

# SEEC

13<sup>TH</sup> SOUTHEAST EUROPEAN CONFERENCE  
ON CHEMOTHERAPY AND INFECTION

OCTOBER 12-15, 2023.



## **Proceedings of Supplement J.IMAB**

Publications of papers presented in the Scientific Programme of the  
**13-th South-East European Conference Infections and Cancer**

Belgrade, Serbia

12-15 October, 2023

**Proceedings of Supplement J.IMAB**

**SECTION**

**DENTAL MEDICINE**

e-ISSN: 1312-773X

# Journal of IMAB

*- Annual Proceeding  
(Scientific Papers)*

**2023; vol. 29,  
Supplement2 - Section Dental Medicine**

**Joint Forum 13 SEEC & 33 IMAB**

ISSN: 1312 773X  
<https://www.journal-imab-bg.org>

Publisher:  
*Peytchinski Publishing Ltd.*  
Pleven, Bulgaria

**Publications of presented papers in the Scientific Programme of:  
Joint Forum:  
13th South-East European Conference of Chemotherapy, Infections and Cancer  
and 33rd Annual Assembly of International Medical Association Bulgaria (IMAB)**

12-15 October 2023,  
Congress Center, Hotel M, Belgrade, Serbia

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**Journal of IMAB** - 2023; vol. 29(Supplement2 - Section Dental Medicine)  
ISSN: 1312-773X; DOI: <https://dx.doi.org/10.5272/jimab.2023v29Supplement2>

# **THE SUCCESS OF INITIAL ENDODONTIC THERAPY**

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**ABSTRACT:** An effective endodontic treatment requires that the root canals be properly shaped, cleaned, and sealed. The purpose of this study was to evaluate the main root canal therapy success rates.

In this study we included 51 cases with equal amounts of anteriors, premolars, and molars in each jaw. To analyse the periapical condition and root filling quality, pre- and post-operative periapical radiographs were evaluated. As well as electronically databases were included.

Pre-operative periapical lesion presence had the greatest impact on primary root canal therapy outcome among the clinical factors assessed in this review and meta-analysis of the literature. Furthermore, when compared to "hand" instrumentation, the introduction of "rotary" instrumentation, one of the most recent developments in endodontics, was not found to be a statistically significant factor affecting treatment outcomes. This is a good thing because technological advancements aimed at standardising and boosting endodontic treatment efficiency haven't come at the expense of physiologically meaningful results.

Whatever the outcome criteria applied, primary root canal therapy keeps providing excellent results, and endodontic treatment is often a trustworthy and successful way to preserve the native dentition. The greatest determinant of the result of primary root canal therapy remains to be biological, such as the existence of a pre-operative periapical radiolucency.

**Key words:** endodontic therapy, success of endodontic therapy, endodontic treatment, Obturation, Long-term follow-up

## **INTRODUCTION**

A "prognosis" is an estimate of how an illness will progress. Therefore, this phrase refers to both the course of the disease and the likelihood of healing in the case of apical periodontitis. An effective endodontic treatment requires that the root canals be properly shaped, cleaned, and sealed.

Without going over the anatomical apex, filling materials should entirely fill the root canal space. When the filling material protrudes into the periapical tissues past the apex, overfilling could happen.

The purpose of this study was to evaluate the main root canal therapy success rates. With a particular focus on tooth type and root filling quality, this study assessed the radiographic results of root canal treatments (RCTs) carried out by dental practitioners.

## **MATERIALS AND METHODS**

All patients who underwent root filling between 2022 and 2024 in the private practice in city of Varna were included in the target population. In this study we included 51 cases with equal

amounts of anteriors, premolars, and molars in each jaw. To analyse the periapical condition and root filling quality, pre- and post-operative periapical radiographs were evaluated.

As well as electronically databases were included: Pubmed, Wiley, and Web of Science. Longitudinal clinical investigations (cohort studies, retrospective observational studies, randomised control trials) were among the research designs included. The result criteria were described as either "loose" (decrease in size of existing periapical lesion) or "strict" (full resolution of periapical lesion).

## RESULTS

The primary goal of root canal therapy is to eradicate the endodontic microbial biofilm, which may trigger an inflammatory response in the periapical tissues. This is achieved through cleaning and sealing the root canal space [1]. Therefore, proper mechanical shape, an abundant and efficient irrigation regimen, and three-dimensional (3D) obturation of the root canal system are necessary for successful endodontic therapy [2]. To achieve long-term clinical success, a proper coronal seal that prevents micro-leakage is crucial [3].

A lot of endodontic procedures rely on techniques developed via trial and error. As a consequence of experience, a few basic concepts have developed that help dentists achieve excellent endodontic results. Nevertheless, some of these techniques are empirical and have not been thoroughly examined by science. Periodically, even the most fundamental concepts or established guidelines need to be examined, if only to reinforce trust in them with additional verifiable evidence.

The quality of the evidence and the development of practice recommendations are given more attention in the current evidence-based approach. The root canal procedures covered in this case series involved unintentional overfilling of gutta-percha and root canal sealant. Periapical radiographs were taken on a regular basis to monitor the patients' teeth and assess the results over an extended period. In every case, the extruded materials in the periapex demonstrated healing and gradual resorption (Fig. 1,2,3,4)



*Fig. 1 Curved canal of tooth 15 before treatment*



*Fig. 2 Tooth 15 after filling*



*Fig. 3 Tooth 46 with periapical lesion*



*Fig. 4 Tooth 46 after 5 months follow-up*

The pulp and periapical tissues' preoperative state had a direct impact on the treatment's success. While only 86% of instances with pulp necrosis and periapical radiolucency demonstrated apical healing, the success rate for patients with vital or nonvital pulps and no periapical radiolucency are above 96% according to literature [4].

The degree of root filling and the potential for instrumenting the entire root canal had a big impact on how well the treatment worked. Just 62% of the periapical lesions on teeth that had previously had root fillings healed after retreatment. Therefore, the result of endodontic treatment may depend critically on variables that have not been quantified or discovered [4].

