatment.

Sialadenitis requires prompt diagnosis and appropriate treatment to prevent severe complications; Antibiotics play an essential role in treating bacterial infections, and surgery may be necessary in complicated cases. Effective management and preventive measures are crucial for ensuring the health of the salivary glands and preventing recurrences, thus ensuring an optimal quality of life for patients.

Antibiotic therapy is an essential pillar in the treatment of bacterial sialadenitis, ensuring a quick recovery and preventing complications. Accurate diagnosis and responsible use of antibiotics, guided by bacteriological tests and antibiograms, are imperative for successful treatment. In addition, preventing the development of bacterial resistance through the proper use of antibiotics is essential to maintain their effectiveness in treating salivary gland infections and to ensure the long-term health of patients.

Preventing antibiotic resistance is crucial to maintaining the effectiveness of current and future treatments, and requires responsible use of antibiotics and strict adherence to medical indications. Further research and development of new antibiotics are also essential to combat resistant bacteria and ensure effective therapeutic options for future generations.

References

1. P.-J. Lamey, M.A. Boyle, T.W. MacFarlane, L.P. Samaranayake, Acute suppurative parotitis in outpatients: Microbiologic and posttreatment sialographic findings, Oral Surgery, Oral Medicine, Oral Pathology, Volume 63, Issue 1, 1987, Pages 37-41, ISN 0030-4220,https://doi.org/10.1016/0030-4220(87)90337-9.
2. M.A.O. Lewis, P.-J. Lamey, J. Gibson,Quantitative bacteriology of a case of acute parotitis, Oral Surgery, Oral Medicine, Oral Pathology, Volume 68, Issue 5,1989, Pages 571-575, ISSN 0030-4220,https://doi.org/10.1016/0030-4220(89)90242-9.
3. Shkedy Y, Alkan U, Roman BR, Hilly O, Feinmesser R, Bachar G, Mizrachi A. Role of perioperative antibiotic treatment in parotid gland surgery. Head Neck. 2016 Apr;38 Suppl 1(Suppl 1):E1876-80. doi: 10.1002/hed.24339. Epub 2015 Dec 24. PMID: 26702565; PMCID: PMC4990133.
4. De Lalla F. Perioperative antibiotic prophylaxis: a critical review. Surg Infect (Larchmt). 2006;7 Suppl 2:S37-9. doi: 10.1089/sur.2006.7.s2-37. PMID: 16895502.
5. Decusara M, Cocoș DI, Caraiane A. REHABILITATION OF AGENESIA 2.2 WITH PRAM INVOLVEMENT. CASE REPORT. MEDICINE AND MATERIALS Volume 3, Issue 1, 2023: 23-30| ISSN: 2784 – 1499 & e-ISSN: 2784 – 1537 DOI: 10.36868/MEDMATER.2023.03.01.023
6. Pacurar M, Cocoș DI, Lazăr M, Lazăr C, Caraiane A. CONE BEAM COMPUTED TOMOGRAPHY, IMPORTANCE OF EXAMINATION FOR THE STORAGE OF THERAPEUTICAL FAILURES IN IMPLANTOLOGY. MEDICINE AND MATERIALS. Volume 3, Issue 1, 2023: 3-12 | ISSN: 2784 – 1499 & e-ISSN: 2784 – 1537. DOI: 10.36868/MEDMATER.2023.03.01.003
7. Cocoș DI, Earar K, Bucur SM, Păcurar M, Mariș M, Cocoș ID, Galea C. FREQUENCY OF THIRD MOLAR PATHOLOGY: INNOVATIVE CAUSES, SYMPTOMS AND TREATMENT OPTIONS. Romanian Journal of Oral Rehabilitation Vol. 15, No.4 October-December 2023
8. Cocoș DI, Păcurar M, Nistor AC, Moaleș D, Cocoș ID, Earar K. THE ROLE OF CBCT IN ASSESSING THE SEVERITY OF WISDOM TEETH INCLUSION COMPARED TO

DOI : 10.6261/RJOR.2024.4.16.91

CONVENTIONAL RADIOLOGICAL TECHNIQUES. Romanian Journal of Oral Rehabilitation Vol. 16, No.2 April-June 2024. DOI : 10.6261/RJOR.2024.2.16.51
9. Cocoș DI, Dumitriu Buzia O, Tatu AL, Dinu M, Nwabudike LC, Stefan CS, Earar K, Galea C. Challenges in Optimizing Nanoplatforms Used for Local and Systemic Delivery in the Oral Cavity. Pharmaceutics. 2024; 16(5):626. https://doi.org/10.3390/pharmaceutics16050626
10. Slattery WH 3rd, Stringer SP, Cassisi NJ. Prophylactic antibiotic use in clean, uncontaminated neck dissection. Laryngoscope. 1995 Mar;105(3 Pt 1):244-6. doi: 10.1288/00005537-199503000-00004. PMID: 7877411.
11. Bowater RJ, Stirling SA, Lilford RJ. Is antibiotic prophylaxis in surgery a generally effective intervention? Testing a generic hypothesis over a set of meta-analyses. Ann Surg. 2009 Apr;249(4):551-6. doi: 10.1097/SLA.0b013e318199f202. PMID: 19300236.
12. Bowater RJ, Stirling SA, Lilford RJ. Is antibiotic prophylaxis in surgery a generally effective intervention? Testing a generic hypothesis over a set of meta-analyses. Ann Surg. 2009 Apr;249(4):551-6. doi: 10.1097/SLA.0b013e318199f202. PMID: 19300236.
13. Moalem J, Ruan DT, Farkas RL, Shen WT, Kebebew E, Duh QY, Clark OH. Patterns of antibiotic prophylaxis use for thyroidectomy and parathyroidectomy: results of an international survey of endocrine surgeons. J Am Coll Surg. 2010 Jun;210(6):949-56. doi: 10.1016/j.jamcollsurg.2010.02.040. PMID: 20510804.
14. Bratzler DW, Dellinger EP, Olsen KM, Perl TM, Auwaerter PG, Bolon MK, Fish DN, Napolitano LM, Sawyer RG, Slain D, Steinberg JP, Weinstein RA; American Society of Health-System Pharmacists (ASHP); Infectious Diseases Society of America (IDSA); Surgical Infection Society (SIS); Society for Healthcare Epidemiology of America (SHEA). Clinical practice guidelines for antimicrobial prophylaxis in surgery. Surg Infect (Larchmt). 2013 Feb;14(1):73-156. doi: 10.1089/sur.2013.9999. Epub 2013 Mar 5. PMID: 23461695.
15. Gurusamy KS, Koti R, Wilson P, Davidson BR. Antibiotic prophylaxis for the prevention of methicillin-resistant Staphylococcus aureus (MRSA) related complications in surgical patients. Cochrane Database Syst Rev. 2013 Aug 19;(8): CD010268. doi: 10.1002/14651858.CD010268.pub2. PMID: 23959704.
16. Solomon O, Galea C, Feier R, MostoveI A. ACTIONS OF DROSERA SP IN DENTISTRY DISEASES. PHITOCHEMICAL COMPONENTS, PHARMACOLOGICAL ACTIONS. MEDICINE AND MATERIALS Volume 3, Issue 1, 2023: 37-42| ISSN: 2784 – 1499 & e-ISSN: 2784 – 1537 DOI: 10.36868/MEDMATER.2023.03.01.037
17. Galea C, Cocoș DI, Feier F, Moales D. THE USE OF ESSENTIAL OILS IN THE DEVELOPMENT OF DERMATO-COSMETIC PRODUCTS. MEDICINE AND MATERIALS Volume 3, Issue 1, 2023: 31-36| ISSN: 2784 – 1499 & e-ISSN: 2784 – 1537 DOI: 10.36868/MEDMATER.2023.03.01.031
18. Galea C, Cocoș DI, Earar K, Moales D, Ratiu RF, Cocoș ID, Păcurar M, Bucur SM. TAXONOMIC POSITION, CULTIVATION METHOD IN ROMANIA AS WELL AS THE RATE OF OBTAINING THE ESSENTIAL GERANIUM OIL GROWN. Romanian Journal of Oral Rehabilitation. Vol. 15, No.4 October-December 2023
19. Dumitriu Buzia O, Păduraru AM, Stefan CS, Dinu M, Cocoș DI, Nwabudike LC, Tatu AL. Strategies for Improving Transdermal Administration: New Approaches to Controlled Drug Release. Pharmaceutics. 2023; 15(4):1183. https://doi.org/10.3390/pharmaceutics15041183
20. Feier R, Sireteanu Cucui RM, Ratiu RF, Baciu D, Galea C, Sachelarie L, Nistor C, Cocos D, Hurjui LL, Cernei ER. Comparative Study of Ozonated Olive Oil and Extra Virgin Olive Oil Effects on Oral Hygiene. Applied Sciences. 2023; 13(5):2831. https://doi.org/10.3390/app13052831
21. Cocoș DI, Earar K, Dinu M, Lungu I, Bazbanela C, Galea C. PERSPECTIVES ON THE USE OF GERANIUM ESSENTIAL OIL: PELARGONIUM GRAVEOLENS AND PELARGONIUM ROSEUM, IN DENTAL MEDICINE. Romanian Journal of Medical and Dental Education Vol. 12, No. 2, March-April 2023
22. Dinu M, Tatu AL, Cocoș DI, Nwabudike LC, Chirilov AM, Stefan CS, Earar K, Dumitriu Buzia O. Natural Sources of Therapeutic Agents Used in Skin Conditions. Life. 2024; 14(4):492. https://doi.org/10.3390/life14040492

