



Functional Dentistry: A Narrative Review of a Whole-Body Approach to Oral Health

Stella S^{1*}, Saraan K V¹, Ramathilagam G¹, Chandhini Parveen A¹, Ardra Rajkumar¹, Joshua Samuel Raj¹, Brindha S²,
Dr. Kavitha Muthu²

¹ Interns, Department of Oral Pathology and Oral Microbiology, RVS Dental College and Hospital, Tamil Nadu, India

² Professor and HOD, Department of Oral Pathology and Oral Microbiology, RVS Dental College and Hospital, Tamil Nadu, India

Corresponding Author: Stella S

Abstract

Functional dentistry views the oral cavity as an integral part of overall body health rather than an isolated anatomical system. It implies identifying and eliminating the causative agents of oral diseases, including oral microbiome dysbiosis, nutrition, inflammation, airway function, sleep, stress, and other aspects of patients' lifestyles. This review article provides scientific evidence supporting principles of functional dentistry. Scientific studies prove strong connections between periodontal disease and various systemic diseases. Oral microbiome research shows the importance of microbial balance for both oral and systemic health. Modern approaches to cariology, personalised risk assessment, and prevention-oriented medicine correspond to the principles of functional dentistry.

Keywords: Functional dentistry, holistic dental care, periodontal disease, microbiome, airway-centric dentistry, myofunctional therapy, preventive dentistry

Introduction

Conventional dentistry has been based on a predominantly mechanical and restorative process where decayed teeth are filled or extracted, and an artificial tooth is inserted for any missing tooth. The presence of the lesion necessitates treatment. However, recently, this traditional mode of treatment has been questioned due to the increased evidence that oral disease is an integral part of systemic physiology, both influencing and influenced by it ^[1]. Oral disease is influenced by diet, oral flora, metabolism and hormonal levels, airway anatomy, sleep patterns, and psychological stress, while oral disease adds to systemic infection burden and inflammation ^[1]. This led to the development of a new field of practice known as Functional Dentistry.

Functional dentistry is a holistic approach to treating the mouth by understanding the underlying factors causing the dental issue, educating the patient regarding maintenance of oral health and considering the links between oral health and overall well-being ^[2].

This narrative review aims to provide an overview of functional dentistry, scientific evidence supporting its clinical applications, and to distinguish between aspects that are supported by strong evidence and those that should be interpreted with caution due to limited or inconsistent research.

Defining Functional Dentistry

The concept of functional dentistry is a new direction in the evolution of traditional dentistry. The concept is associated with a preventive approach that aims at finding the main cause of the development of any disease, application of non-toxic materials in case treatment, and perception of the whole organism as a unity rather than separate organs ^[3].

The core principles of functional dentistry include identifying the cause rather than treating the symptom. The approach aims to prevent degenerative disease through personalised diet counselling, lifestyle modification, stress

management and improved oral hygiene practices. The use of dental materials that are non-biocompatible is avoided, and wherever possible, minimally invasive procedures are preferred to preserve the natural tooth structure. Preventing and correcting malocclusion is also an important factor in functional dentistry ^[3, 4].

In order to identify the causes of oral health issues, functional dentists employ a broader range of diagnoses. A functional dentist performs a comprehensive assessment that extends beyond a regular dental checkup. This includes evaluating nutritional status, identifying vitamin or mineral deficiencies that lead to oral diseases, assessing quantity and quality of saliva, oral microbiome composition, occlusion, TMJ function, breathing pattern, and sleep-related disorders. They also create individualised treatment plans that take into account the patients' medical histories, genetic factors, and lifestyles ^[5].

Terms such as holistic, biologic, and integrative dentistry can be interchangeable with functional dentistry because they refer to similar concepts. The "root-cause," preventative approach has started to become consistent with contemporary periodontal medicine and cariology science; some of the claims made in the holistic dentistry context, such as the rejection of specific procedures used in standard practice, go beyond what is currently proven ^[4].

Evidence Review by Clinical Domain

1. The oral-systemic disease link

Functional dentistry emphasises a close relationship between oral health and overall health, recognising that conditions such as cardiovascular diseases, diabetes, gastrointestinal diseases and sleep disturbances may influence oral health and vice versa ^[3]. In the contemporary literature, periodontitis is no longer described as a localised disease but rather as a systemic disease connected to over 70 infectious and non-infectious diseases with a variety of mechanisms that connect the two conditions. One of these

mechanisms is the translocation of pathogens and their virulence factors from the mouth to other parts of the body through blood, airways, and the intestinal tract, damaging the organs along the way [3]. Another mechanism is the inflammatory response brought on by the translocation of pathogens and the movement of inflammatory mediators from the infected area to the blood, which results in systemic inflammation.

