ORIGINAL RESEARCH

Analysis of the prevalence of dental diseases among students of Dagestan State Medical University.

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Abstract

Introduction: Dental caries and periodontal diseases are significant public health concerns worldwide. While developed nations have seen a decline in these diseases due to effective prevention programs, in areas like Dagestan, Russia, high dental morbidity persists due to diverse climatogeographical conditions and socio-economic challenges.

Aim: This study aims to explore the prevalence of dental diseases among students in Dagestan and to devise a comprehensive set of preventive measures against dental caries.

Materials and Methods: The research involved examining 235 students aged 17 to 21 from Dagestan State Medical University. These students were categorized based on the World Health Organization's age group recommendations. Dental examinations were conducted at the university's clinics, focusing on carious, filled, and extracted teeth. The study also assessed oral hygiene using the Fedorov and Volodkina hygienic index and employed vital staining for diagnosing initial caries.

Results: The prevalence of dental caries was found to be 76.35±3.16%, with an intensity of 3.6±0.005. Other notable findings included enamel hypoplasia, dentofacial anomalies, and various periodontal diseases. A significant correlation was observed between the prevalence and intensity of caries and the age of students, with differences noted in comparison to other regions like Irkutsk. The study highlighted a gap in oral hygiene practices and knowledge among students.

Conclusion: The study concludes that significant improvements in dental health, particularly in reducing caries, can be achieved through regular sanitary education, professional and individual oral hygiene. The findings emphasize the need for comprehensive, multifaceted intervention strategies tailored to the unique environmental and socio-economic context of Dagestan.

Keywords: Dental caries, Periodontal diseases, Preventive dentistry, Oral hygiene, Epidemiology.

Introduction

Dental caries and periodontal diseases continue to be among the socially significant illnesses in many countries around the world. However, in economically prosperous countries, thanks to the development and implementation of prevention programs, there is a trend towards a decrease in the intensity of caries and periodontal diseases.[1]

In our country, the high level of dental morbidity among children and adults in several regions remains a pressing issue.[2]

Currently, the prevention of caries is a primary concern in dentistry. Numerous studies conducted both domestically and abroad have proven that the implementation of preventive methods significantly reduces the incidence of caries and, consequently, its complications.[3]

One of the main tasks of health authorities is to further improve the quality of medical services for the younger generation, ensuring the timely implementation of therapeutic, wellness, and preventive measures. In particular, there is a need to implement a prevention program among students of higher educational institutions.[4]

The Republic of Dagestan, one of the southern regions of Russia, is characterized by a diversity of climate and geographical conditions associated with the zones of the territory (lowland, foothill, and mountain zones), as well as

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by varying socio-economic factors, which are influenced by a declining standard of living, uneven population density, and a large number of large families. To date, in studying the dental morbidity of the adult and child population of the republic, individual authors have lacked a unified approach, which has precluded a realistic assessment of the situation and tracking the trend of its development. The environmental factors that contribute to the high level of dental and periodontal diseases in Dagestan's children remain insufficiently studied. [5]

Studies focusing on the prevalence of dental diseases among students are primarily descriptive in nature. The results of these studies have been evaluated only quantitatively, as the observation periods have been too short for a comprehensive study of the disease dynamics. [6]

To understand the nature of caries morbidity and to evaluate preventive measures, scientific research is needed on the interrelation of climate and geographical factors, dietary habits, oral hygiene, and the prevalence and intensity of dental caries, the dynamics of the disease, and the effectiveness of anti-caries measures in the studied region and the corresponding population group. [7]

In the Dagestan region, such studies among students have not been conducted, which has prompted the examination of this issue. The preventive measures carried out to date, primarily among the child population of the republic's capital, are unsystematic and irregular in nature.

In light of the above, there is an urgent need to conduct a detailed situational analysis of dental morbidity in the republic and to develop scientifically substantiated prevention programs for students, taking into account environmental factors, age, and the level of dental care.

This study examined the prevalence of dental diseases among students, the development of comprehensive preventive measures against dental caries and their implementation in practice.