According to Huuonen et al., radiographic images show a two-dimensional portion of a three-dimensional anatomical structure [5]. Cone-beam computed tomography (CBCT) in three dimensions has been found to be more sensitive than radiography in identifying apical periodontitis [6,7]. When the reduction of the size of radiographic radiolucency (loose criteria of success) is taken into consideration, this increased sensitivity may reveal enlarged lesions, or it may result in the detection of apical periodontitis when radiographic examination indicates complete resolution (strict criteria of success) [8].

#### ***Clinical features' effects on success rates***

- Preoperative periapical lesion present - regardless of whether "loose" or "strict" criteria were used, the weighted success rates for teeth with pre-operative periapical lesions were lower than those for teeth without such lesions. [8]

- Method of instrumentation - according to the research of Burns and al. the results of all the studies do not differ significantly in statistics based on the type of instrumentation used (rotary vs. hand).

#### **DISCUSSION**

The need for cost-effective improvements in population health that doesn't put a strain on the economy is the main force behind all healthcare professions. These goals are combined with the need for therapy delivery that is both efficient and effective.

Sometimes the harm that enthusiastic treatment causes to the periapical tissues may be greater than the intended benefit. Every endodontic treatment should be made with attention and a dental

practitioner must judge what is best for the patient and whether his own abilities as a healer are sufficient to help.

It has been noted that the reported success rate could be inflated in studies with substantial patient lost to follow-up. But when the endodontic treatment is done according to the rules and the protocols are followed, success rates show improvement over time. One further disadvantage of prior systematic evaluations on the result of endodontic treatment is the lack of clarity about the categorization of extractions and retreatments as failures [9].

Pre-operative periapical lesion presence had the greatest impact on primary root canal therapy outcome among the clinical factors assessed in this review and meta-analysis of the literature. Furthermore, when compared to "hand" instrumentation, the introduction of "rotary" instrumentation, one of the most recent developments in endodontics, was not found to be a statistically significant factor affecting treatment outcomes. This is a good thing because technological advancements aimed at standardising and boosting endodontic treatment efficiency haven't come at the expense of physiologically meaningful results.

## **CONCLUSION**

Whatever the outcome criteria applied, primary root canal therapy keeps providing excellent results, and endodontic treatment is often a trustworthy and successful way to preserve the native dentition. The greatest determinant of the result of primary root canal therapy remains to be biological, such as the existence of a pre-operative periapical radiolucency.

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# MULTIFACTORIAL RELATED RAMPANT CARIES IN LATE MIXED DENTITION - A CLINICAL CASE REPORT

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**ABSTRACT:** Rampant caries is characterized as an abruptly clinically manifested, wide-spreading and promptly progressing carious process, that affects also adolescents. The aim is to be investigated the role of multifaceted factors for the rampant caries in adolescence. By implementation of standard clinical markers is recorded a clinical case of a subject with late mixed dentition affected by multiple carious lesions. By the means of the indices of PLI, GI and PBI we evaluate a situation of a severe degree of generalized plaque-associated gingivitis altered by the detrimental factors of recurrent respiratory infections, xerostomia-provoking medications, mild degree of fluorosis, improper dietary regime and negligence of oral hygiene cares. The effective control and improvement of the oral health related quality of life requires precise collection and analysis of a concise and detailed medical history, on time performed diagnostic procedures, with awareness, attitude and knowledge of identification of the variety of risk factors, as well as inhibition of their activity.

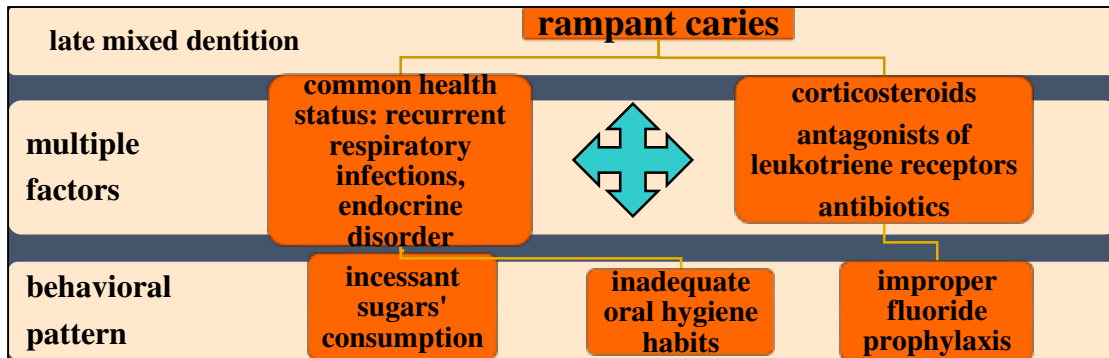
**Key words:** rampant caries, children, common health disorder, medication side effects, behavioral pattern

**INTRODUCTION** Oral-dental health is in close complex interrelationships with overall health in different periods of childhood, including adolescence [1]. Rampant caries is characterized as an abruptly clinically manifested, wide-spreading and promptly progressing carious process. It is determined as a pathological condition affecting a considerably high number of teeth surfaces, principally not predisposed to tooth decay, for a definite period of time. Besides nursing bottle rampant caries, researchers distinguish two more variations of adolescent rampant caries and xerostomia-induced rampant caries. Rampant caries is etiologically associated with harmful factors such as inadequate oral hygiene cares, abnormal plaque accumulation, improper dietary regime, common health disorders, medication, qualitative and quantitative properties of saliva, healthcare culture, social-economic traits, systemic and oral immunity, fluoride supplementation. According to the World Health Organization (WHO) the definition of the term of adolescents concerns individuals of the age range between 10 and 19 years. Some adolescents irregularly consume sweets, especially in the evening before going to bed, which leads to multifocal carious lesions, predominantly on upper frontal teeth [1, 2]. Among children and adolescents are recognized explicit stages of significantly high risk of caries, involving the age interval between 11 and 14 years. The puberty- related hormonal and psycho-emotional fluctuations specific for that period correspond to negligence concerning individual oral hygiene procedures, failure to perform proper dental cares, irregular dental check-up visits, prevailing in emergency, lack or deficits of practicing basic primary dental prophylaxis' rules [1, 2]. These interrelations are considered in fig. 1 [1, 2].

