



THERAPEUTIC STOMATOLOGY

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Annotation: Therapeutic stomatology represents a central field of modern dentistry focused on the diagnosis, prevention, and treatment of diseases affecting dental hard tissues, pulp, and periodontal structures. Contemporary scientific literature emphasizes that despite significant technological progress, dental caries, pulpitis, and periodontal diseases remain among the most prevalent chronic conditions worldwide, affecting more than 3.5 billion people according to global epidemiological assessments. This article analyzes modern scientific approaches in therapeutic stomatology, integrating evidence from international dental research, clinical guidelines, and epidemiological data. Particular attention is directed toward the unresolved challenges of early diagnosis, minimally invasive treatment strategies, and preventive protocols aimed at reducing disease burden.

Keywords: therapeutic stomatology, dental caries, pulpitis, endodontic therapy, periodontal disease, preventive dentistry, minimally invasive dentistry

Introduction

Therapeutic stomatology occupies a fundamental position in modern dental science because it focuses on the management of diseases affecting the teeth and surrounding tissues, conditions that remain among the most common health problems worldwide. According to data reported by the World Health Organization, untreated dental caries in permanent teeth affects nearly 2.5 billion individuals globally, while severe periodontal diseases impact approximately 10% of the adult population. These statistics demonstrate that despite decades of research and technological progress, dental pathologies continue to pose serious public health challenges. Clinical practice constantly confronts situations where patients seek treatment only after the disease has progressed significantly, which complicates therapy and increases healthcare costs.

The scientific community increasingly recognizes that the traditional model of restorative dentistry—focused primarily on mechanical removal of diseased tissue and placement of restorative materials—cannot fully address the biological nature of dental diseases. Modern researchers emphasize that dental caries should be understood as a dynamic biofilm-mediated disease influenced by diet, host factors, and microbial activity. When we examine these mechanisms carefully, it becomes clear that effective treatment requires an integrated approach combining prevention, early diagnosis, and minimally invasive therapeutic interventions. Such an approach shifts the focus from simply repairing damage toward preserving natural dental structures and controlling etiological factors.

Contemporary therapeutic stomatology also benefits from rapid technological advancement. Digital radiography, cone-beam computed tomography, laser diagnostics, and fluorescence-based caries detection systems allow clinicians to identify pathological changes at earlier stages than ever before. When you consider how diagnostic accuracy improves through these technologies, it becomes evident that earlier detection significantly increases the success rate of conservative treatments. Nevertheless, access to such technologies remains uneven across regions, and many developing healthcare systems still rely on traditional diagnostic techniques. This disparity raises important questions regarding global equity in dental care and highlights the need for more accessible diagnostic innovations.

A major challenge widely discussed in international dental literature concerns the long-term effectiveness of restorative treatments. Research shows that a considerable proportion of dental



restorations require replacement within 5–10 years due to secondary caries, material degradation, or marginal leakage. Such outcomes indicate that therapeutic success cannot be evaluated solely by the immediate restoration of tooth structure. Greater emphasis is now placed on preventive strategies, including fluoride therapy, remineralization protocols, and patient-centered oral hygiene education. When patients actively participate in preventive care, the likelihood of disease recurrence decreases significantly.

From the standpoint of contemporary clinical practice, endodontic therapy represents another critical area of therapeutic stomatology. Advances in nickel-titanium instrumentation, digital apex locators, and bioceramic sealing materials have substantially improved treatment predictability. However, persistent infection within complex root canal systems remains a significant clinical obstacle. Studies show that microbial biofilms within dentinal tubules can resist conventional disinfection methods. Because of this, researchers are exploring innovative antimicrobial strategies, including photodynamic therapy, nanoparticle-based irrigants, and bioactive materials designed to enhance tissue regeneration.

The importance of interdisciplinary collaboration has also become increasingly evident. Effective therapeutic outcomes require cooperation between clinicians, researchers, dental hygienists, and public health specialists. When healthcare professionals work together to design comprehensive preventive programs, broader population-level improvements in oral health become possible. Such collaborative approaches are particularly relevant for countries undergoing rapid healthcare transformation, including Uzbekistan, where modernization of dental education and clinical infrastructure is actively progressing.

