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TO STUDY METHODS OF EARLY DIAGNOSIS AND TREATMENT OF COMMON DENTAL DISEASES AMONG THE POPULATION

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Abstract:

This article reviews methods for early diagnosis and treatment of common dental diseases in the general population. Dental diseases such as caries, periodontitis and oral cancer remain common and pose significant health problems. Early detection is critical to prevent progression of these conditions and improve patient outcomes. The article reviews a variety of diagnostic modalities, including visual examinations, radiographic imaging, and new technologies such as salivary diagnostics and biomarkers. It also evaluates treatment options ranging from preventative care and minimally invasive techniques to advanced surgical interventions. Public health strategies and patient education are emphasized as essential components of comprehensive dental care.

Keywords: *Early diagnosis, dental diseases, dental caries, periodontitis, oral cancer, saliva diagnostics, biomarkers, preventive care, minimally invasive dentistry, patient education, public health*

Introduction

Relevance. Dental diseases, including tooth decay, periodontal disease and oral cancer, are among the most common health problems affecting populations worldwide. According to the World Health Organization, dental disease is a significant public health problem affecting nearly 3.5 billion people worldwide (World Health Organization, 2020). Despite advances in dental care and technology, many of these conditions remain common due to factors such as poor oral hygiene, lack of access to dental care, and dietary habits. Early diagnosis and timely intervention are critical to mitigating the effects of these diseases and improving oral health outcomes. Dental caries, or tooth decay, is one of the most common chronic diseases affecting people of all age groups. It results from demineralization of tooth enamel caused by acids produced by bacteria in the mouth, leading to cavities and, if left untreated, more serious complications such as infection or tooth loss. The

Global Burden of Disease (GBD) study reports that untreated dental caries in permanent teeth is the most common disease, affecting more than 2.4 billion people worldwide (Kassebaum et al., 2017). In children, primary dental caries affects more than 530 million children worldwide, making it a leading cause of discomfort and school absence. (Peres et al., 2019).

Periodontal disease, including gingivitis and periodontitis, is another common dental disease that affects the supporting structures of the teeth. Gingivitis, a milder form, is characterized by inflammation of the gums, while periodontitis involves the destruction of the bone that supports the teeth. Severe periodontitis is the leading cause of tooth loss in adults and is associated with systemic diseases such as cardiovascular disease, diabetes, and respiratory infections (Sanz et al., 2020). According to the GBD, severe periodontitis affects approximately 10.8% of the world's population, with a higher prevalence observed among older adults (Кассебаум и др., 2014).

Oral cancer, although less common than tooth decay and periodontal disease, remains a serious health problem, especially in areas with high rates of tobacco, alcohol, and betel chewing. Oral cancer is often diagnosed at an advanced stage, resulting in a poor prognosis and high mortality rate. Early detection is critical to improve survival rates, however many cases are diagnosed late due to lack of regular dental examinations and public awareness (Варнакуласурия, 2020).

Given the prevalence of these diseases and their potential consequences, early diagnosis is essential to prevent progression and reduce the burden of oral health problems. Early intervention can prevent the need for more invasive treatment and improve the quality of life of those affected. Additionally, effective treatment strategies that address the root causes of these diseases are critical to long-term oral health. Early diagnosis of dental diseases is based on a combination of traditional clinical examinations and new diagnostic technologies. Clinical examinations, including visual assessments and palpation, remain the cornerstone of dental diagnosis. These techniques allow dentists to detect visible signs of dental decay, gum disease, and other oral health problems. However, clinical examinations alone cannot detect all diseases at an early stage, especially those that are asymptomatic or located below the gum line. X-rays, such as x-rays, are commonly used to complement visual examinations and identify hidden dental health problems. X-rays can reveal decay between teeth, bone loss associated with periodontal disease, and abnormalities in the jaw and surrounding structures (White & Pharoah, 2014). Panoramic radiographs and bitewing radiographs are standard tools in routine dental care, helping to diagnose conditions at an early stage, when they may not yet be visible to the naked eye. New technologies are expanding dentists' ability to detect diseases at an even earlier stage. For example, salivary diagnostics is a rapidly developing field that uses biomarkers in saliva to diagnose dental diseases and other systemic conditions. Saliva contains proteins, enzymes and nucleic acids that can provide information about the health of the oral cavity and the entire human body. Research has shown that certain biomarkers in saliva are associated with dental caries, periodontal disease and oral cancer, making salivary diagnostics a promising non-invasive tool for early detection. (Loo et al., 2010). Additionally, laser fluorescence devices such as DIAGNOdent can detect early caries lesions by measuring changes in fluorescence of tooth enamel, allowing intervention before cavities form (Alammouri et al., 2020).

