

Keywords

Periodontal diseases; periodontal care; dental services; healthcare organization; prevention; Chui region; Kyrgyz Republic

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Modern Clinical And Organizational Problems Of Providing Dental Care To Patients With Periodontal Diseases: Literature Review And Analysis Of Data In The Chui Region Of The Kyrgyz Republic

Abstract

Background: Periodontal diseases are among the most prevalent oral health conditions globally, especially in the low and middle income countries (LMICs) and represent a major public health challenge due to their impact on oral function, quality of life, and overall health. Despite advances in periodontal care, disparities in access to specialized dental services remain a significant concern in the Kyrgyz Republic.

Objective: This study aimed to examine the clinical and organizational challenges associated with providing dental care for patients with periodontal diseases through a review of the literature and an analysis of dental service data from the Chui region of the Kyrgyz Republic.

Methods: A narrative review of national and international literature was conducted using scientific publications, World Health Organization reports, and public health resources. Additionally, statistical and analytical data describing the organization of dental services, prevalence of periodontal diseases, workforce capacity, accessibility of care, and preventive activities in the Chui region were reviewed using comparative and analytical approaches.

Results: The analysis demonstrated a high prevalence of periodontal diseases, particularly among older adults and rural populations. Major barriers to effective periodontal care included shortages of specialized personnel, uneven distribution of dental services, limited preventive programs, and inadequate access to modern diagnostic and treatment technologies. Poor oral hygiene, smoking, diabetes mellitus, and other systemic conditions were identified as the principal risk factors contributing to disease progression.

Conclusion: Strengthening preventive strategies, expanding access to specialized periodontal services, improving workforce capacity, and integrating modern diagnostic technologies are essential to improving periodontal care and reducing the burden of periodontal diseases in the Kyrgyz Republic.

Introduction

Periodontal diseases are included among the most common chronic oral diseases in the world and pose a significant public health problem due to their high prevalence in the population, their gradual progression and their important relationship with oral and systemic health [1]. These conditions are marked by inflammation and destruction of the supporting tissues of the teeth and are a major cause of tooth loss in adults, affecting also the ability to chew food, to speak and the aesthetics of a smile, as well as a significant factor that reduces the quality of life [2]. The World Health Organization (WHO) estimates that hundreds of millions of people worldwide are suffering from severe periodontal diseases and that these undeniably add to the burden of oral diseases [3]. Periodontal diseases result from the complex interactions of pathogenic bacteria in the oral cavity, host immune response, genetic susceptibility, environmental factors, and behavior. Diseases have been linked to poor oral hygiene, smoking, unhealthy diet, psychosocial stress, and systemic diseases like diabetes mellitus and cardiovascular diseases [4]. There is also growing evidence of the bi-directional link between periodontal inflammation and several chronic non-communicable diseases (cNCDs), highlighting the role of periodontal health in the context of integrated health care [5] [6]. Thus, current periodontal management is not just about treating the disease, but also about preventive management, early diagnosis, patient education and collaboration among various disciplines. Therefore, the improvement of periodontal health has become an important goal for health systems to achieve with a view to minimizing disease burden, enhancing quality of life and ensuring healthy aging, by providing effective oral health services.

Although there has been great progress in the diagnosis and treatment of periodontal diseases, there are still many gaps in access, organization and provision of periodontal care, especially in low and middle-income countries [7]. The challenges impact not only the disease burden, but also factors related to the health system, such as the lack of trained dental providers, unequal distribution of healthcare resources, poor preventive programs and delayed access to dental services [8]. Periodontal diseases are very common among the population of the Kyrgyz Republic regardless of the demographic group, and there are significant differences in access to specialist dental care between rural and urban populations [9]. The timeliness of patient presentation, lack of oral health awareness, lack of attention towards prevention and uneven distribution of the workforce remain a problem to the treatment outcomes and heighten burden of disease in the long run [10]. The setting of the Chui region is particularly relevant to consider these issues as it is both urban and rural with significant differences in health service availability, access to dental specialists, and access to modern diagnostic and therapeutic technologies. While there are many studies on the clinical care of periodontal diseases conducted internationally, there has been less research on the organizational and health-care delivery aspects that affect periodontal care in the Kyrgyz health care system. Solve these problems is key to enhancing dental services and formulating policies that

quantify and evidence access to high quality periodontal services throughout the population.