DOI : 10.6261/RJOR.2024.4.16.91

~~23.~~ Cocoș DI, Earar K, Dinu M, Lungu I, Bazbanela C, Galea C. PERSPECTIVES ON THE USE OF GERANIUM ESSENTIAL OIL: PELARGONIUM GRAVEOLENS AND PELARGONIUM ROSEUM, IN DENTAL MEDICINE. Romanian Journal of Medical and Dental Education Vol. 12, No. 2, March-April 2023
24. Bejan A, Baciu D, Cocoș DI, Dimofte AR. CONCEPTS ON THE RESISTANCE OF ACRYLIC TEETH, PMMA. MEDICINE AND MATERIALS Volume 3, Issue 1, 2023: 43-47 | ISSN: 2784 – 1499 & e-ISSN: 2784 – 1537 DOI: 10.36868/MEDMATER.2023.03.01.043
25. Cocoș DI, Bucur SM, Coman TM, Păcurar M. Observational study on the frequency of anchorage auxiliaries in fixed orthodontics, Romanian Journal of Oral Rehabilitation vol. 13, nr. 3,(iulie-septembrie) anul 2021.
26. Bucur SM, Popa R, Cocoș DI, Tunyogi AB, Istrate P. Presence of candida albicans in hawley plate wearers: a pilot study Romanian Journal of Oral Rehabilitation Vol. 14, No. 1, January - March 2022. ISSN2066-7000 ISSN-L 2601-4661
27. Solomon O, Earar K, Cocoș DI, Forna DA, Brechler C, Micu AA, Nițoi LC, Grigorescu CC. THE ROLE OF DENTAL GUARDS IN MANAGING DENTAL PARAFUNCTION: A DETAILED ANALYSIS. Romanian Journal of Oral Rehabilitation Vol. 16, No.3 July-September 2024. DOI : 10.6261/RJOR.2024.3.16.60
28. Galea C, Cocoș DI, Forna NC, Păcurar M, Earar K. PHYTOCHEMICAL STUDY OF THE ESSENTIAL OIL OF PELARGONIUM ROSEUM BY GAS CHROMATOGRAPHIC METHOD. Romanian Journal of Oral Rehabilitation Vol. 16, No.3 July-September 2024. DOI : 10.6261/RJOR.2024.3.16.65
29. Tüzes L, Cocoș DI, Szőts M, Bucur SM. Coronavirus prevention methods in dental practices Romanian Journal of Oral Rehabilitation Vol. 14, No.2 April-June 2022.
30. Bucur SM, Bud A, Gligor A, Vlasa A, Cocoș DI, Bud ES. Observational Study Regarding Two Bonding Systems and the Challenges of Their Use in Orthodontics: An In Vitro Evaluation. Applied Sciences. 2021; 11(15):7091. https://doi.org/10.3390/app11157091
31. Bucur SM, Cocoș D, Saghin A. Bond strength of three adhesive systems used for bonding orthodontic brackets, Romanian Journal of Oral Rehabilitation Vol.12, pag 162-167, No. 1, January - March 2020.
32. Bucur SM, Iantovics LB, Bud A, Bud ES, Cocoș DI, Vlasa A. Retrospective study regarding orthodontic retention complications in clinical practice Appl Sci 2021. 12 (1) 273.
33. Vlasa A, Bud ES, Păcurar M, Lazăr L, Streiche L, Bucur SM, Cocoș DI, Bud A. Effects of Composite Resin on the Enamel after Debonding: An In Vitro Study—Metal Brackets vs. Ceramic Brackets. Applied Sciences. 2021; 11(16):7353. https://doi.org/10.3390/app11167353
34. Tiutiuca C, Ceban E, Solomon O. Anatomy and pathology of the optic nerve. MEDICINE AND MATERIALS Volume 4, Issue 1, 2024: 25-32 | ISSN: 2784 – 1499 & e-ISSN: 2784 – 1537 DOI: 10.36868/MEDMATER.2024.04.01.025.
35. Feier R, Pacurar M, Cocos DI. materials used in fracture rehabilitation "e fort I, II and III". MEDICINE AND MATERIALS Volume 4, Issue 1, 2024: 33-42 | ISSN: 2784 – 1499 & e-ISSN: 2784 – 1537 DOI: 10.36868/MEDMATER.2024.04.01.033
36. Salcianu IA, Bratu AM, Bratu IC, Parvu S. Biomaterials used in heart valve substitution. MEDICINE AND MATERIALS Volume 4, Issue 1, 2024: 43-50 | ISSN: 2784 – 1499 & e-ISSN: 2784 – 1537 DOI: 10.36868/MEDMATER.2024.04.01.043.
37. Daciu D, Bujoreanu-Bezman L, Salcianu IA. Treatment of fractures performed with biomaterials in the arm and forearm. MEDICINE AND MATERIALS Volume 4, Issue 1, 2024: 3-10 | ISSN: 2784 – 1499 & e-ISSN: 2784 – 1537 DOI: 10.36868/MEDMATER.2024.04.01.003.
38. Calin AM, Bratu IC, Dinu CA, Nechita A. Transmission of human immunodeficiency virus (hiv) from mother to fetus with implications in oral pathology. MEDICINE AND MATERIALS Volume 4, Issue 1, 2024: 11-16 | ISSN: 2784 – 1499 & e-ISSN: 2784 – 1537 DOI: 10.36868/MEDMATER.2024.04.01.011.
39. Budacu CC, Agop Forna D, Dimofte AR, Miulescu M. OMF versus migraine pain: similarities, differences, and realization of laser treatment. MEDICINE AND MATERIALS Volume 4, Issue 1, 2024: 17-24 | ISSN: 2784 – 1499 & e-ISSN: 2784 – 1537 DOI: 10.36868/MEDMATER.2024.04.01.017.