**AIM** Survey of the role of multifaceted factors for the rampant caries in adolescence.

**MATERIAL AND METHODS**

The mother of the participant signed a declaration of an informative consent at the beginning of the dental visit. The parent of the child took active participation in the registration of anamnestic data. The oral check-up was performed under typical ambulatory conditions at a dental office. The epidemiological index of tooth decay dft/DMFT was applied [3]. The plaque index PLI Silness-Löe was used for the assessment of the accumulation of dental plaque in the cervical zone on four sites (vestibular, oral, mesial and distal) of the Ramfjord teeth 16, 22, 24, 36, 42 and 44.



*Fig. 1. Multiple factors for rampant caries [1, 2]*

The degree of plaque accumulation varies in the interval between 0 and 3 [4]. The gingival index GI Löe-Silness is applied for recording of the state of gingival tissue and evaluation of the degree of its inflammation. The values of that index belong to the range of figures between 0 and 3. All the figures of PLI and GI registered for the examined sites of the representative teeth are summed and divided by 24. The values of PLI in the interval between 0.1 and 0.9 are indicative for excellent to very good and good condition of oral hygiene; scores in the range between 1.0 and 1.9 illustrate a tendency from good to fair oral hygiene status; figures from 2.0 to 3.0 correspond to poor oral hygiene state. Based on the index GI, a mild degree of gingivitis is characterized with values in the range from 0.1 to 1.0. The scores from 1.1 to 2.0 are in accordance with a moderate degree of gingival inflammation. Recordings of the index GI from 2.1 to 3.0 conform to a severe degree of gingivitis [4]. The assessment of the extent of bleeding of gingival tissue is performed by implementation of the clinical parameter of Papillary Bleeding Index by Saxer and Muhlemann (PBI). The precise recording of that index requires the usage of an atraumatic periodontal probe which enters gingival sulcus at the basic level of interdental papilla moving in occlusal direction mesial and distal to the highest point of papilla. The intensity of bleeding is evaluated in the interval between 0 and 4. The value of PBI is determined by dividing the quantity of bleeding by the number of inspected papillae. The average PBI rates on a scale from 0 to 4. Values in the interval between 0 and 1.3 correlate to very good condition of gingival tissues; recordings from 1.4 to 2.7 correspond to good state; scores from 2.8 to 4.00 are in accordance to poor status [5]. The percentage ratio of PBI lower than 10% is related to gingival health. The percentage values in the range from 10% to 30% are indicative for localized inflammation of gingiva. The status of

generalized gingival inflammation is characterized with scores of PBI greater than 30% [3, 4]. According to the most widely applied Dean's fluorosis index, that is recommended by WHO, the mild degree of clinically manifested fluorosis is characterized with narrow whitish-colored lines which follow the tracks of perikymas, the so-called Snow-capping in the zone of cusps, without clearly distinguished solid enamel. On the enamel surface are established extensively distributed opaque regions, without exceeding to more than 50% of the tooth surface [6]. **Case description.** **Clinical case:** A clinical case of a male at the age of 11 years and 10 months suffering from obesity and recurrent respiratory infections, with episodes of status asthmaticus. **Anamnestic data:** Considerably frequent intake of wide-spectrum antibiotics, combined with inhaled corticosteroids (Pulmicort) and antagonists of leukotrienes' receptors (Ephyra) 3 to 4 times per year during the latest 7 years. The patient performs inadequate individual oral hygiene cares, without application of interdental brushes, interdental floss, mouth washes. The boy uses fluorides'-containing tooth paste, but often ignores evening tooth brushing. Another behavior patterns'-associated harmful habit concerns the improperly organized dietary regime. The child's daily diet is deprived of some of the necessary essential amino acids related to exclusion of fish from the menu and scanty consumption of meat and meat products, at the expense of excessive daily consumption of sugars, including fizzy drinks. Besides the deteriorated common health status and detrimental behavioral traits of the subject, the environmental characteristic of low educational qualification of the parents corresponds to the explicitly high caries risk. Anamnestic data for a prolonged, uncontrolled, incessant consumption of fluoridated mineral waters with high fluorides' content (Hisar, Devin-Blue Label) till the age of 7, namely during the period of formation of the crowns and pre-eruptive mineralization of the first permanent molars, central and lateral incisors. **Clinical examination** The subject of that clinical case report is with established rampant caries under conditions of late mixed dentition. The epidemiological index of dft amounts to 100% due to the remaining deciduous teeth 55, 65, 75 and 85 with recorded treated and untreated complicated carious lesions. The index of DMFT equals to 70.83%. That value is related to cavitated occlusal carious lesions on all the first permanent molars, close asymptomatic pulpitis on dens 24, multiple approximal cavitated carious lesions on the mesial and distal surfaces of all the upper frontal teeth, respectively dentes 13, 12, 11, 21, 22, 23. The calculated value of the plaque index PLI is 2.125, which concerns a condition of poor oral hygiene. The recorded level of the gingival index GI is 2.33, that corresponds to a state of severe gingival inflammation. The average value of PBI amounts to 2.84, indicative for a poor status of gingiva. The percentage rate of PBI is 100%, related to a generalized gingivitis. Clinical manifestation of a mild degree of fluorosis, affecting predominantly the first permanent molars, maxillary central and lateral incisors, is recorded. The mandibular frontal teeth are not afflicted by the multifocal cavity-related carious process, which can be explained with the protective role of saliva produced and secreted by both of the major salivary glands- sublingual and submandibular ones.

**DISCUSSION** Adolescents represent a specific segment of society on the border between child's age and adulthood. That is related to the explicit necessity of organization and performance of oral

healthcare activities for improvement of oral-dental status as a prerequisite for proper quality of life [1]. Dentition of teenagers can also be affected by rampant caries under conditions of incessant consumption of cariogenic foods, especially between meals, most frequently combined with deficits of oral hygiene cares. There are established carious lesions on the vestibular and oral surfaces of premolars and molars, as well as on the approximal and oral surfaces of upper frontal teeth [2]. Dental medicine doctors have to be aware of the condition of dry mouth (xerostomia) in its role of a prerequisite for caries. Xerostomia is etiologically associated to various factors, including medications such as corticosteroids, antihistamines, antibiotics, antagonists of leukotriene receptors [7]. The strict control of sugars' intake and regular dental visits are of explicit significance for preventing tooth decay lesions from developing into cavitation, with concentrated efforts for minimization of tooth extraction, in terms of united skills and professional experience of pedodontists and pediatricians among children with common health disorders [8]. Fluorides are essential for caries prevention. Researchers established a definite interrelationship between water fluoridation and caries reduction. In parallel, the problem of fluorosis and its oral health-related consequences persists to be of great importance among children. The excessive endogenous intake of fluorides exerts damaging impact on enamel, disturbing its proper mineralization and causing opaque mottling and increased porosity, thus predisposing to enhanced risk of hard teeth tissues' destruction [9].