In the previously published study, the focus has mainly been on clinical manifestations, microbiological mechanisms, therapeutic approaches and prevention strategies, while the relationship of these perspectives with analyses of the organisation of healthcare and service delivery has been comparatively less studied. There is limited evidence of the linkage of disease burden, workforce capacity, access to specialized care and organizational barriers in the context of the Kyrgyz Republic, specifically the Chui region. This study aims to fill this gap in the knowledge by compiling the national and international literature and available data on the structure of dental services in the Chui region to get a full picture of the clinical and organizational aspects of periodontal care. The health systems perspective that is taken in this review differs from traditional narrative reviews, which primarily target the characteristics of the disease, by also including the effects of the distribution of the workforce, preventive programs, infrastructure and accessibility on periodontal disease management. The study uses a clinical approach along with organizational factors to provide context-based findings that will inform policy makers, health care planners, and health care providers in the Kyrgyz Republic seeking to enhance oral health care. The results will help design better periodontal preventive measures, better organize periodontal services, and enhance the accessibility, quality, and efficiency of dental services for patients with periodontal diseases. Therefore, the purpose of this study is to study the current clinical and organizational problems of providing dental care to patients with periodontal diseases, based on the analysis of the existing literature and data on dental services in the Chui region of the Kyrgyz Republic.

2. Materials and Methods

2.1 Study Design

The purpose of this study was a narrative literature review in conjunction with a descriptive analysis of the available data on a regional level regarding the clinical and organizational problems of dental care for patients with periodontal diseases within the Chui region of the Kyrgyz Republic. The review compiled evidence on epidemiology, risk factors, diagnosis, treatment, prevention, and health care organization of periodontal diseases, and put these in perspective with the dental care system in the region.

2.2 Data Sources and Literature Search

A thorough literature review was performed to gather pertinent articles from the national, and international literature, regarding periodontal diseases and the structure of dental health care services. In addition to publications from the Ministry of Health of the Kyrgyz Republic, the World Health Organization (WHO) and official public health agencies, electronic databases (PubMed/MEDLINE, Scopus, Web of Science and Google Scholar) were systematically searched. Information was gathered from other medical journals within the region, government reports, and professional dental journals, to provide context specific information relevant to the Kyrgyz Republic and neighbouring

countries. The following keywords and Medical Subject Headings (MeSH) were combined and used in the literature search where they applied: "periodontal diseases," "periodontitis," "periodontal care," "oral health," "dental care," "dental services," "periodontology," "oral healthcare organization," "healthcare accessibility," "preventive dentistry," "oral disease prevention," "dental workforce," "public health dentistry," and "Chui region" or "Kyrgyz Republic". The search terms were combined using boolean operators (AND, OR) for better retrieval of relevant publications. To identify more potentially eligible studies, selected articles were supplemented by a hand search of reference lists.

Peer-reviewed articles, systematic reviews, clinical guidelines, epidemiological studies, and official reports in English and Russian were included, with priority accorded to those reporting on the epidemiology, diagnosis, treatment, and prevention of periodontal disease; the organization of health care services and resources; the capacity of health care workforce; and access to periodontal care. To offer a full background and contextual evidence, where relevant, seminal publications and internationally recognized clinical guidelines were included.

2.3 Regional Data Collection

To complement the literature review, publicly available statistical and analytical data describing the organization of dental services in the were examined. These data encompassed measures of prevalence of dental disease, availability and distribution of dental personnel, access to specialized periodontal services, preventive activities, and characteristics of the organization of dental care with regard to the region. The purpose of these regional data was to give contextual evidence of the current situation of periodontal healthcare delivery and to recognize challenges in the organization of the regional healthcare system.

2.4 Data Analysis

The collected evidence was analyzed using bibliographic, comparative, analytical, and systematic synthesis methods. Information from national and international sources was critically compared to identify consistent findings regarding disease burden, major risk factors, preventive strategies, and models of periodontal care. Regional data from the Chui region were subsequently integrated with the literature findings to assess similarities, contextual differences, and healthcare system challenges. The research evidence was presented in major thematic areas: disease epidemiology, risk factors, access to dental services, capacity of the dental workforce,

preventive programs, and organisational issues in periodontal care. This thematic approach allowed for the identification of main clinical and organizational challenges the provision of periodontal care faces and the recommendations on the improvement of dental service delivery in the Kyrgyz Republic.