DOI : 10.6261/RJOR.2024.4.16.91

40. Brook I. Acute bacterial suppurative parotitis: microbiology and management. J Craniofac Surg. 2003 Jan;14(1):37-40. doi: 10.1097/00001665-200301000-00006. PMID: 12544218.
41. Raad II, Sabbagh MF, Caranasos GJ. Acute bacterial sialadenitis: a study of 29 cases and review. Rev Infect Dis. 1990 Jul-Aug;12(4):591-601. doi: 10.1093/clinids/12.4.591. PMID: 2385766.
42. Lamey PJ, Boyle MA, MacFarlane TW, Samaranayake LP. Acute suppurative parotitis in outpatients: microbiologic and posttreatment sialographic findings. Oral Surg Oral Med Oral Pathol. 1987 Jan;63(1):37-41. doi: 10.1016/0030-4220(87)90337-9. PMID: 3468465.
43. Maier H, Tisch M. Bakterielle Infektionen der grossen Kopfspeicheldrüsen [Bacterial sialadenitis]. HNO. 2010 Mar;58(3):229-36. German. doi: 10.1007/s00106-009-2078-x. PMID: 20204311.
44. Lewis MA, Lamey PJ, Gibson J. Quantitative bacteriology of a case of acute parotitis. Oral Surg Oral Med Oral Pathol. 1989 Nov;68(5):571-5. doi: 10.1016/0030-4220(89)90242-9. PMID: 2682427.
45. Troeltzsch M, Pache C, Probst FA, Troeltzsch M, Ehrenfeld M, Otto S. Antibiotic concentrations in saliva: a systematic review of the literature, with clinical implications for the treatment of sialadenitis. J Oral Maxillofac Surg. 2014 Jan;72(1):67-75. doi: 10.1016/j.joms.2013.06.214. Epub 2013 Aug 29. PMID: 23992785.
46. Magda ANTOHE , Dana BACIU, Dragos Nicolae FRATILA, Ramona FEIER. HE USE OF XYLITOL IN PERIODONTAL TREATMENT. CASE REPORT. MEDICINE AND MATERIALS Volume 3, Issue 1, 2023: 13-22| ISSN: 2784 – 1499 & e-ISSN: 2784 – 1537 DOI: 10.36868/MEDMATER.2023.03.01.013
47. Coman TM, Mănărăzan AD, Cîrstea AS, Cocoș DI. The multidisciplinary approach of a patient with Sjögren´s Syndrome in the dental office – case report, Acta Stomatologica Marisiensis 2019 ;2(2)235-240 https://asmj.ro/tag/hypertension/
48. Maier H, Zerfowski M, Schlegel P. Ausscheidung von beta-Lactamantibiotika im menschlichen Parotisspeichel [Excretion of beta-lactam antibiotics in human parotid saliva]. HNO. 1991 Mar;39(3):102-7. German. PMID: 2050551.
49. Decousser JW, Lamy B, Pina P, Allouch PY; Collège de Bactériologie Virologie Hygiène Study Group (ColBVH). Trends in antibiotic susceptibility of bloodstream pathogens in hospitalized patients in France, 1996 to 2007. Diagn Microbiol Infect Dis. 2010 Mar;66(3):292-300. doi: 10.1016/j.diagmicrobio.2009.10.007. Epub 2009 Nov 10. PMID: 19903587.
50. .Lupescu, S ., Istrate, B ., Munteanu, C ., Minciuna, MG , Focsaneanu, S , Earar, K , Characterization of Some Master Mg-X System (Ca, Mn, Zr, Y) Alloys Used in Medical Applications Revista De Chimie, 2017, 68 (6) , pp.1310-1315
51. Bratu, IC , Strambu, IR , Salcianu, IA , Carnaru, MV , Dumitriu-Buzia, O , Sarbu, N , Ciuca, I , Calin, AM , Forna, N ., Parvu, S., Innovations in the treatment of pediatric conjunctivitis: modern solutions for small patients, Romanian journal of oral rehabilitation, 202416 (2) , pp.706-716
52. Saveanu, C.I., Forna, N.C. ,Danila, L., Barlean, L. Balcos, C., , Danila, V ., Cheptea, C. , Golovcencu, L .Anistoroaei, D., Management attitudes of dentists in dental offices, 2018, Romanian journal of oral rehabilitation, 10 (4) , pp.149-156
53. Bolat, M., Nicolae, B.D., Baciu, E.R., Forna, D.A. Bosînceanu, D.G., Forna, N.C. , Partial dentures-succeses and failures, Romanian journal of oral rehabilitation, 2017, 9 (4) , pp.93-96
54. Earar, K , Gradinaru, S . Pariza, G ., Miculescu, F ., Antoniac, A ., Cojocaru, VD , Mohan, A , Pintilie, G ., Grigorescu, DO , Effect of the Sterilization Procedures of Different Surgical Meshes for Abdominal Surgery, Revista de chimie, 2017, 68 (8) , pp.1868-1873
55. Ancuta, C., Pomirleanu, C ., Iordache, C., Antohe, M.E., Chirieac, R., Ancuta, E., Luchian, D .Esanu, I.M ., Serum Lipid Profile in Diffuse versus Limited Systemic Sclerosis Data from the SASS cohort, Revista de chimie, 2018 , 69 (2) , pp.403-406
56. Checherita, L ., Beldiman, M.A., Stamatin, O., Foia, L., Forna, N.C. , Aspects on Structure of Materials Used for Different Types of Occlusal Splints, Revista de chimie, 2013, pp.864-867

DOI : 10.6261/RJOR.2024.4.16.91

THE INFLUENCE OF DIABETES IN PEDIATRIC DENTISTRY

Oleg Solomon[1], Irina Adriana Beuran[2]*, Iulian Constantin[3]*, Razvan Leata[3], Grosu Robert Marius[3], Petrea Marius[3], Alina Calin[3], Kamel Earar[3]

[1] Faculty of Stomatology, Nicolae Testemitanu State University of Medicine and Pharmacy, Chisinau, Republic of Moldova
[2]Faculty of Dental Medicine, Carol Davila University of Medicine and Pharmacy, Bucharest, Romania
[3]Faculty of Medicine and Pharmacy, University "Dunarea de Jos" Galati, Romania
Corresponding authors: dririnab@yahoo.com , drconstantiniunlian@gmail.com

All authors have the same contributions.