**CONCLUSION** The efficient management of rampant caries and limitation of its negative effects is related to the necessity of collection and analysis of a concise and detailed medical history, on time performed diagnostic procedures, with awareness, attitude, and knowledge of identification of the variety of risk factors, as well as inhibition of their activity.

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## **ORAL CANDIDIASIS IN ELDERLY PATIENTS**

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**ABSTRACT:** Elderly patients frequently do not receive the regular treatment required to keep their oral health at a high level. Elderly denture wearers are particularly susceptible to Candida infections and poor denture cleanliness. Although most Candida species are harmless, under the right circumstances, they can spread illness. This study aimed to identify older complete denture wearers' oral hygiene practices, denture cleanliness, and yeast presence.

An analysis of five years' worth of medical records from a private dental clinic was done and to establish a connection between our study and the literature, we reviewed the scientific literature to find articles that addressed oral candidiasis in the elderly.

In the elderly, oral candidiasis is a serious infectious process. Dental professionals deal with it in a range of clinical settings, including both acute and chronic types. Additionally, *C. albicans* has a significant role in the development of median rhomboid glossitis and angular cheilitis. The goal of dental care services should be to prevent and cure these issues in order to enhance the quality of life for senior citizens.

**Key words:** oral candidiasis, *C. albicans*, ageing, dental, geriatric dentistry, fungal infections

### **INTRODUCTION**

The world's population and age distribution have seen significant change in the last 70 years. The 2017 Global Burden of Diseases, Injuries, and Risk Factors Study's analyses predicted that the world would continue to age for the rest of the twenty-first century, posing significant difficulties to health care systems in their efforts to maintain healthy lifespans for ageing populations [1].

Despite being a crucial component of overall health and wellness, oral health is frequently disregarded in the global health agenda. The majority of oral health issues may be avoided or treated; however elderly patients frequently do not receive the regular treatment required to keep their oral health at a high level.

Elderly denture wearers are particularly susceptible to Candida infections and poor denture cleanliness. Although most Candida species are harmless, under the right circumstances, they can spread illness. It has been discovered that elderly people have poor oral hygiene habits. This could be the result of aging-related declines in manual dexterity. Yeasts can grow in dentures, and this can be made worse by ill-fitting or outdated dentures.

This study aimed to identify older complete denture wearers' oral hygiene practices, denture cleanliness, and yeast presence.

### **MATERIALS AND METHODS**

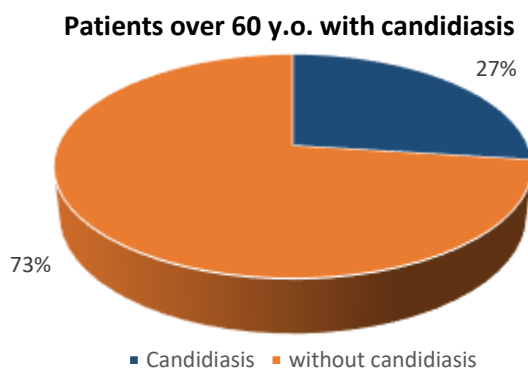
An analysis of five years' worth of medical records from a private dental clinic was done as part of a qualitative and quantitative retrospective observational study. The records were chosen based

on the subsequent selection criteria: (i) The patient must have been at least 60 years old at the time of the initial consultation; and (ii) a clinical examination must demonstrate the existence of relevant intraoral lesions or complications.

To establish a connection between our study and the literature, we reviewed the scientific literature to find articles that addressed oral candidiasis in the elderly. To locate relevant research on the topic, we searched the databases of PubMed, Cochrane Library, Web of Science, and Scopus.

## RESULTS

In the dental center were examined 651 patients who were 60 years of age or older between 2019 and 2024. The most common oral lesions among the people in the study were cases with Candidiasis. Throughout the study period, there was a statistically significant correlation was seen between the occurrence of xerostomia and oral candidiasis.



**Fig.1 Percentage distribution of patients over 60 years of age with candidiasis**

A yeast-like fungus called *Candida albicans* is common in the mouths of 30 to 60% of the general population. When it transforms from a commensal to a pathogenic condition in the elderly, it takes on clinical significance as an infectious agent. [2,3] In our research we found that elderly patients with candidiasis were 176 from 651 – 27% (fig. 1).

Inequality in oral health across the globe is a global burden. The number of unmet dental care needs is rising, particularly in low- and middle-income nations Inequality in oral health across the globe is a global burden. The number of unmet dental care needs is rising, particularly in low- and middle-income nations [4].

Oral candidiasis is commonly diagnosed in four forms: acute pseudomembranous, acute atrophic, chronic atrophic, and chronic hyperplastic. Acute pseudomembranous candidiasis manifests as discrete or confluent patches of soft, white, curd-like substance adhered to the oral mucosa (thrush). Acute pseudomembranous candidiasis may lead to acute atrophic candidiasis, which is typified by painful, erythematous mucosal patches. A well-defined area of erythema appears beneath removable dental prosthesis as a sign of chronic atrophic candidiasis, often known as denture sore mouth or denture stomatitis. The long-lasting, firm white plaque that characterizes the chronic hyperplastic type of candidiasis is clinically identical to other hyperkeratotic lesions.

Furthermore, *C. albicans* infections have been linked to median rhomboid glossitis and angular cheilitis [5].