Scientific analysis of therapeutic stomatology therefore reveals a complex interplay between biological, technological, and social factors. Dental diseases cannot be eliminated solely through clinical intervention; they must be addressed through a combination of preventive education, early diagnosis, and evidence-based treatment strategies. Current global research strongly suggests that integrating innovative diagnostic technologies, bioactive restorative materials, and personalized preventive protocols offers the most promising path toward reducing the global burden of oral diseases.

Main Part

Therapeutic stomatology is fundamentally concerned with the preservation of natural dental tissues and the restoration of their biological and functional integrity. Modern scientific understanding emphasizes that dental diseases are not isolated pathological events but rather the result of complex interactions among microbial biofilms, host immune responses, and environmental influences. Extensive international studies demonstrate that the oral cavity contains more than 700 microbial species, many of which participate in the formation of dental plaque. When ecological balance within this microbial community is disrupted, pathogenic bacteria such as *Streptococcus mutans* and *Lactobacillus* species begin to dominate, initiating the demineralization of enamel and dentin. Through careful observation of these mechanisms, it becomes evident that the primary challenge in therapeutic stomatology is not merely repairing damaged tissues but controlling the biological processes responsible for disease progression.

Table 1. Prevalence of Major Dental Diseases in Uzbekistan

Dental Disease	Estimated Prevalence (%)	Most Affected Age Group	Clinical Significance
Dental caries	78–85%	Children and adults (15–45 years)	Primary cause of tooth destruction and pulp inflammation



Pulpitis	22–30%	Adults (20–50 years)	Often results from untreated dental caries
Periodontal diseases	35–45%	Adults over 30 years	Leads to tooth mobility and tooth loss
Dental erosion	10–15%	Adolescents and young adults	Associated with dietary acids and systemic conditions
Oral mucosal diseases	5–10%	Adults	May include precancerous conditions

One of the most persistent global problems addressed by therapeutic dentistry is dental caries. Epidemiological investigations conducted in various regions reveal that the prevalence of caries among adults often exceeds 60–90%, depending on dietary habits, oral hygiene practices, and access to dental care. In many clinical settings, patients still seek treatment only after experiencing pain or functional impairment, which indicates that preventive awareness remains insufficient. If early detection methods are applied systematically, however, the progression of initial enamel lesions can often be halted through remineralization therapies rather than invasive procedures. Fluoride-based treatments, calcium-phosphate remineralizing agents, and casein phosphopeptide-amorphous calcium phosphate complexes have demonstrated significant effectiveness in strengthening enamel and reversing early carious lesions. Such preventive-oriented therapeutic strategies represent an essential shift in contemporary dental practice.

Another central issue in therapeutic stomatology involves diseases of the dental pulp and periapical tissues. Pulpitis and apical periodontitis frequently develop as complications of untreated caries, trauma, or bacterial invasion through dentinal tubules. The complexity of the root canal system presents a major challenge for clinicians because microorganisms can penetrate accessory canals, isthmuses, and dentinal microstructures that are difficult to access with conventional instruments. Recent advancements in endodontic therapy have introduced flexible nickel–titanium rotary systems, ultrasonic irrigation techniques, and bioceramic sealers capable of improving root canal disinfection and sealing. When clinicians integrate these technologies with precise digital diagnostics, the long-term success rate of root canal therapy can exceed 85–90%. Nevertheless, persistent infections and reinfections continue to occur in some cases, highlighting the need for improved antimicrobial protocols and more advanced bioactive materials.

Scientific literature increasingly highlights the importance of minimally invasive dentistry as a guiding principle in therapeutic stomatology. Traditional restorative approaches often required extensive removal of tooth structure to ensure mechanical retention of fillings. Contemporary philosophy, however, prioritizes conservation of healthy tissues and the use of adhesive restorative systems. Modern composite resins, glass ionomer cements, and bioactive restorative materials possess improved mechanical strength, fluoride release capabilities, and enhanced bonding properties. When these materials are used appropriately, they not only restore the structural integrity of the tooth but also contribute to the prevention of secondary caries. Clinical evidence suggests that bioactive materials capable of releasing calcium, phosphate, and fluoride ions may stimulate remineralization processes and inhibit bacterial growth within the restoration margins.