Abstract

Pediatric diabetes presents significant challenges in dental treatment, requiring a tailored approach to minimize the risks associated with oral complications. Optimal glycemic control is fundamental before any intervention, and close collaboration with the diabetologist is essential to stabilize glucose levels. Local anesthesia should be used with caution, preferring solutions with low adrenaline concentrations, especially in patients with inadequate glycemic control. Dental treatment in children with diabetes involves a specialized approach due to the increased risks of oral complications and the peculiarities associated with this condition. Stable glycemic control is essential before any dental intervention, and collaboration with the diabetologist is crucial for adjusting the treatment. Local anesthesia should be administered with caution, using solutions with low adrenaline concentrations, especially in patients with unstable glycemic control. Educating patients and families about oral hygiene, diet, and the importance of regular visits to the dentist play a fundamental role in preventing dental complications. Children with diabetes are at increased risk of gum disease, such as gingivitis and periodontitis, so prompt management of these conditions through scaling and regular evaluations is vital. Rigorous oral hygiene should be encouraged to prevent infections and complications associated with compromised immune response. Interdisciplinary collaboration between dentists, diabetologists and other health professionals is essential for developing a coordinated and effective treatment plan.

Keywords: pediatrics, diabetes in pediatrics, oral health, oral hygiene, glycemic control.

Introduction

Diabetes mellitus is a chronic condition with a major impact on health, being characterized by high levels of glucose in the blood, as a result of insufficient insulin production or use. This disease not only affects the general metabolism, but also various aspects of oral health, having profound implications including among children [1,3].

In Romania, as in other countries, the number of cases of pediatric diabetes is increasing, especially type 1, which is most common among children. According to recent statistics, the number of children diagnosed with type 1 diabetes continues to increase, and this phenomenon puts pressure on the medical system to develop specific prevention and care methods [1-3].

Beyond the general implications of diabetes on children's health, the influence of this disease on oral health and, implicitly, on dental treatment is an essential concern in pedodontics. Children with diabetes have a higher risk of developing conditions such as gingivitis, tooth decay, xerostomia (dry mouth) and, in more advanced cases, even periodontitis [1,2].

These problems are caused by the side effects of diabetes, including decreased salivary flow, a poor immune response, and fluctuations in blood sugar, which create an environment conducive to the growth of harmful bacteria in the oral cavity [2,3].

Diabetes can influence tooth development and the timing of tooth eruption, leading to delays in tooth development, which requires closer monitoring of oral health from

DOI : 10.6261/RJOR.2024.4.16.90

an early age. Because of the difficult glycemic control in children and its implications for oral health, dental treatment for diabetic children requires a multidisciplinary approach. The dentist must work closely with the diabetologist and parents to ensure effective care that prevents complications [2-4].

Family education and counseling play a crucial role, as parents are the ones who oversee both the child's oral hygiene and blood sugar control. This article explores in detail the influence of diabetes on children's oral health, reviewing potential complications, as well as prevention and treatment measures, to provide a solid knowledge base and recommendations specific to pedodontics [2,4].

Pathophysiology of diabetes in the context of pedodontics

Diabetes, especially type 1 diabetes, is a chronic autoimmune condition commonly found in children and adolescents, characterized by insulin deficiency and high blood glucose levels. This metabolic disorder affects the entire body, including the oral cavity, thus creating a series of complications that require a particular approach in pedodontics [3,4].

It influences oral health through complex mechanisms, including reduced blood flow, decreased salivary flow and compromised immune response. At the microvascular level, persistent hyperglycemia causes damage to the walls of small blood vessels, thus reducing blood flow to the gums and supporting tissues of the teeth. This reduction in oxygen and nutrient intake contributes to gum inflammation and increases the risk of bacterial infections in the oral cavity, such as gingivitis and periodontitis [3-5].

Hyperglycemia leads to a decrease in salivary flow, generating xerostomia (the sensation of dry mouth). Saliva plays an essential role in maintaining oral health, through its action of cleaning food debris and limiting the proliferation of harmful bacteria. A lack of saliva can accelerate the buildup of plaque and promote the development of tooth decay, a common problem in children with diabetes. Moreover, reduced saliva also affects the microbiological balance of the oral cavity, contributing to an increase in pathogenic bacteria, which can worsen infections and gum inflammation [4-6].

Children with diabetes have a poor immune response in the gums due to decreased immune cell activity. Hyperglycemia affects the functioning of leukocytes, reducing their ability to respond to bacterial infections and effectively eliminate pathogens from the oral cavity. This explains the increased susceptibility of children with diabetes to gum inflammation and recurrent infections [5,6].

The exaggerated and prolonged inflammatory response in the presence of minor pathogenic factors contributes to the degradation of gingival tissue and supporting alveolar bone, which can lead, over time, to more serious periodontal complications [5-7].

Diabetes can delay tooth eruption and affect tooth mineralization. This delay may be related to endocrine and metabolic changes specific to diabetes, which influence the rate of development and maturation of dental tissue. Studies show that high blood glucose levels can disrupt normal enamel formation processes, leading to hypomineralization and increased vulnerability to cavities [5-7].

DOI : 10.6261/RJOR.2024.4.16.90

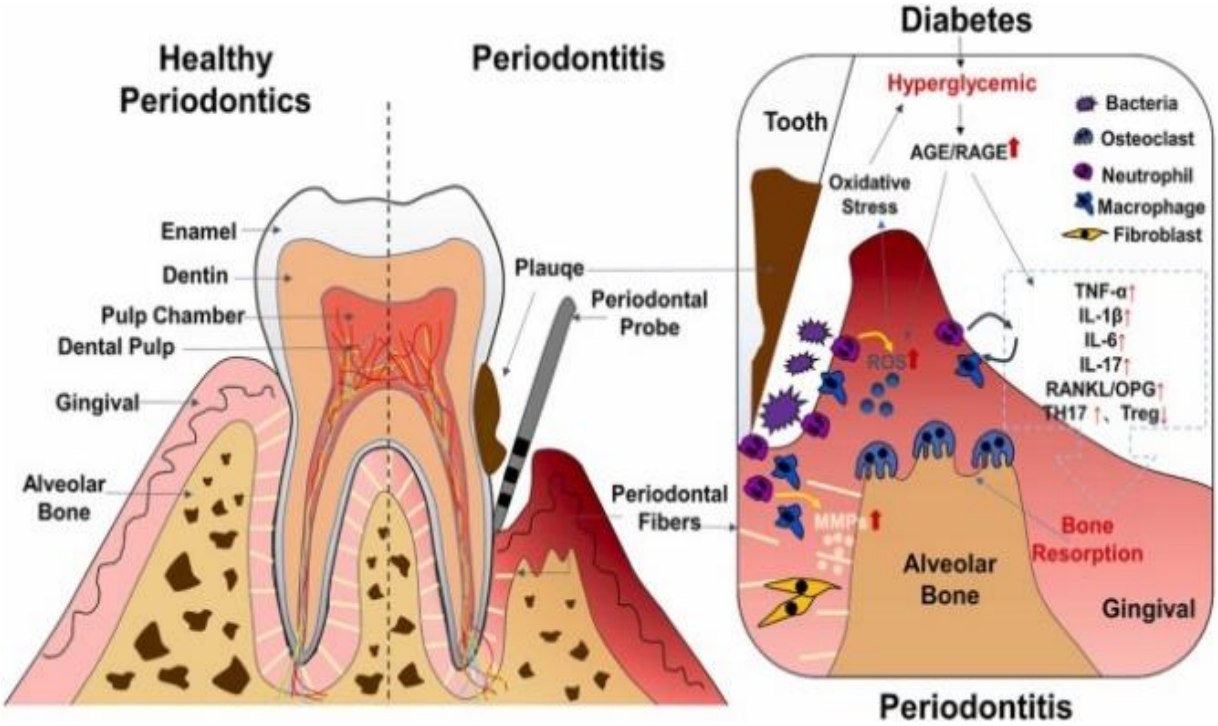

Image 1. Healthy and inflamed periodontitis [5].