When a patient has oral candidiasis, a medical expert may notice it as the initial sign of an underlying, crippling illness. Therefore, an endocrinopathy like diabetes mellitus or a systemic cancer like lymphoma or leukemia could be signalled by this oral fungal infection. Oral *Candida* infections can also be caused by other reasons, such as immunosuppression brought on by radiation or chemotherapy, xerostomia, antibiotic therapy, and nutritional inadequacies. [6,7]

To provide an appropriate method of treatment for oral candidiasis, it is critical to identify and treat curable systemic causes. Neglecting to take these aspects into account could reduce the effectiveness of routine therapies. Recognizing local variables that predispose people to *Candida* infections is also necessary. Malocclusive dentures that are inaccurate and do not offer sufficient lip support are frequently linked to different types of candidiasis. These defects in dentures may irritate the mucosa over time, making the tissue more vulnerable to fungal infections.

Plaque clinging to the micropores of the tissue surface of an acrylic denture base serves as an important reservoir for *C. albicans*. *Candida* may reappear after treatment if this source of reinfection is not removed by maintaining proper cleanliness around prosthetic devices [8].

One way to diagnose *Candida albicans* is by swabbing suspected regions of the disease with a cotton-tipped applicator and cultured in Sabouraud's medium. Another diagnostic procedure is the cytologic smear, which uses fungal hyphae to be visible under a microscope. The smear needs to be stained with PAS (periodic acid-Schiff) in order to more clearly define *Candida* hyphae. Using a tongue blade to scrape the mucosa, thinly spread the material onto a microscope slide, then fix the specimen with either commercial hair spray or cytologic fixative are the steps involved in this technique [9].

Treatment for oral candidiasis has involved the use of several medications with differing degrees of success. Among these medications include clotrimazole, miconazole, ketoconazole, nystatin, amphotericin B. To prevent reinfection with fungi that retain plaque, dental prosthesis should be taken out before being thoroughly cleansed and rinsed with the suspension. Treatment for persistent cases may take more than eight weeks, and close observation and follow-up are needed.

## **DISCUSSION**

A key aspect of overall health is dental health. Although it has a lifelong impact on quality of life, integrated approaches to general health promotion frequently overlook it. Since dental health is a modifiable risk factor, dental doctors should look for ways to stop the beginning of malnutrition and may find that doing oral health checks as part of frailty assessments is a relatively easy way to start. To maintain and improve the quality of life in elderly people, clinicians have to work to reduce major oral diseases such periodontal disease, dental caries and mucosal diseases.

Prosthetic misfitting, nighttime use, and poor denture cleanliness are linked to this mycosis. These variables, along with the extensive range of prosthetic therapies offered by the public health system, likely account for the increased incidence of candidiasis in the aged population.

As a result of population ageing brought on by longer life expectancies, problems involving the elderly will become more frequent in the years to come. Elderly patients are far more likely to experience negative treatment-related side effects from their medications, especially if they are feeble and in severe condition. An important factor is the aging-related changes in pharmacokinetics and pharmacodynamics, which are made more difficult by organ dysfunction, a decrease in homeostatic regulation, co-morbidities, and polypharmacy. For example, a higher frequency of xerostomia found in this study is likely related to the impact of the many medicines they were taking. [10, 11, 12].

## CONCLUSION

In the elderly, oral candidiasis is a serious infectious process. Dental professionals deal with it in a range of clinical settings, including both acute and chronic types. Additionally, *C. albicans* has a significant role in the development of median rhomboid glossitis and angular cheilitis. The goal of dental care services should be to prevent and cure these issues in order to enhance the quality of life for senior citizens.

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# **ECOLOGICAL IMPACT OF THE DENTAL PRACTICE- FUTURE ALTERNATIVES**

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## **ABSTRACT**

As climate changes apparently, people have become more ecologically conscious. The focus is towards diminishing our impact on the environment. This principle can be successfully engaged in the holistic profession of dentistry.

Yet the dental practices and most of our economy is fossil based. Most of the products are not recycled. This has a huge impact on the environment. Dental offices due to cross infection control rules and regulations use a lot of single use products which are fossil based. In addition, practices throw away a lot of methacrylate products from the dental bins and bibs, to the dental impression materials, waste bags, saliva ejectors, bond applicators, etc. Dental practices have a huge carbon impact on the environment. Is there a way to solve that?

A comprehensive electronic data search was conducted in Google Scholar and PubMed search engines to identify articles discussing the ecological impact of the dental practice. Only original studies and review articles were considered for the following systematic review. From the gathered data new products which are plant based, mineral based, metal based, even carbon based or use less petrol can solve the problem. Such possible alternatives are bamboo trees, rice, cannabis plants and graphene. Graphene is a material that holds immense possibilities.

We as dentists and humans need to change our footprint on the environment and bring sustainable development. This review focuses on the possible future alternatives.

**Key words:** dental, ecological, impact, future, alternatives

## **INTRODUCTION**

One of the major challenges of the twenty-first century has been global warming-induced climate change [1]. The increasing population burdens the ecological and healthcare systems, with human activity identified as the primary cause of unprecedented weather events globally [1][2]. Dentistry must reduce its ecological impact by curbing fossil fuel consumption and carbon emissions to ensure a sustainable future. Global commitment to sustainability is growing, urging dentistry to address its carbon footprint [3].

## **MATERIAL AND METHODS**

A comprehensive electronic data research was proceeded in Google Scholar and PubMed search engines to identify articles focusing on the ecological impact of dentistry. Only original studies and review articles published in English were considered for the following systematic review.

## RESULTS

Dental ecology emphasizes the reciprocal influence between the environment and dental health [4]. The rising preference for eco-friendly practices among dentists and patients worldwide highlights the need to reduce carbon footprint [5]. Strategies include paper reduction, waste minimization, and adopting sustainable materials governed by the four principles of sustainability: reduce, recycle, reuse, and rethink [6].

**Infection Control:** Infection control is pivotal in dentistry, maintaining high standards but contributing significantly to waste and energy consumption. Instruments, tissues, and various disposables lead to substantial waste. Incorporating eco-friendly practices, such as digital records, reduces the environmental impact [7,8].

**Office Administration:** The regulatory demands of running a dental practice involve extensive paperwork. Transitioning to digital documentation addresses ethical concerns and reduces the burden on staff and the environment [9][10].