[1].

There is a lot of evidence connecting cardiovascular health and periodontal disease. Despite the current lack of evidence demonstrating the benefit of periodontal therapy on cardiovascular outcomes, there is broad agreement that cardiovascular patients should be informed about the significance of their oral health and referred for dental risk assessment. This is an important distinction between correlation and clinically relevant cause-and-effect that any responsible evaluation of functional dentistry must maintain.

[6].

Neuropsychiatric connections have also become apparent. The presence of periodontal disease leads to increased levels of pro-inflammatory cytokines like CRP, IL-6, and TNF-alpha, which have the ability to pass through the blood-brain barrier and cause neuroinflammation and disturbance of neurotransmitters, including serotonin, associated with depression [3].

Metabolic diseases are characterised by equally high and well-understood associations: some periodontal bacteria, especially *Porphyromonas gingivalis*, synthesise enzymes which cleave the incretin hormone GLP-1, thus disturbing glucose homeostasis, while the inflammation caused by periodontitis may itself disrupt the pathway of GLP-1 and exacerbate glucotoxicity and lipotoxicity in patients suffering from diabetes and obesity [6].

2. Oral Microbiome and Dysbiosis

There is a significant body of evidence concerning the oral microbiome. The oral microbiome refers to the community of microorganisms that live in the oral cavity, including bacteria, fungi, archaea, and viruses. The oral microbiome is affected by factors such as diet, smoking, alcohol consumption, lifestyle, and diseases. The disruption of the microbiome balance, known as dysbiosis, can cause such diseases as dental caries, gingivitis, periodontitis, oral candidiasis, and halitosis, as well as other systemic diseases that include gastrointestinal, cardiovascular, endocrine, neurological, and autoimmune diseases. The connection between the mouth and faraway locations via the oral-gut axis and microbial translocation is another characteristic feature of the oral microbiome [7].

In the case of caries, the dysbiosis mechanism is well understood: it is a bacterial, sugar-induced, oral hygiene-influenced disease in which the regular intake of carbohydrates makes the oral biofilm more acidic and causes the dysbiosis of the microbiota, making the environment more suitable for the development of acid-tolerant cariogenic microorganisms such as *Streptococcus mutans* and *Lactobacillus* [7]. It is the evidence base that backs the approach of functional dentistry in favouring such approaches to caries treatment as diet advice and preservation of the microbiome instead of blind antimicrobial therapy. Functional dentistry emphasises addressing the underlying causes of dysbiosis, such as dietary habits, salivary function, oral hygiene practices, and lifestyle, rather than relying solely on restorative procedures

or indiscriminate antimicrobial therapy. The goal is to restore a healthy microbial ecology while preserving the beneficial members of the oral microbiome [1, 6].

3. Diet and Nutrition

The relationship between nutrition and oral health is bidirectional: diet influences the integrity of oral tissues, while oral disease may impair mastication and affect nutritional intake. Functional dentistry focuses on the reduction of sugar consumption. Adequate intake of essential micronutrients is important for periodontal health, and a balanced diet containing adequate protein, vitamins, and micronutrient-rich foods supports tissue repair and immune function [8].

Thus, nutritional management in functional dentistry must involve dietary assessment, reduction of cariogenic foods, increasing nutritional intake and referral to a registered dietitian when required. Nutritional intervention should be individualised to the patient according to their health status, age, diet pattern, and nutritional requirement. Recommending routine supplements without any deficiency is not advised [9].

4. Minimally Invasive Cariology and Remineralisation

This concept correlates with current caries research that is based on the microbiome approach, which stresses the innate ability of the teeth to remineralise and prefers diet and preventive management rather than operative intervention at an early stage [10]. This corresponds to the modern trend in the field of cariology to regard caries as the dynamic process of demineralisation-remineralisation rather than irreversible damage.