Oral manifestations of diabetes in children

Children with diabetes, especially those with type 1 diabetes, are prone to a number of oral complications, caused by chronic hyperglycemia and disruption of the immune balance. Diabetes affects oral tissues and natural protective mechanisms, and specific manifestations can vary in severity and progression depending on glycemic control and the patient's age [6,7].

Gum inflammation is common in diabetic children, who have a significantly increased risk of gingivitis and periodontitis compared to those without diabetes. Prolonged hyperglycemia affects the small blood vessels in the gums, reducing blood flow and the body's defense capacity. This immune deficiency allows the proliferation of pathogenic bacteria and leads to inflammation and bleeding gums, even following minor stimuli. In advanced cases, untreated inflammation can extend to the periodontal level, affecting the supporting structures of the tooth [7-9].

Xerostomia (dry mouth) and hyperglycemia contribute to an increased risk of cavities in children with diabetes. Reduced salivary flow affects the oral cavity's ability to neutralize acids produced by bacteria and clean up food debris. At the same time, high levels of glucose in the blood and, implicitly, in saliva, create a favorable environment for cariogenic bacteria. This makes oral hygiene crucial and diabetic children require additional prevention measures [8,9].

Diabetes affects the secretion of the salivary glands, resulting in xerostomia. Saliva has multiple roles in protecting the oral cavity, including lubricating tissues, regulating oral pH, and inhibiting bacteria. Dry mouth reduces these protective functions, facilitating enamel erosion and accelerating the progression of cavities and oral infections [8-10].

DOI : 10.6261/RJOR.2024.4.16.90

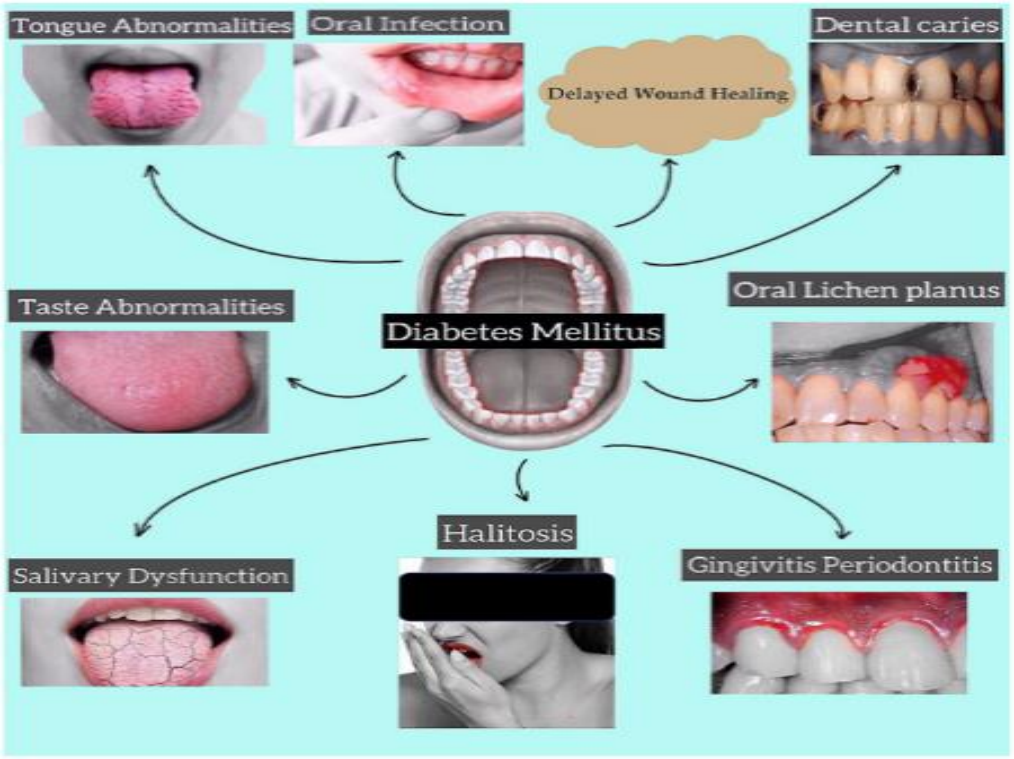

Image 2. Diabetes disorders on oral health [9].

The metabolic and hormonal imbalances associated with diabetes can delay tooth eruption at both the temporary and permanent dentition levels. This delay can cause dental malpositions and influence the development of occlusion, requiring monitoring and possibly orthodontic treatments [9-11].

The compromised immune system makes the diabetic child's body more vulnerable to infections, such as oral candidiasis, a fungal infection caused by Candida albicans. It is manifested by white, painful lesions on the oral mucosa and requires specialized treatment, tending to relapse in conditions of uncontrolled hyperglycemia [9,10]

Diabetes affects the ability of oral tissues to regenerate, delaying healing following dental treatments, such as tooth extractions or periodontal interventions. [11-13].

.

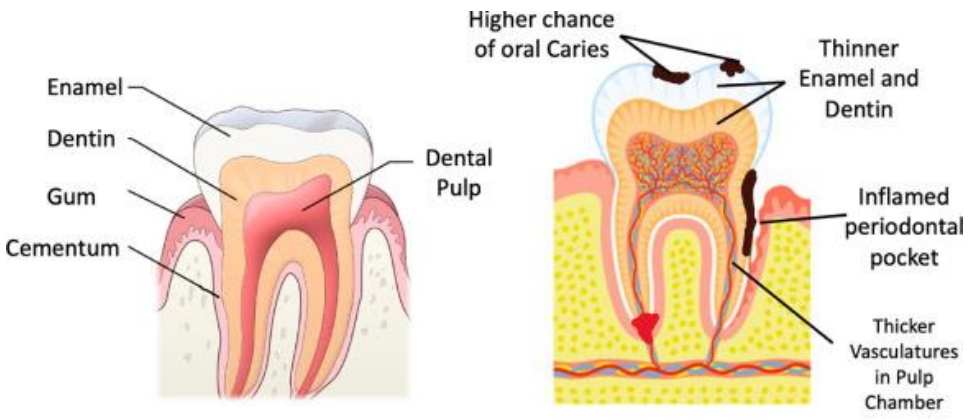

Image 3. Healthy tooth structure and tooth structure in diabetic patients [12].

DOI : 10.6261/RJOR.2024.4.16.90

The influence of glycemic control on children's oral health

Rigorous glycemic control is a determining factor in maintaining oral health in children diagnosed with diabetes, helping to reduce the incidence and severity of oral conditions such as gingivitis, periodontitis and tooth decay. Chronic hyperglycemia has direct effects on microcirculation, immune response and salivary secretion, critical factors in the onset and progression of oral pathologies [12-14].

High blood sugar affects small blood vessels in the gums, decreasing blood flow and oxygenation of oral tissues. This microvascular disruption limits the ability of gum tissues to regenerate and respond inflammatory to pathogens, contributing to an increased risk of infections and periodontal inflammation. In the presence of optimal glycemic control, these microvascular effects are diminished, supporting adequate circulation and preventing the progression of gingival inflammation to periodontitis [13,15].

Hyperglycemia compromises the function of neutrophils and monocytes, decreasing the body's ability to fight oral bacterial infections. In the context of uncontrolled glycemic levels, children with diabetes are more prone to recurrent oral infections, such as candidiasis, and gum inflammation. Keeping blood sugar levels at optimal levels supports the efficient functioning of the local immune system, limiting the incidence of infections and chronic inflammation [14-16].