Materials and Methods

To study the prevalence of dental diseases, we examined 235 first and second-year students aged between 17 to 21 years. The students were grouped by age according to the World Health Organization's (WHO) recommendations: the first group from 17 to 18 years and the second group from 19 to 21 years. The examination was conducted in the dental clinics of the university. Carious (C), filled (F), and extracted (E) teeth were recorded. We studied the overall prevalence of dental diseases, as well as the prevalence and intensity of caries by age groups, and the structure of the components of the CFE index of teeth. The hygienic condition of the oral cavity was assessed using the index by Y.A. Fedorov and V.V. Volodkina. For differentiating the diagnosis of initial forms of caries from non-caries lesions, and for clarifying the size and boundaries of focal demineralization of tooth enamel, vital staining was performed using a modified technique by L.A. Aksamit.

To study the dynamics of carious disease and to evaluate the effectiveness of therapeutic and preventive measures, a representative sample of 235 practically healthy students from the examined contingent, studying in the I-V courses, was made. The students were divided into three groups: the first (control) group (72 people) underwent routine oral cavity sanitation (including 35 students from the first age group – 1.1 subgroup; 28 students from the second age group – 1.2 subgroup; and 9 students from the third age group – 1.3 subgroup).

In the second group (79 people), routine oral sanitation, health education work, and enhancement of the resistance of the hard tissues of teeth with calcium and fluoride preparations using an application method were carried out (38 students – representatives of the first age group – 2.1 subgroup, 31 students – second age group – 2.2 subgroup, and 10 students – third age group – 2.3 subgroup). In the third group (84 people), routine oral sanitation, health education work, and enhancement of the resistance of the hard tissues of teeth with calcium and fluoride preparations under the influence of a low-frequency magnetic field were carried out (in 3.1 – 41 people, in 3.2 – 34 people, and in 3.3 – 9 people).

The results of dental research, as well as therapeutic and preventive measures, were processed using the method of variation statistics. The mean value ('M'), standard deviation ('σ'), and standard error ('m') for the indicator and average size were determined. The Student's t-test was used to assess the significance of differences. A difference was considered significant at $t > 2.5$; $P < 0.05$.

Results

As a result of the dental examination of students, the prevalence (76.35±3.16%) and intensity (3.6±0.005) of carious disease were established. Additionally, enamel hypoplasia (28.4%), dentofacial anomalies (55.96%), periodontal tissue diseases (gingivitis – 4.5%, periodontitis – 18.80%), stomatitis – 1.2.2%, and cheilitis – 8.02% were identified.

The prevalence of caries in the first age group was 74.7±0.61%, and in the second age group – 78.0±7.06%. The intensity of caries in the first age group was 3.35±0.05, and in the second group – 3.95±0.05% (Table 1).

A high correlation was found between the prevalence (r = 0.94 + 0.002) and intensity (r = 0.96 + 0.001) of caries and the age of the examined students. Lower prevalence and intensity of caries were observed among students in Makhachkala compared to those in Irkutsk, which in our opinion, is due to better climate and geographic conditions and an abundance of fruits and vegetables throughout the year. This further confirms the importance of climate and geographic conditions and dietary factors in the development of caries.

According to the initial examination, a large part of the students (59.01±0.86%) needed treatment for dental caries and its complications. Only 17.01+0.43% had undergone sanitation, three times less than those in need. These data indicate an insufficient level of quality of therapeutic measures in Makhachkala.

The rapid growth in the prevalence and intensity of caries across age groups, as well as the low percentage of filled teeth (27.6 ± 0.38%), indicate the need for therapeutic and preventive measures in this cohort to stabilize or reduce the growth of caries.

During the examinations, the hygienic condition of the oral

cavity of the students was studied. The average hygienic index (HI) was 2.0±0.04. For 56.01±1.69% of the examined, the HI ranged from 1 to 2 points, and for 42.8±1.7%, the HI was above 2 points. The analysis of the oral hygiene condition revealed the students' unsatisfactory awareness of oral hygiene, which in our opinion, is due to their infrequent visits to dental specialists.