**Alternatives to Plastic and Petroleum Products:** Reducing reliance on fossil-based products is crucial. Biodegradable materials like Polyethylene (PE), Polypropylene (PP), and eco-friendly alternatives can replace traditional plastics [11][12].

**Alternative Fuels, Energy:** Considering the substantial energy consumption in dentistry, transitioning to greener alternatives aligns with EU climate-neutral policies [13][14].

**Reducing Patients' Environmental Impact:** Encouraging patients to use eco-friendly products like tablets, biodegradable toothbrushes, and natural mouthwashes contributes to reducing their environmental impact [15].

**Graphene,** an eco-friendly material with vast production potential, holds promise in replacing conventional materials in dentistry [16].

### **Dental Specialties and Climate Change**

**Prosthodontics:** Digitalization in prosthodontics significantly reduces energy consumption, waste, and travel costs for patients and staff [17].

**Endodontics:** Adopting new protocols in endodontics, such as laser disinfection and eco-friendly restorative materials, minimizes environmental impact [18][19].

**Operative Dentistry:** Shifting from environmentally problematic materials like amalgam to stable, eco-friendly alternatives aligns with global efforts [20][21][22].

**Pedodontics:** The specific requirements of pedodontics demand significant material usage, emphasizing the need for sustainable practices [23].

**Orthodontics:** Utilizing aligners, digital planning, and impressions reduces travel needs and energy consumption for orthodontic patients and staff [24].

**Oral Surgery:** While certain protocols and materials cannot be changed immediately, a focus on prevention and patient awareness contributes to reducing the environmental impact [25][26][27].

**Periodontology:** Preventing periodontal disease through patient education and advanced diagnostic tools is crucial for minimizing the specialty's environmental impact [28][29].

## DISCUSSION

Dentistry's focus on patient well-being must extend to environmental conservation. Eco-friendly policies, governmental support, and prioritized research are crucial. Life cycle analysis (LCA) of dental treatments can identify practices with a disproportionate adverse environmental impact, facilitating prioritized changes [30]. Dentistry, as a highly resource-intensive profession, must acknowledge its significant environmental impact. Adapting to greener solutions is imperative for the transformation of dentistry into a sustainable and environmentally friendly practice.

## CONCLUSION

Reevaluating healthcare policies, reducing waste, recycling, and adopting a purposeful approach are essential for the dental profession. A commitment to sustainable practices ensures a responsible and eco-friendly future for dentists and humanity.

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## **THE AGEING ORAL CAVITY – HOW TO DIFFERENTIATE NORMAL FROM DISEASE.**

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**ABSTRACT:** The changes in ageing oral cavity can greatly impact oral health and overall well-being. It is important to understand the ageing process in the oral cavity, the components affected, common oral health issues that may arise, and ways to prevent and manage these issues. The purpose of this review paper is to draw attention to changes in oral health associated with ageing and how they affect a person's quality of life. We conducted a literature review and identified scientific papers that discussed dental health pathology in the aged population.

A healthy smile is linked to comfortable and functional aging. The most common dental disease that affects the elderly is caries, which is brought on by changes in salivary glands associated with ageing, xerostomia from drug use, eating a poor diet, exposure of dental roots due to gingival recession. It has been shown that tooth extractions are more common in the elderly.

**Key words:** oral changes, ageing, dental, geriatric dentistry, quality of life

### **INTRODUCTION**

The social, psychological, and clinical facets of illnesses affecting older people are the focus of geriatric medicine. Geriatric dentistry, on the other hand, focuses on treating and preventing oral problems in the elderly [1].

The changes in ageing oral cavity can greatly impact oral health and overall well-being. It is important to understand the ageing process in the oral cavity, the components affected, common oral health issues that may arise, and ways to prevent and manage these issues.

The frequency and extent of studies on the oral health status of senior populations have been restricted. However, as people age, they may experience lingual varicosities, glossitis, atrophy of the salivary glands and taste buds, varying degrees of xerostomia, periodontal disease, and an increased chance of developing cancers. [2,3,4,5] Additionally, as people age, their teeth are more susceptible to caries, attrition, and abrasion. [6]. Furthermore, there are insufficient descriptive and longitudinal studies on the ageing of the lips and perioral tissue, tongue and oral sensation, and saliva and salivary gland function.

The purpose of this review paper is to draw attention to changes in oral health associated with ageing and how they affect a person's quality of life.

### **MATERIALS AND METHODS**

We conducted a literature review and identified scientific papers that discussed dental health pathology in the aged population. We looked through the databases of PubMed, Cochrane Library, Web of Science, and Scopus to find pertinent material on the subject. Following a thorough content

analysis that extracted the most pertinent and instructive data and outcomes, the papers deemed appropriate were first chosen based on both their title and abstract.

## **RESULTS**

A healthy smile is linked to comfortable and functional aging. A functioning dentition consisting of 20 teeth in occlusion, however reduced, has been suggested as a gauge for successful oral aging. Good dental health is essential to good aging from both a biologically and functionally. Aging-related alterations to mucosal tissue include a decreased ability to heal wounds. On the other hand, smoking and other environmental variables significantly raise the risk of mucosal pathology. Decreased salivary gland function is frequently linked to conditions like diabetes mellitus and drug use. Chronic illnesses and drug addiction are becoming more common among the elderly. Masticatory function is crucial for elderly people. It's critical to maintain a diet rich in nutrients to prevent the frailty syndrome and sarcopenia.

The most common dental disease that affects the elderly is caries, which is brought on by changes in salivary glands associated with ageing, xerostomia from drug use, eating a poor diet, exposure of dental roots due to gingival recession. Compared to younger populations, where the more conservative course of removing as much of the decayed tooth as feasible while maintaining the original teeth is selected, it has been shown that tooth extractions are more common in the elderly. [7, 8]

The connections between several systemic disorders and periodontal infections have been the subject of numerous consensus panels and systematic reviews. Periodontitis increases the risk of atherosclerotic cardiovascular disease (ACVD) and may also be associated with decreased kidney function in the elderly. However, more research is needed to determine whether periodontal therapy can help lower the risk of kidney disease developing or worsening. Periodontitis may worsen hyperlipidemia brought on by diabetes, change immune cell function, and impede tissue healing. There is enough data to suggest measures to avoid systemic diseases by reducing periodontal infections, even if a body of research indicates varying degrees of correlation between periodontitis and inflammatory responses. However, the evidence is not strong enough to establish this correlation as causal [9,10,11].