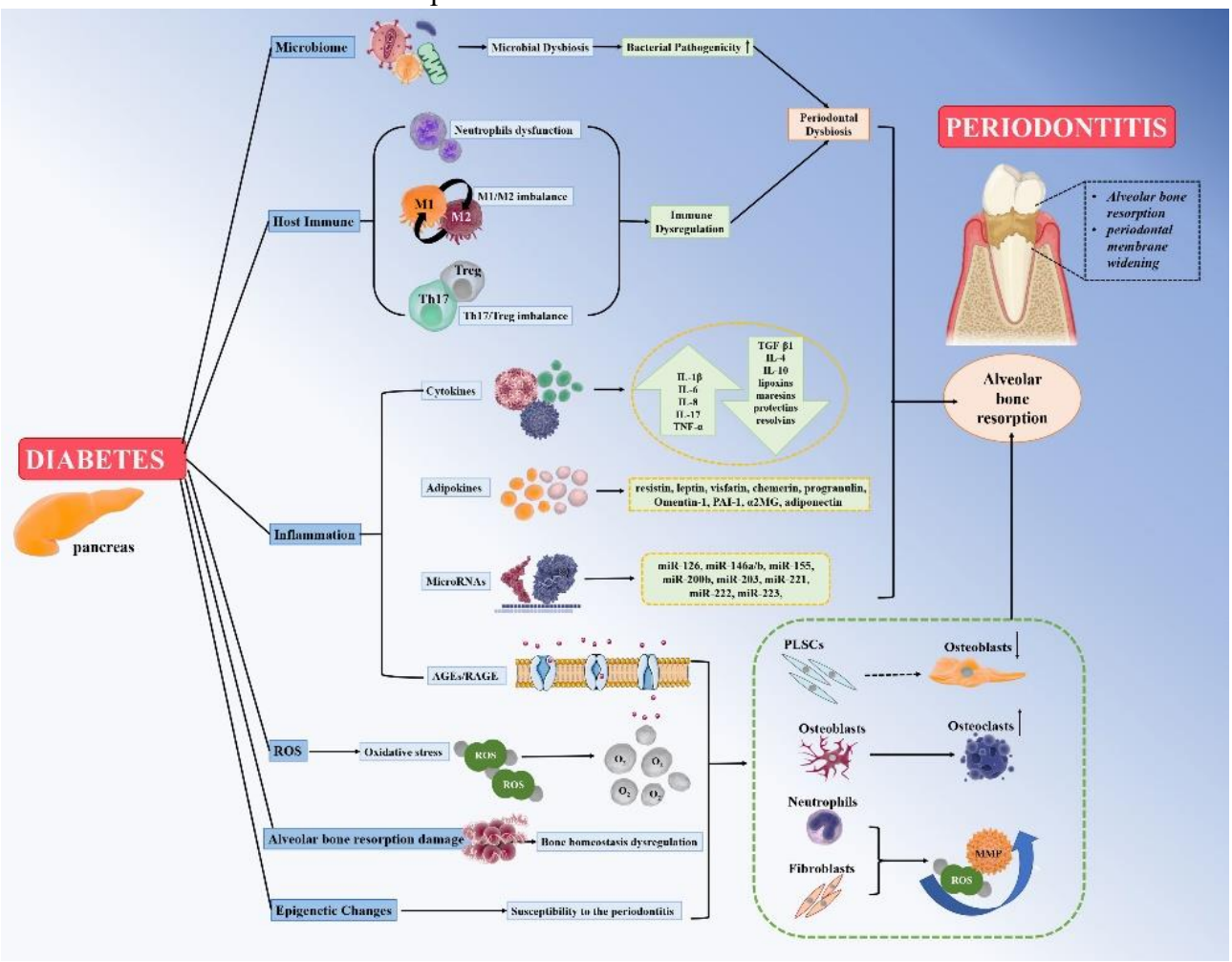

Image 4. Biological processes that increase the predisposition of diabetes mellitus to periodontitis [16].

DOI : 10.6261/RJOR.2024.4.16.90

Chronic hyperglycemia is associated with decreased salivary secretion, which leads to xerostomia (dry mouth), a condition that favors the formation of bacterial plaque and increases the risk of cavities. Saliva has a protective role, being essential in neutralizing acids and inhibiting cariogenic bacteria; Stabilizing blood sugar can help maintain adequate salivary flow, reducing the risk of tooth decay and other complications associated with xerostomia [14-16].

In diabetic children, poor glycemic control can lead to an increase in saliva glucose levels, creating an environment conducive to acidogenic bacteria that cause cavities and gum infections. By stabilizing blood sugar, it reduces the exposure of oral bacteria to glucose sources and prevents imbalance of the oral microbiome [15-17].

Management and prevention of oral diseases in children with diabetes

The management and prevention of oral diseases in children with diabetes requires an integrated approach, focused on rigorous glycemic control, sustained oral hygiene and regular monitoring of oral health. Diabetes predisposes children to a variety of oral complications, including gingivitis, periodontitis, xerostomia, and cavities, as a result of chronic hyperglycemia and its impact on the immune and salivary systems. The effective prevention of these conditions depends on the collaboration between diabetologist, dentist, child and parents [17,18].

Strict glycemic control is essential in reducing the risk of oral complications, as high glucose levels are directly correlated with gum inflammation and predisposition to infections. Stabilizing blood sugar helps protect microcirculation and local immune function, essential elements for periodontal health. Diabetologists and pediatricians should monitor and adjust insulin therapy or antidiabetic medications to prevent major variations in blood sugar [17-19].

Children with diabetes and their parents should receive education and training on proper oral hygiene, tailored to the specific risks of this condition. Brushing your teeth twice a day, flossing daily, and rinsing with antibacterial mouthwash (recommended by your doctor) are essential for plaque reduction and cavity prevention. Xerostomia can be relieved by constant hydration and the use of special products, such as salivary gels or sprays that help stimulate saliva [18,19].

Children with diabetes should be examined periodically by a dentist, preferably every 3-4 months. It allows for early identification of signs of gingivitis, cavities or infections, allowing for quick and effective interventions. The dentist can also monitor the impact of diabetes on tooth development and eruption and adapt the preventive treatment plan [18-20].

Professional fluoride application and the use of fluoride toothpaste can be beneficial in the prevention of cavities, as fluoride strengthens tooth enamel and makes it more resistant to the action of cariogenic bacteria. Sealing dental cracks and grooves is an effective preventive measure, which limits the retention of food debris and the accumulation of bacterial plaque, areas with an increased risk of developing caries in diabetic children [18-20].

Low salivary flow, common in children with diabetes, can be managed through proper hydration methods and the use of products that stimulate salivary secretion, such as sugar-free chewing gum or salivary sprays. Your dentist may recommend salivary substitutes to reduce the discomfort of xerostomia and prevent its negative effects on enamel and gums [18,19].

Nutritional counseling plays an important role in the prevention of oral diseases in children with diabetes. A balanced diet, with the avoidance of frequent snacks and

DOI : 10.6261/RJOR.2024.4.16.90

foods high in sugar, helps reduce the exposure of teeth to acid attacks. Dietitians and diabetologists can work together to ensure that a child's diet supports both blood sugar control and oral health [18-20].