Artificial intelligence (AI) is also playing an increasingly important role in the early diagnosis of dental diseases. AI algorithms can analyze X-rays, intraoral scans and patient records to identify patterns and anomalies that may indicate early stage disease. Модели машинного обучения показали себя многообещающими в выявлении ранних признаков кариеса зубов, заболеваний пародонта и рака полости рта, потенциально повышая точность диагностики и позволяя проводить более ранние вмешательства (Schwendicke et al., 2020).

Machine learning models have shown promise in identifying early signs of dental caries, periodontal disease, and oral cancer, potentially improving diagnostic accuracy and allowing for earlier interventions (Schwendicke et al., 2020).

Once diagnosed, treatment for dental disease depends on the severity and progression of the condition. For dental caries, treatment ranges from preventive care and remineralization of early lesions to restorative procedures such as fillings, crowns and, in severe cases, root canal therapy or tooth extraction (Fejerskov & Kidd, 2015). Preventive measures, including fluoride application, dental sealants, and education in proper oral hygiene, are important in reducing the incidence of dental caries, especially in children.

Treatment of periodontal disease usually involves a combination of non-surgical and surgical approaches. Non-surgical treatments include scaling and root planing to remove plaque and tartar below the gum line, and the use of antimicrobials to reduce bacterial infection. In more advanced cases, surgical procedures such as flap surgery, bone grafting, and guided tissue regeneration may be required to restore the supporting structures of the teeth (Pihlstrom et al., 2005). Maintenance therapy, including regular teeth cleaning and patient education, is critical to preventing recurrence of periodontal disease.

Treatment for oral cancer often involves a multidisciplinary approach, including surgery, radiation therapy, and chemotherapy. Early-stage cancer can be treated with localized surgery to remove the tumor, while more advanced cases may require combination therapy. Early detection is critical to improve survival rates, as oral cancer diagnosed at an advanced stage has a much lower prognosis (Rivera, 2015). Public health campaigns aimed at reducing risk factors such as tobacco use and encouraging regular dental examinations are essential for early detection and prevention. In addition to clinical interventions, public health strategies play an important role in the early diagnosis and treatment of dental diseases. Educational campaigns promoting good oral hygiene, such as regular brushing, flossing, and professional cleaning, are critical to preventing dental disease at the population level. Public health initiatives providing access to fluoride, either through community water fluoridation or surface application of fluoride, have been shown to significantly reduce the prevalence of dental caries.

Screening programs that offer free or low-cost dental exams to low-income communities can help identify dental disease early and get people the treatment they need. These programs are especially important in low-income and rural areas where access to dental care may be limited. Collaboration among dentists, health care providers, and community organizations is critical to expanding the reach of these programs and improving oral health outcomes.

Conclusions. In conclusion, early diagnosis and treatment of common dental diseases is critical to reducing the global burden of oral health problems. Using a combination of traditional diagnostic methods, new technologies and effective treatment strategies, dental professionals can identify and treat dental diseases at an early stage, preventing their progression and improving the quality of life of patients. Public health initiatives and preventive measures play an equally important role in promoting oral health and reducing the incidence of dental diseases in the population.

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