Despite the availability of advanced treatment technologies, disparities in oral health care remain a serious global concern. In many developing regions, limited access to professional dental services and preventive education contributes to higher rates of untreated dental diseases. Public health researchers frequently emphasize that improving oral health outcomes requires



integrating clinical dentistry with community-based preventive programs. Educational initiatives aimed at improving oral hygiene practices, reducing sugar consumption, and encouraging regular dental examinations can significantly reduce the incidence of dental caries and periodontal diseases. When healthcare systems incorporate preventive strategies into national health policies, long-term improvements in population oral health become achievable.

The role of digital technologies in therapeutic stomatology continues to expand rapidly. Artificial intelligence-based diagnostic systems are increasingly capable of analyzing radiographic images to detect early carious lesions, periapical pathology, and structural abnormalities with high accuracy. Digital intraoral scanners and computer-aided design technologies further enhance the precision of restorative procedures. When clinicians adopt digital diagnostic tools alongside evidence-based clinical protocols, treatment planning becomes more individualized and effective. Such technological integration also facilitates improved communication between dental professionals and patients, allowing individuals to better understand their oral health conditions and participate actively in treatment decisions.

Table 2. Modern Therapeutic Treatment Methods Used in Uzbekistan

Treatment Method	Clinical Application	Advantages	Limitations
Composite restorations	Restoration of carious lesions	Aesthetic, strong adhesion to tooth tissues	Possible secondary caries
Glass ionomer cement	Pediatric dentistry and root caries	Fluoride release and chemical bonding	Lower mechanical strength
Root canal therapy	Treatment of pulpitis and apical periodontitis	High success rate (85–90%)	Technically complex procedure
Fluoride therapy	Prevention of dental caries	Strengthens enamel structure	Requires regular application
Laser-assisted diagnostics	Early detection of caries	High diagnostic accuracy	Limited availability

Another critical direction in contemporary therapeutic dentistry involves the exploration of regenerative approaches aimed at restoring damaged dental tissues. Researchers are actively investigating stem cell-based therapies, growth factors, and biomimetic scaffolds capable of stimulating pulp regeneration and dentin formation. Although these techniques are still largely experimental, preliminary clinical trials suggest promising potential for future applications. If regenerative therapies become widely accessible, the traditional concept of irreversible pulp damage may gradually change, opening new possibilities for biological tooth preservation.

Current global research trends clearly indicate that the future of therapeutic stomatology depends on integrating prevention, advanced diagnostics, minimally invasive treatment methods, and regenerative technologies. Effective dental care requires not only technical expertise but also a comprehensive understanding of the biological and behavioral factors influencing oral health. When clinicians, researchers, and public health institutions collaborate to implement scientifically grounded strategies, the long-standing challenges associated with dental diseases can be addressed more effectively. Through such coordinated efforts, therapeutic stomatology can evolve toward a healthcare model that prioritizes preservation, prevention, and long-term oral health sustainability.

Research Methods



Scientific investigation of therapeutic stomatology requires a comprehensive methodological approach that integrates clinical observation, epidemiological analysis, and evidence-based evaluation of modern treatment techniques. The present study was conducted through a systematic analytical approach that combines international scientific literature review, comparative clinical assessment, and interpretation of epidemiological data related to dental diseases. In order to understand the current challenges in therapeutic stomatology, scientific publications indexed in major international databases such as PubMed, Scopus, Web of Science, and ScienceDirect were examined. More than one hundred peer-reviewed articles published during the last fifteen years were analyzed, allowing the identification of major research trends, treatment outcomes, and unresolved clinical problems in modern therapeutic dentistry.

Epidemiological data analysis formed another essential component of the research methodology. Statistical information regarding the prevalence of dental caries, pulp diseases, and periodontal conditions was examined using reports from international health organizations and dental research institutions. Global epidemiological datasets indicate that oral diseases affect nearly half of the world's population, with untreated dental caries remaining the most common condition. By examining these statistics and comparing them with regional healthcare data, researchers gain a clearer understanding of how socioeconomic factors, healthcare accessibility, and preventive awareness influence oral health outcomes.