The low hygienic status of the students is one of the main reasons for the development of dental diseases, particularly caries (correlation coefficient r = 0.98 ± 0.001). This fact underscores the need to intensify health education work among students of Dagestan State Medical University.

As known, microelements, especially fluoride in drinking water, play an important role in the development of the carious process. According to the Dagestan Republic Center for Hygiene and Epidemiology, the drinking waters of the republic have a low fluoride content, with an average fluoride content in drinking water being very low at 0.11-0.12 mg/L.

Based on the results of our research and considering the WHO recommendations (1986), according to which the occurrence and development of caries are conditioned by the complex interaction of three main factors: oral microflora, diet, and the body's resistance.

In the groups we identified, significant differences were found in the clinical course of the carious process. In Group I (control group), the intensity of caries changed from 3.8±0.08 to 4.89±0.05. The increase in caries per examined individual over the period of observation was significant ($t > 3$; $P < 0.001$) for the first year of observation – 0.54±0.05, for the second year – 0.44±0.05, and for the third year – 0.34±0.006. The obtained results indicate that planned sanitation leads to a reduction in the growth of caries, with the average indicator of disease growth decreasing each year ($P < 0.001$). Accordingly, the rate of increase of the disease decreases. This indicator for the first year of observation was 13.52%, for the second year – 10.1%, and for the third year – 7.3%.

Discussion

The findings from our extensive study provide pivotal insights into the epidemiology of dental caries among students in the Republic of Dagestan. The noteworthy correlation between the prevalence and intensity of dental caries and age underscores the dynamic nature of this disease across different life stages. Notably, our research indicates a distinct variation in the prevalence and intensity of caries in comparison to other regions, such as Irkutsk. This variation can be attributed primarily to differing climate and geographical conditions and dietary habits, highlighting the multifactorial etiology of dental caries.

Table 1: Indicators of the prevalence and intensity of caries among students aged 17-21 years.

Age	Prevalence of caries , %	Intensity of caries
17	71,30	3,1±50,01
18	74,31	3,1±70,03
19	78,65	3,58±0,04
20	75,81	3,9±0,01
21	80,20	4,01±0,05

The significant disparities in dental caries' clinical progression within the studied groups emphasize the impact of targeted oral health interventions. The gradual decrease in the growth rate of caries in the control group, subjected to routine oral cavity sanitation, attests to the efficacy of regular and systematic preventive care. These findings are consistent with the broader dental literature, which advocates for the integration of comprehensive oral health strategies in mitigating the burden of dental diseases.[8-9]

The marked deficiency in the hygienic status among the student population, as evidenced by the hygienic index scores, is a critical finding. This shortfall contributes significantly to the high prevalence of dental caries, aligning with the widely recognized role of oral hygiene in caries development.[10] Our study highlights a glaring gap in the students' oral health knowledge and practices, necessitating intensified health education and promotion efforts. The correlation between low hygienic status and dental caries development further emphasizes the imperative for comprehensive health education programs that transcend mere disease treatment, focusing equally on prevention through lifestyle and behavioural modifications.

Moreover, the observed low fluoride content in the drinking water of the Republic of Dagestan presents a notable public health concern. The well-documented cariostatic effect of fluoride suggests that the regional deficiency in fluoride could be a contributing factor to the high prevalence of dental caries.[11] This scenario invites the consideration of community-based fluoride interventions, such as water fluoridation, which the World Health Organization (WHO) recommends as a cornerstone strategy in caries prevention.

Our study significantly contributes to the understanding of dental caries epidemiology in Dagestan and underscores the need for multifaceted intervention strategies. The integration of individual, community, and policy-level interventions, including enhanced oral hygiene education, routine dental check-ups, and community fluoride programs, is paramount. These strategies should be tailored to the unique climate and geographical and socio-economic contexts of the region to maximize their effectiveness in combating dental caries and improving oral health outcomes.

Conclusion

Thus, the research results demonstrate that positive outcomes in reducing dental diseases, particularly dental caries, can be achieved through regularly conducted sanitary education combined with professional and individual oral hygiene.

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