Effective oral health management in children with diabetes requires close collaboration between diabetologist, dentist and pediatrician. The diabetologist is responsible for stabilizing blood sugar, the dentist for preventing and treating oral complications, and the pediatrician for general health monitoring. This integrated approach allows for an adaptation of dental treatment to the specific metabolic and immune needs of each diabetic patient [18-20].

Family education and counseling

Family education and counseling are essential in managing oral health in children with diabetes, helping to prevent complications and support an effective daily routine. Through proper education, parents and caregivers can understand the importance of oral hygiene, glycemic control, and balanced nutrition in reducing the risks of oral complications [19,20].

Explaining how diabetes affects oral health should be in such a way that the family understands the risks associated with chronic hyperglycemia, such as gingivitis, periodontitis, cavities, and recurrent oral infections. Understanding these aspects motivates the family to support the child in maintaining strict oral hygiene and to follow medical recommendations [19,20-30].

Diet plays a dual role in diabetes, influencing both oral health and blood sugar control. The family should be advised on the right foods, avoiding simple sugars that increase the risk of cavities and choosing nutritional options that do not destabilize blood sugar. Working with a pediatric diabetes nutritionist can be beneficial to create a balanced eating plan tailored to your child's needs [20,21].

The family plays a major role in monitoring and supporting glycemic control, a key aspect for preventing oral complications. Parents should be educated on daily blood glucose monitoring and treatment adjustment as recommended by the diabetologist. In this regard, the medical team must provide them with clear instructions and help them identify signs of inadequate glycemic control, such as dry mouth or bleeding gums [19-21].

Caring for a diabetic child is a complex and continuous process, and a relationship of trust between the family and the medical team (diabetologist, dentist, nutritionist) facilitates effective management. Through regular counseling, the family is encouraged to actively participate, ask questions, and report any issues in a timely manner in order to adapt the care plan [20,21].

Diabetes is a chronic condition that can generate stress and anxiety among children and parents. The family can benefit from psychological counseling to manage stress and support the child in adopting and maintaining healthy habits. Effective emotional support builds a child's confidence in their own ability to manage their condition [20-22].

The dentist can instruct parents and children on the correct oral hygiene techniques: brushing teeth twice a day, flossing and rinsing with antiseptic mouthwash. It is also essential for the family to understand the additional need for hygiene due to the diabetic child's predisposition to infections and oral complications, it is important to follow the indications of biomaterials and possible innovation systems. [19, 30-35].

Conclusions

The prevention of oral diseases in children with diabetes is a challenge that requires personalized management and rigor. With a strategy based on glycemic control, strict oral hygiene, and frequent dental visits, complications can be reduced, ensuring

DOI : 10.6261/RJOR.2024.4.16.90

optimal oral health and improved quality of life for children with diabetes.

It is crucial that blood sugar is stable before interventions. Collaboration with the diabetologist is necessary to assess glucose levels and postpone treatments in case of hyperglycemia or hypoglycemia.

Strict oral hygiene is essential. Patients should be instructed to maintain a rigorous dental hygiene routine to prevent gum disease and infections, given the compromised immune response.

Prompt treatment of gingivitis and periodontitis is crucial. Regular scaling and regular assessments of gum condition help prevent severe complications.

Family education and counseling are essential in diabetes management and in the prevention of oral complications in affected children. Proper training, emotional support, and close collaboration with the medical team can turn prevention and daily care into a joint effort, ensuring optimal health and improved quality of life for the child with diabetes.

A well-implemented prevention and management strategy can significantly contribute to maintaining the oral and general health of children with diabetes, thus giving them the chance for harmonious development and an optimal quality of life.

Dental treatment in children with diabetes requires a careful and personalized approach, taking into account the specific risks and individual needs of each patient. Collaboration between medical teams, proper education of patients and parents, along with a robust preventive strategy, are essential for ensuring optimal oral health and preventing diabetes-related complications.

References

1. Orbak R, Simsek S, Orbak Z, Kavrut F, Colak M. The influence of type-1 diabetes mellitus on dentition and oral health in children and adolescents. Yonsei Med J. 2008 Jun 30;49(3):357-65. doi: 10.3349/ymj.2008.49.3.357.
2. Davidopoulou S, Bitzeni-Nigdeli A, Archaki C, Arhakis A. Oral Health Implications and Dental Management of Diabetic Children. Int J Clin Pediatr Dent. 2022 Sep-Oct;15(5):631-635. doi: 10.5005/jp-journals-10005-2426.
3. Rai K, Hegde AM, Kamath A, Shetty S. Dental caries and salivary alterations in Type I Diabetes. J Clin Pediatr Dent. 2011 Winter;36(2):181-4. doi: 10.17796/jcpd.36.2.x436ln878221g364.
4. Ge Zhou, Xingyue Shu, Youlin Long, Yubin Cao, Juan Wang, Ga Liao, Ling Zou, Dental caries and salivary alterations in patients with type 2 diabetes: A systematic review and meta-analysis, Journal of Dentistry, Volume 150, 2024, 105321, ISSN 0300-5712, doi.org/10.1016/j.jdent.2024.105321.
5. Naixu Shi, Chenfei Kong, Lin Yuan, Lu Liu, Kelin Zhao, Junfeng Lü, Xiaofeng Wang, The bidirectional relationship between periodontitis and diabetes: New prospects for stem cell-derived exosomes, Biomedicine & Pharmacotherapy, Volume 165, 2023, 115219, ISSN 0753-3322, https://doi.org/10.1016/j.biopha.2023.115219
6. Dileepan K, Feldt MM. Type 2 diabetes mellitus in children and adolescents. Pediatr Rev. 2013 Dec;34(12):541-8. doi: 10.1542/pir.34-12-541.
7. Liu T, Wei Y, Zhu Y, Yang W. Caries Status and Salivary Alterations of Type-1 Diabetes Mellitus in Children and Adolescents: A Systematic Review and Meta-analysis. J Evid Based Dent Pract. 2021 Mar;21(1):101496. doi: 10.1016/j.jebdp.2020.101496.
8. Busato, I. M. S., Machado, M. Â. N., Brancher, J. A., Lima, A. A. S. d., Deantoni, C. C., Réa, R. R., … & Azevedo-Alanis, L. R. (2011). Impact of hyperglycemia on xerostomia and salivary composition and flow rate of adolescents with type 1 diabetes mellitus. Type 1 Diabetes Complications. https://doi.org/10.5772/22321
9. Ahmad R, Haque M. Oral Health Messiers: Diabetes Mellitus Relevance. *Diabetes Metab Syndr Obes*. 2021;14:3001-3015 https://doi.org/10.2147/DMSO.S318972