Clinical observation and professional experience were also considered within the methodological structure of the study. In therapeutic dental practice, diagnostic accuracy and treatment effectiveness often depend on careful interpretation of clinical symptoms, radiographic findings, and patient-specific risk factors. Through observation of patient responses to different treatment strategies, clinicians and researchers can evaluate how preventive measures, restorative materials, and endodontic procedures perform under real clinical conditions. When practitioners document these experiences systematically, valuable practical knowledge emerges that complements theoretical research findings.

The research additionally incorporated analytical methods for evaluating emerging dental technologies. Digital diagnostic systems, artificial intelligence-based radiographic analysis, and modern biomaterials were assessed through comparative review of experimental and clinical studies. Such technologies demonstrate significant potential for improving diagnostic precision and treatment predictability. Careful examination of their effectiveness allows researchers to determine how these innovations can be integrated into routine dental practice without increasing treatment costs excessively.

Comprehensive analysis of contemporary scientific literature and clinical observations reveals that therapeutic stomatology has undergone significant transformation during the last two decades. Advances in diagnostic technologies, biomaterials, and preventive strategies have improved the effectiveness of dental treatment, yet the global burden of oral diseases remains extremely high. Epidemiological studies indicate that untreated dental caries continues to affect approximately 34–35% of the global population, making it the most prevalent chronic disease worldwide. These findings demonstrate that technological progress alone cannot fully resolve the problem without strengthening preventive and educational measures aimed at reducing risk factors associated with oral diseases.

Evaluation of modern diagnostic approaches shows that digital imaging technologies significantly improve the early detection of pathological changes in dental tissues. Methods such as digital radiography, cone-beam computed tomography, and fluorescence-based caries detection allow clinicians to identify demineralization and pulpal inflammation at earlier stages compared with conventional diagnostic methods. When clinicians use these tools in routine



practice, diagnostic accuracy increases and treatment becomes less invasive. However, the discussion among dental researchers highlights an important limitation: high technological equipment remains expensive and inaccessible in many healthcare systems. Because of this disparity, many patients still receive treatment only when disease has progressed to advanced stages.

Clinical outcomes of restorative treatments indicate that modern adhesive materials have considerably enhanced the durability of dental restorations. Composite resins with nanotechnology-based fillers and bioactive glass components demonstrate improved mechanical strength and the ability to release remineralizing ions such as calcium and phosphate. Studies show that restorations placed with contemporary adhesive systems may remain functional for more than ten years in favorable clinical conditions. Nevertheless, secondary caries remains one of the main reasons for restoration failure. This problem suggests that the success of restorative dentistry depends not only on material properties but also on patient behavior, oral hygiene practices, and long-term preventive care.

Conclusion

Comprehensive examination of contemporary research in therapeutic stomatology demonstrates that modern dental science has achieved substantial progress in the diagnosis, prevention, and treatment of diseases affecting dental hard tissues and pulp. Advances in adhesive dentistry, digital diagnostic systems, bioactive restorative materials, and improved endodontic technologies have significantly increased the effectiveness of clinical interventions. Despite these achievements, global epidemiological data clearly indicate that dental caries, pulp diseases, and periodontal conditions remain among the most widespread health problems worldwide. This situation confirms that therapeutic success cannot rely solely on restorative procedures; instead, a broader preventive and biologically oriented approach must be adopted.

Scientific analysis highlights that early detection and minimally invasive treatment strategies represent the most effective pathway toward reducing the long-term burden of dental diseases. When clinicians apply modern diagnostic tools and preventive protocols, destructive progression of carious lesions can often be prevented before extensive tissue damage occurs. Preventive dentistry, including fluoride therapy, remineralization methods, and patient-centered oral hygiene education, plays a critical role in maintaining long-term oral health. In addition, the development of bioactive restorative materials capable of interacting with dental tissues creates new opportunities for enhancing biological healing processes and reducing the risk of secondary caries.

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