While pharyngeal and oral cancers often affect people in their middle years and beyond, a greater than anticipated proportion of these tumors that affect the oropharynx have been documented in younger persons in recent years [12]. The monitoring of malignancies of the mouth and throat necessitates a sophisticated system of reporting, diagnosis, and surveillance. A component of the WHO NCD strategy is the surveillance of risk factors that are common to other noncommunicable diseases (NCDs), such as alcohol, tobacco, and sexually transmitted infections [13]. Regular dental check-ups are crucial to detect any signs of oral cancer early and improve outcomes through timely treatment.

Nutrition is impacted by the deterioration of masticatory and occlusal functioning. The quantity and kind of occlusal contacts, as well as how they affect performance and day-to-day activities, could be monitored. One of the primary biological changes in the ageing oral cavity is the loss of

teeth. This can occur due to tooth decay, gum diseases, or other factors such as poor oral hygiene and nutritional deficiencies. The loss of teeth can greatly affect a person's ability to chew food properly and can lead to a variety of oral health issues [14, 15].

Numerous socioeconomic factors, such as costs, educational background, and social class, and systemic conditions, such as xerostomia, orofacial pain, and oral and pharyngeal cancer, which are common in the elderly, interfere with the maintenance of a functional dentition and a healthy oral cavity and may have both local and systemic effects [16].

Additionally, older adults may also experience difficulties in maintaining proper oral hygiene due to physical limitations or cognitive decline. This can further increase the risk of oral health problems. Caregivers and healthcare professionals play a vital role in assisting older adults with their oral hygiene routines and ensuring their oral health needs are met.

## **DISCUSSION**

Poor oral health and diminished oral function brought on by ageing may have a detrimental effect on older individuals' quality of life and general health. Understanding and recognizing the differences can help healthcare professionals provide appropriate care and interventions to maintain oral health and overall well-being in older adults. Regular dental check-ups and oral examinations are essential for differentiating between normal age-related changes and disease in the elderly.

The weakening of the tooth structure and gums can result in increased tooth sensitivity. Older adults may experience discomfort or pain when consuming hot or cold foods and beverages. Using desensitizing toothpaste and maintaining good oral hygiene practices can help alleviate tooth sensitivity and improve oral comfort.

Maintaining good oral hygiene is crucial for preventing oral health issues in the elderly. Daily brushing and flossing help remove plaque and food debris, reducing the risk of tooth decay and gum diseases. Older adults may benefit from using electric toothbrushes or other adaptive aids to make oral hygiene practices more comfortable and effective. In case of limited mobility or dexterity, caregivers can assist in maintaining proper oral hygiene routines.

Nutrition plays a vital role in maintaining oral health. A well-balanced diet that includes adequate nutrients, such as calcium, vitamin D, and vitamin C, can promote healthy teeth and gums. Older adults should consume a variety of foods from different food groups and limit sugary snacks and beverages that can contribute to tooth decay. If necessary, dentists or nutritionists can provide guidance on dietary modifications to support oral health in the elderly.

The loss of teeth can also impact a person's self-esteem and confidence. Missing teeth can affect the appearance of the smile, leading to social and psychological consequences. Restorative dental treatments such as dental implants, dentures, or bridges can help replace missing teeth and restore both function and aesthetics.

For developing community-based programmes for oral health promotion and disease prevention, systematic data on risk factor prevalence is crucial. Estimating the oral health consequences of socio-behavioral factors could lead to the development of pertinent intervention strategies by

combining clinical oral health and risk factor data into a single database. Maintaining good dental health can prevent conditions that impair mastication, which lessens the detrimental effects of malnutrition in later life.

## CONCLUSION

As the average age of the ageing population rises in both developed and developing nations, oral impairment and disability become an inevitable aspect of ageing. An individual's lifespan is often marked by an unpredictable sequence of varying experiences, some of which may be better than others, which contributes to the ageing process.

The ageing oral cavity undergoes various changes that can significantly affect oral health. Understanding the ageing process, the components affected, common oral health issues, and preventive measures is crucial for maintaining oral health in the elderly. Regular dental check-ups, proper oral hygiene practices, and a balanced diet can help preserve healthy teeth and gums and enhance overall well-being as we age.

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## DIETARY INTAKE OF VITAMIN D AND DENTAL CARIES IN CHILDREN AGED 6 TO 12 YEARS

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### ABSTRACT

**Introduction:** Vitamin D plays an important role in calcium metabolism and in the prevention of bone diseases, but in the recent years the knowledge about the role of vitamin D metabolites outside of the bone biology has been increased. Children and adolescents are particularly vulnerable to the clinical manifestations of vitamin D deficiency due to its central role in bones and teeth formation.

**The aim** of the present study was to evaluate the amount of nutritional intake of vitamin D and its relationship to the prevalence of dental caries in children aged 6 to 12 years.

**Material and methods:** The study included 768 children aged 6 to 12 years, of whom 390 are boys and 378 are girls. With the help of a 3-day food diary, the intake of vitamin D with food is estimated with a computer program.

**Results:** Statistically significant difference was found between the average daily intake of vitamin D for girls (M=2.989, SD = 4.648) and for boys (M=2.024, SD=1.792):  $t(768) - p < 0.05$ . A significant negative coefficient were found ( $\rho(768) = -0.251, p < 0.05$ ), showing that there is a weak correlation between the intake of vitamin D with food and the intensity of dental caries in the studied children.

**Conclusion:** The results show that there is a deficiency of vitamin D when taken with food, and the correlation analysis showed a weak link between vitamin deficiency and the development of dental caries.

**Key words:** Vitamin D, dental caries, children

**INTRODUCTION:** Vitamin D has been associated with two of the most prevalent oral diseases: dental caries and periodontal diseases [1]. In last decades, the functions of vitamin D have been the subject of active research. Its role in the mineral homeostasis of calcium-phosphorus metabolism and in the prevention of bone diseases has been studied [2, 3, 4]. However, in recent years, knowledge of the effects of its metabolites outside of bone biology has also increased [5, 6, 7]. Children and adolescents are particularly vulnerable to the clinical manifestations of vitamin D deficiency because of the central role of this vitamin in bone and tooth formation [5, 8].