2.5 Ethical Consideration

This study was conducted in accordance with the ethical principles of the Declaration of Helsinki and its subsequent amendments [11]. Due to the retrospective nature of the study and the use of anonymized patient data, the IRB Ethics Committee of Osh State University waived the requirement for obtaining informed consent. Patient confidentiality and data privacy were maintained throughout the study

3. Results and discussions

The literature search and analysis of the health care situation in the region revealed a number of clinical and organisation problems affecting the prevention and treatment of periodontal diseases in the Kyrgyz Republic. The evidence shows that periodontal diseases have significant disease burden and that disease pathogenesis is highly complex and takes place in the context of various predisposing factors; also that the effectiveness and availability of periodontal services are affected by factors within the healthcare system. Moreover, issues encompassing distribution of the workforce, preventive programs, and healthcare infrastructure are identified and highlighted, together with opportunities for enhancing periodontal care. Findings are presented in thematic sections for easy discussion of the evidence and what it means for clinical practice and health policy.

3.1 Epidemiology and Burden of Periodontal Diseases

The analysis of domestic and foreign literature indicates that periodontal diseases remain one of the most common forms of dental pathology, occupying a significant place in the structure of chronic inflammatory diseases of the oral cavity [12]. According to current epidemiological studies, chronic periodontitis of varying severity is detected in a significant part of the adult population, while the prevalence of the disease varies from 60% to 95%, depending on the age group and level of dental care [13] [14].

Numerous studies emphasize that microbial plaque is a key factor in the development of periodontal diseases, but the clinical manifestation of the disease depends on the interaction of local and systemic factors [15] [16]. Disorders of the immune response, changes in the composition of the oral microbiota, and the presence of a chronic inflammatory process play a significant role in pathogenesis [17]

Table 1: Prevalence of periodontal diseases among the population of different age groups. (Data from recent literature)

Age group	Periodontal disease prevalence (%)
18-24 years	62.4
25-34 years	71.8
35-44 years	84.6
45-54 years	91.2
55 years and older	94.1

As can be seen from the table, there is a pronounced tendency to increase the prevalence of periodontal diseases with age, which confirms the chronic and progressive nature of the pathology.

3.2 Risk Factors and Systemic Associations of Periodontal Diseases

According to the World Workshop on Periodontal Diseases, periodontitis is considered as a multi-factorial disease based on the interaction of microbial,

immunological and behavioral factors [18]. At the same time, the role of systemic inflammation in the development of both local and general somatic complications has been proven [19]. Of particular importance in the development of periodontal diseases are systemic diseases. A close two-way relationship has been established between periodontitis and diabetes mellitus, cardiovascular diseases, and metabolic syndrome [20]. Periodontitis is considered as a potential factor that increases systemic inflammation of the body.

Table 2: Main risk factors for periodontal diseases

Risk factor	Mechanism of influence
Oral hygiene	Biofilm formation
Smoking	Vasoconstriction and tissue hypoxia
Diabetes Mellitus	Microcirculation disorders
Stress	Immunosuppression
Nutrition	Micronutrient deficiency

According to the Global Burden of Disease, oral diseases, including periodontitis, are among the most common noncommunicable diseases in the world and have a significant impact on the economic and social well-being of the population [21].

3.3 Organizational Challenges in Periodontal Care in the Kyrgyz Republic

The prevalence of dental diseases remains high in the Kyrgyz Republic. According to national studies,

periodontal diseases are detected in the majority of the adult population, and the incidence rate is higher in rural regions than in urban ones. This is due to the limited availability of dental care and an insufficient level of prevention [22]. Of particular importance is the Chui region, which is characterized by a high population density and a pronounced difference between urban and rural areas. Analysis of literature data shows that dental care is unevenly distributed, and specialized periodontal care is available mainly in large medical centers.