5. Airway-Centric Dentistry and Myofunctional Therapy

A special aspect of functional dentistry that has been receiving increasing attention is airway anatomy, breathing patterns, and sleep. An airway-based approach to orthodontics and dentistry marks a move from the tooth-based concept to the broader concept of health and wellness, partially due to the findings that sleep-disordered breathing and obstructive sleep apnea are invariably related to cardiovascular and metabolic conditions, with periodic hypoxemia making a patient more prone to cardiovascular disease, insulin resistance, neurologic impairment, and even cancer in some cases [11].

Orofacial myofunctional therapy, which is a type of exercise training of the muscles of the tongue, lips, and face to help breathe through the nose and keep the airways open, is one of the main procedures used in this area. Myofunctional therapy has a beneficial effect on sleep apnea, but there are no data on the use of the therapy in upper airway resistance syndrome and the longevity of its effects [11]. The main drawback here is adherence; the patient compliance rate with myofunctional exercises that take 20-40 minutes every day for a minimum of three months can be as low as 10 per cent in certain studies, revealing a difference between efficiency and effectiveness of treatment [11]. When it comes to children, myofunctional therapy is used to train proper eating, chewing, swallowing and speaking habits and proper rest position of the mouth such as lips sealing, tongue being positioned on the palate and nasal breathing, in an ideal case in cooperation with a multidisciplinary team including paediatrics, otolaryngology, paediatric

dentistry/orthodontics, myofunctional therapy and sleep medicine ^[11, 12].

6. Biocompatible Materials and Individualised Care

Biocompatible, tooth-colored materials are commonly used in functional dentistry. It also includes a personalised analysis of a patient's risk before proceeding with any procedure, as opposed to the blanket application of a single material or method to everyone ^[2]. The idea behind this is to evaluate a person's individual risk factors for each treatment to make the best decision ^[13]. It is essential to note that this makes a huge difference when doing evidence-based evaluation since the latter is not well-supported by existing evidence.

7. Salivary Diagnostics

The latest technical development in the realm of functional dentistry is the use of salivary diagnostics, which aligns with the preventive approach of the discipline. Saliva has recently been discovered as an easy-to-obtain biofluid for diagnostic purposes in medicine and dentistry, as it contains biomarkers in the form of proteins, enzymes, nucleic acids, and metabolites, which indicate the state of health of patients' bodies and oral cavity ^[14]. The presence of salivary cytokines, enzymatic markers, microbial DNA, and new biomarkers such as exosomes and microRNAs Provides a dynamic environment for the early detection of disease, risk stratification, and treatment of periodontitis, as well as promising opportunities in the diagnosis and treatment of systemic diseases such as diabetes and cardiovascular disorders, since salivary glucose levels correlate well with blood glucose ^[14].

8. Prevention-Oriented, Patient-Centered Care

In all fields, prevention and early diagnosis are always emphasised in functional dentistry. In contrast to reacting to caries, gingivitis, periodontal disease, and bone loss with treatment procedures such as drilling, medication, or surgical procedures, the approach digs much deeper into why the issue occurred ^[4]. It seeks to prevent problems, identify them early, and maintain optimal health rather than simply solving crises ^[5]. The same is true of paediatric craniofacial monitoring, acknowledging the importance of early structural and functional development ^[12].

9. Ozone Therapy

Ozone therapy is an adjunctive approach used in functional dentistry because of its antimicrobial, oxidative, and potential tissue- healing properties ^[15]. Ozone causes oxidative damage to microbial cell membranes and cellular components, and reduces microbial load in the oral cavity. It is used to treat caries, periodontal diseases, and endodontic treatment, as a minimally invasive approach and as an adjunct therapy for conventional treatment ^[15]. Ozone is also proposed to help wound healing by local oxidative and inflammatory responses ^[15]. However, due to limited evidence, ozone therapy is used as a complementary treatment rather than a replacement for conventional treatment.

Conclusion

Functional dentistry reframes the mouth as a complex component of whole-body physiology and not an isolated anatomical structure. The major areas of functional dentistry, including periodontal/systemic inflammation, oral

microbial management, conservative/remineralization approach to caries, myofunctional evaluation with focus on the airway, biocompatibility and personalised choice of materials, and preventive approach to patient care, are becoming more science-based despite some claims made by holistic dentistry in general not being fully supported by science. With further development of research on the mouth-body connection, functional dentistry has great potential for transformation from the marginal position of integrative practice into a more evidence-based approach within mainstream preventive dentistry if its claims keep pace with evidence.

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