DOI : 10.6261/RJOR.2024.4.16.90

10. Thomson WM, Lawrence HP, Broadbent JM, Poulton R. The impact of xerostomia on oral-health-related quality of life among younger adults. Health Qual Life Outcomes. 2006 Nov 8;4:86. doi: 10.1186/1477-7525-4-86.
11. Dos Santos Letieri A, Siqueira WL, Solon-de-Mello M, Masterson D, Freitas-Fernandes LB, Valente AP, Ribeiro de Souza IP, da Silva Fidalgo TK, Maia LC. A critical review on the association of hyposalivation and dental caries in children and adolescents. Arch Oral Biol. 2022 Dec; 144:105545. doi: 10.1016/j.archoralbio.2022.105545.
12. Mariana da Silva Muñoz, Natália Marcumini Pola, Paulo Roberto Grafitti Colussi, Cassiano Kuchenbecker Rösing, Francisco Wilker Mustafa Gomes Muniz, Association between salivary flow and dental caries in institutionalized adolescents: Cross-sectional study, Journal of Oral Biology and Craniofacial Research, Volume 14, Issue 1, 2024, Pages 55-60, ISSN 2212-4268, https://doi.org/10.1016/j.jobcr.2023.12.004.
13. Cocoș DI, Bucur SM, Coman TM, Păcurar M. Observational study on the frequency of anchorage auxiliaries in fixed orthodontics, Romanian Journal of Oral Rehabilitation vol. 13, nr. 3,(iulie-septembrie) anul 2021.
14. Cocoș DI, Earar K, Bucur SM, Păcurar M, Mariș M, Cocoș ID, Galea C. Frequency of third molar pathology: innovative causes, symptoms and treatment options. Romanian Journal of Oral Rehabilitation Vol. 15, No.4 October-December 2023
15. Cocoș DI, Dumitriu Buzia O, Tatu AL, Dinu M, Nwabudike LC, Stefan CS, Earar K, Galea C. Challenges in Optimizing Nanoplatforms Used for Local and Systemic Delivery in the Oral Cavity. Pharmaceutics. 2024; 16(5):626. https://doi.org/10.3390/pharmaceutics16050626
16. Hoseini A, Mirzapour A, Bijani A, Shirzad A. Salivary flow rate and xerostomia in patients with type I and II diabetes mellitus. Electron Physician. 2017 Sep 25;9(9):5244-5249. doi: 10.19082/5244.
17. Zhao Mingcan , Xie Yuandong , Gao Wenjia , Li Chunwang , Ye Qiang , Li Yi, Diabetes mellitus promotes susceptibility to periodontitis—novel insight into the molecular mechanisms, Frontiers in Endocrinology, VOLUME 14, 2023, DOI=10.3389/fendo.2023.1192625, ISSN=1664-2392
18. Anastasia Babatzia, William Papaioannou, Anastasia Stavropoulou, Nikolaos Pandis, Christina Kanaka-Gantenbein, Liza Papagiannoulis, Sotiria Gizani, Clinical and microbial oral health status in children and adolescents with type 1 diabetes mellitus†, International Dental Journal, Volume 70, Issue 2, 2020, Pages 136-144, ISSN 0020-6539, https://doi.org/10.1111/idj.12530.
19. Siudikiene J, Maciulskiene V, Nedzelskiene I. Dietary and oral hygiene habits in children with type I diabetes mellitus related to dental caries. Stomatologija. 2005;7(2):58-62. PMID: 16254468.
20. Ciubara, A.B., Antohe, M.E., Peterson, I., Ciubara, A., Social media addiction in adolescents and young adults - psychoeducational aspects, Archiv Euromedica, 2022, 12.
21. Bolat, M; Antohe, M and Forna, NC, Clinical aspects of therapeutical solutions involved in oral rehabilitation of partially edentulous patients, 2013, Romanian journal of oral rehabilitation 5 (4) , pp.75-81
22. Diaconu-Popa, D. , Vitalariu, A., Martu, I., Luchian, I. , Luca, O ., Tatarciuc, M Full dentures realization -conventional vs digital technologies,Romanian journal of oral rehabilitation, 2021,13 (4) , pp.160-173
23. Dascalu, CG ,Antohe, ME , Zegan, G ., Burlea, SL , Carausu, EM , Ciubara, A , Purcarea, VL , Blended Learning - The Efficiency of Video Resources and YouTube in the Modern Dental Education, Revista de cercetare si interventie sociala, 2022, 72 , pp.288-310
24. Budala, DG , Baciu, ER , Surlari, Z ., Balcos, C ., Virvescu, D.I ., Interim crowns of PMMA and bis-acryl resin and their colour change in various conditions-a comparative study,Romanian journal of oral rehabilitation, 2021, 13 (2) , pp.231-236
25. Iordache, C ., Fatu, A.M ., Pomârleanu, C., Scurtu, D., Ancuta, C ., Temporomandibular joint in juvenile idiopathic artritis: an imaging study and ergonomic considerations, Romanian journal of oral rehabilitation, 2017, 9 (1) , pp.60-67
26. Surlari, Z , Virvescu, DI , Baciu, ER , Vasluianu, RI , Budala, DG ., The Link between Periodontal Disease and Oral Cancer-A Certainty or a Never-Ending Dilemma?, APPLIED SCIENCES-BASEL, 2021, 11 (24)
27. Ifteni, G ., Aungurencei, O ., Apostu, A ., Tanculescu, O ., Cotea, C ., Virvescu, D ., Surlari, Z ., Comparative analysis of tmj tomographic images in patients with dysfunctional syndrome of TMJ, Romanian journal of oral rehabilitation, 2018, 10 (2) , pp.76-85

DOI : 10.6261/RJOR.2024.4.16.90

28. Botnariu G., Forna N., Popa A.,Popescu R ., Onofriescu A. ,Cioloca D., Lacatusu C. , Mihai B. ,Correlation of Glycemic Control Parameters in Non-Diabetic Persons with Cardiovascular Risk Scores - Results from a Cross-Sectional Study,Revista De Chimie , 2017, 68 (1) , pp.108-110
29. Agop-Forna, D ., Cretu, C., Topoliceanu, C ., Salceanu, M., Vasincu, D ., Forna, N ., Clinical applications of diode lasers in oral surgery, Romanian Journal Of Oral Rehabilitation, 2021 13 (1) , pp.265-270
30. Antohe, ME , Andronache, M ., Feier, R , Stamatin, O ., Forna, NC , Statistical studies regarding therapeutic approaches for edentulous social clinical cases in students' practical stages, Apr-jun 2017, Romanian journal of oral rehabilitation 9 (2) , pp.94-99
31. Scutariu, MM,, Budala, DG ,Davidescu, A ,Romanec, C ,, Ciupilan, C ,Drugus, D , The performance of the romanian health system in the european context Romanian Journal Of Oral Rehabilitation,2022,14 (4) , pp.96-104
32. Lupescu, S ., Istrate, B ., Munteanu, C ., Minciuna, MG , Focsaneanu, S , Earar, K , Characterization of Some Master Mg-X System (Ca, Mn, Zr, Y) Alloys Used in Medical Applications Revista De Chimie, 2017, 68 (6) , pp.1310-1315
33. Ciocan-Pendefunda, A.A**.** , Apostu, A.M**.** , Antohe, M.E**.** , Tanculescu, O**.** , The aspects of morpho - functional restoration of endodontically treated teeth, Romanian Journal of Oral Rehabilitation,Volume 12, Issue 2, 2020, Page 128-136
34. Bassir L, Amani R, Khaneh Masjedi M, Ahangarpor F. Relationship between dietary patterns and dental health in type I diabetic children compared with healthy controls. Iran Red Crescent Med J. 2014 Jan;16(1):e9684. doi: 10.5812/ircmj.9684.
35. Bratu, IC , Strambu, IR , Salcianu, IA , Carnaru, MV , Dumitriu-Buzia, O , Sarbu, N , Ciuca, I , Calin, AM , Forna, N ., Parvu, S., Innovations in the treatment of pediatric conjunctivitis: modern solutions for small patients, Romanian journal of oral rehabilitation, 202416 (2) , pp.706-716

DOI : 10.6261/RJOR.2024.4.16.90