Table 3: Clinical and organizational problems of dental care in the Chui region

Problem	Characteristics
Late treatment	Treatment rate at stage III-IV
Staff shortage	Lack of periodontologists
Uneven	City / village imbalance
Weak prevention	Lack of system programs
Limited equipment	Lack of technologies

The analysis shows that one of the most significant organizational problems remains the personnel shortage of periodontists. Insufficient provision of medical institutions with narrow-profile specialists is especially pronounced in rural areas of the Chui region. This leads to a decrease in the availability of specialized care and an increase in the number of patients with complicated forms of periodontal diseases [23] [24].

Along with personnel difficulties, there are still problems of material and technical support of dental institutions. Despite the active development of modern dentistry and the introduction of new methods of diagnosis and treatment, the provision of state-owned dental organizations with modern equipment remains insufficient [25]. Limited use of digital technologies, modern methods of professional hygiene and minimally

invasive treatment reduces the effectiveness of dental care for the population [26].

3.4 Preventive Strategies

In modern dentistry, special attention is paid to the prevention of periodontal diseases. The most effective areas of preventive work are sanitary and educational activities, the formation of individual oral hygiene skills, regular preventive examinations and dispensary observation of patients [27]. However, the analysis of literature data shows that the preventive activity of the population of the Kyrgyz Republic remains insufficient. According to studies, the effectiveness of treatment of periodontal diseases directly depends on early diagnosis and regular monitoring of patients [28]. However, in conditions of limited access to dental care, a significant part of patients apply already at the stages of severe destruction of periodontal tissues.

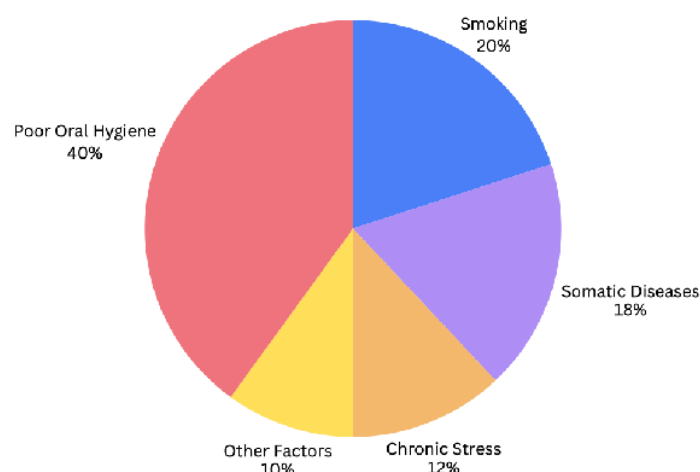


Figure 1: Distribution of the major risk factors associated with periodontal disease. Percentages represent the proportion attributed to each risk factor in the study population

Current clinical guidelines emphasize the need for a comprehensive approach to the treatment of periodontal diseases, including occupational hygiene, anti-inflammatory therapy, surgical methods, and long-term follow-up. Special attention is paid to preventive programs aimed at reducing the prevalence of periodontal diseases. According to studies, regular routine checkups can reduce the risk of periodontitis progression by up to 30-40%. At the same time, countries with limited resources, including the Kyrgyz Republic, are experiencing difficulties in implementing systemic preventive dentistry. This is due to a lack of personnel, weak motivation of the population, and limited funding for healthcare [29].

According to study by F Soheili et al. (2024), improving the organization of dental care, implementing prevention programs, and developing primary health care are key areas for reducing the prevalence of periodontal diseases. Additionally, the role of digital technologies in dentistry is noted, including the use of digital diagnostics and telemedicine solutions, which make it possible to increase the availability of specialized care in remote regions [30]. In the conditions of the Chui region, the development of such technologies can have a significant potential for improving the efficiency of dental services. Another study by TH Kwon et al. (2021) shows that periodontal diseases remain a significant clinical and organizational problem in LMICs and the main negative factors in such nations includes rural regions are the high prevalence of the disease, insufficient prevention, limited availability of specialized care, and a shortage of personnel in the dental service system [31].