**AIM:** This study aims to provide a comprehensive evaluation of the amount of dietary vitamin D intake and its relationship with the prevalence of dental caries in children aged 6 to 12 years.

**MATERIALS AND METHODS:** A total of 768 children aged 6 to 12 years were included in the study, 390 boys and 378 girls, after obtaining informed consent signed by their parents. Food diaries that kids kept with parental assistance have been examined in order to evaluate dietary vitamin D intake. They are made up of two weekdays and one day off, or three consecutive days of the week. Carious lesions have been diagnosed according to the DMFT index, assessing Decayed (D), Missing due to caries (M), or Filled (F) teeth. The study was authorised by the Ethics Committee of the Medical University of Sofia

(KENIMUS). Data processing has been performed using IBM SPSS Statistic 20 (Armonk, NY, 10504-1722, USA).

**RESULTS:** Table 1 presents the results of the comparison by age and sex of dietary vitamin D intake for the children included in the study. Two statistical methods have been applied: descriptive analysis and the t-test. It has been found that there is no statistically significant difference when comparing the results of the two age groups  $p = 0.839$ .

**Table 1. Vit D status, dietary intake according to the age and sex, and differences between groups means**

	Age	N	Mean	SD	SE Mean	Sig. (2-tailed)	Std. Error	95% CI	
								Lower	Upper
Vit. D	6-8	539	2.769	3.211	0.283	0.839	0.412	-0.646	0.925
	9-12	229	2.817	3.516	0.267				
	Sex	N	Mean	SD	Std. Error	Sig. (2-tailed)	Std. Error	95% CI	
	Girls	378	2.989	4.648	0.448	0.053*	0.453	0.007	1.751
	Boys	390	2.024	1.792	0.132				

\* The mean difference is significant at the 0.05 level.

The results of the comparison by sex of the dietary intake of vitamin D for the studied children have revealed a statistically significant difference between the average daily intake of vitamin D for girls (Mean=2.989, SD=4.648) and for boys (Mean=2.024, SD=1.792):  $p = 0.053^*$ .

**Table 2. Vitamin D status and dietary intake according to the DMFT**

	N	Mean	SD	Std. Error	95% CI		Min.	Max.
					Lower	Upper		
Up to 2 DMF	135	9.8579	8.73456	1.70462	3.7401	11.7532	0.80	26.54
Up to 4 DMF	287	3.0246	1.89671	0.14218	1.1712	2.3052	0.40	9.32
Over 4 DMF	346	2.8973	1.68979	0.18612	1.1847	2.1526	0.48	8.87
Total	768	4.9824	3.86037	0.31238	1.9683	2.7913	0.41	32.18

Table 2 demonstrates the severity (incidence) of dental caries based on the children's vitamin D intake during the three days of the study. It is obvious that in children with a low intensity of dental caries up to 2 DMF, the intake of vitamin D is increased than in the remainder of the children who have an incidence of dental caries of 4 DMF or more, where the intake is much lower. A one-way analysis of variance (ANOVA) of the mean daily values of vitamin D intake in children with different DMFs has been performed. As a result of data analysis, a statistically significant difference,  $F(2,3274) = 38.67$ ,  $p < 0.001$  for vitamin D intake between the three distinct groups has been found (tbl.3).

**Table 3. Differences between groups means – ANOVA**

	Sum of Squares	df	Mean Square	F	Sig.
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Between Groups	690.058	2	345.029	38.670	0.001
Within Groups	2444.724	274	8.922		
Total	3134.783	276			

The Spearman's rank correlation coefficient rho has been applied to establish the relationship between vitamin D intake and dental caries in the children as subjects of the study. A significant difference and adverse correlation have been revealed in the analysis of vitamin D values ( $\rho(768) = -0.251, p < 0.05$ ), indicating that the higher dietary vitamin D intake results in a less pronounced intensity of dental caries. Evaluation of food diaries has found that the largest relative share of vitamin D intake is provided by meat (53%), followed by milk and milk products (29%), cereals (11%), fish and other seafood (4%), and finally eggs (3%).

**DISCUSSION:** Vitamin D deficiency affects over one billion children and adults globally and is a major public health concern. The deficiency is linked to a variety of illnesses, including childhood dental caries, periodontitis, autoimmune diseases, infectious diseases, cardiovascular diseases, malignancies, type 2 diabetes, and neurologic disorders [5, 9, 10, 11]. Vitamin D plays a critical role in human health by supporting healthy bone formation and mineralization, including that of the teeth [12,13]. Oral caries development may be significantly influenced by vitamin D status during childhood and adolescence, according to a number of studies. Recent research has produced contradictory findings; some have found no correlation between decreased vitamin D levels and caries in children [13], while others have shown a positive correlation [12,14].

The precise mechanism by which vitamin D influences the development of dental caries remains unclear, despite an overwhelming number of studies on the subject [13]. Regarding the connection between vitamin D and dental caries development in both dentitions, there is currently no conclusive agreement. When comparing the DMFT index of children with adequate levels of 25(OH)D to that of children aged 7–16 years, it has been observed that the former have a higher incidence of decayed, missing, and filled teeth [15]. Many writers emphasise the association between low vitamin D levels and a high frequency of caries in children and adults; however, the mechanism is unknown [13, 16]. Clinical studies on the effect of vitamin D supplementation on the prevention of dental caries in 2827 children found that it reduced the risk of caries by approximately 47%, although with poor certainty [17]. In the recent decade, the significance of nutrition in oral diseases has been exposed, as has the link between nutritional insufficiency and oral pathologies [18, 19, 20].

**Conclusion:** Our study has examined the readily available levels of this vitamin in children's diets. The results suggest the presence of dietary vitamin D deficiency, as the correlation analysis has revealed a weak relationship between vitamin D deficiency and the development of dental caries. To get a more realistic view of this topic, which is of great interest to many researchers, more children should be included in future studies.

**Acknowledgements:** The present study was supported by Grants № 95/23.04.2019 from The Council of Medical Science in Medical university, Sofia, Bulgaria.

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