4.Future Directions and Recommendations

The results of this review underscore the need for collaborative clinical, organizational and public health efforts to tackle the escalating burden of periodontal diseases in the Kyrgyz Republic. Although the diagnosis and treatment of periodontal disease has advanced and the prognosis for patients has improved over the years around the world, there remain critical issues in the Chui region that affect the delivery of effective services: workforce,

access to specialist services, lack of preventive programmes, and limited health care infrastructure. The development of a more efficient organization of oral health services, based on evidence, in combination with long-term sustainable preventive measures, is crucial for enhancing oral health outcomes and decreasing long-term burden of periodontal diseases. Some recommendations for the future development of periodontal care in the Kyrgyz Republic:

4.1Improve the effectiveness of preventive oral health programs: Design and execute community-level oral health promotion strategies that emphasize oral hygiene education, tobacco cessation, nutrition counseling and periodic dental screening. The potential of preventive oral health care within the primary health care and school-based health care systems to help detect problem areas early and slow the progression of disease [32] [33].

4.2Improve Accessibility to Specialized Periodontal Care: Increase the number of trained periodontists and dental-specific services, especially where they are not being provided, such as in rural areas. To enhance access to comprehensive periodontal care, strategic workforce planning and equitable distribution of dental providers and incentives for practicing in rural areas should be considered [34] [35].

4.3Continuing Professional Development to boost Workforce Capacities: Create ongoing professional development and competency programs for dentists, dental hygienists and primary health care providers in modern assessment and treatment strategies for periodontal disease, minimally invasive treatment strategies, evidence-based clinical guidelines and patient care coordination [36] [37].

4.4Promote Digital Health and Modern Diagnostic Technologies: Promote the implementation of digital dentistry, such as electronic dental records, digital imaging systems, artificial intelligence diagnostic tools, and tele-dentistry platforms to enhance diagnosis, the

provision of specialist consultations and access to periodontal services in geographic isolation [38] [39].

4.5 Foster National Research and Evidence Based Policy Making: Future studies should include multicenter population-based studies and will provide high quality epidemiological data to improve understanding of the burden of periodontal diseases in the Kyrgyz Republic. A national oral health surveillance system with periodontal indicators would provide strong evidence to inform policy development, program resource allocation and the assessment of preventive interventions at the national policy level [40] [41].

5. Conclusion

The high prevalence, chronic nature and adverse effects of periodontal diseases pose them as a significant public health problem. This review shows that there is a complex interaction between behaviour, biology and systemic conditions such as poor oral hygiene and tobacco use as well as diabetes mellitus and cardiovascular diseases which influence the development and progression of periodontal diseases. This rising trend is further emphasized with age, as it is a reflection of the cumulative exposure of such risk factors from a lifetime, and the importance of prevention and early intervention. Combining the available evidence with a contextual analysis of the dental services in the Chui region of the Kyrgyz Republic identified clinic and organisation barriers that still exist and have an impact on the effective management of periodontal diseases. These challenges involve sub-optimal preventive program availability, lack of timely use of dental services, insufficient number of specialized periodontal dentists, inequitable distribution of dental health care resources between urban and rural areas and lack of access to modern diagnostic and treatment technologies. Together, these restricts the effectiveness and availability of periodontal care and help perpetuate the burden of disease in the population. There is a need for an integrated approach, preventive dentistry, early diagnosis, using evidence-based treatment, building the dental workforce, and enhancing the primary oral healthcare service with a patient-centered perspective to address these challenges. In addition, the use of digital health technologies, collaboration between healthcare professionals, and investments in healthcare infrastructure can improve the quality and accessibility of periodontal care, especially in areas that are less well-served. It is also important to continue to raise public awareness and oral health literacy to promote early utilization of health services and enhance long-term health outcomes from treatment. In general, the reviewed paper offers an integrated picture of clinical and organisational issues of periodontal care and the priorities for improvements in dental service delivery in the Kyrgyz Republic. The results could help guide policy, dental service delivery and administration, and inform efforts to improve periodontal services, increase access to specialized periodontal care, and decrease the national burden of periodontal diseases.

Ethics Approval and Consent to Participate: This study was conducted in accordance with the ethical principles of the Declaration of Helsinki and its subsequent

amendments. Due to the retrospective nature of the study and the use of anonymized patient data, the IRB Ethics Committee of Osh State University waived the requirement for obtaining informed consent. Patient confidentiality and data privacy were maintained throughout the study

Availability of Data and Materials: All data generated and analyzed during this study are included in this article. Additional data may be made available from the corresponding author upon reasonable request.

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