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# The prevalence of dental diseases and medical and social characteristics in young people

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## ABSTRACT

***BACKGROUND:*** Despite ongoing treatment and prevention programmes, the prevalence of dental diseases remains high, particularly in young people. The prevalence of oral diseases is influenced by several socioeconomic factors, including age, place of residence, fluoride intake, individual oral care, diet and general somatic disease. The study of these factors is an urgent issue in dentistry.

***AIM:*** To study the medical and social characteristics of young people and their effect on the prevalence of dental diseases.

***METHODS:*** The oral cavities in 917 patients aged 18–44 years who had no history of dental treatment for at least 6 months were examined. The indices of DMF, Silness–Löe, Green–Vermillion, PMA, CPITN, detection of noncarious lesions of teeth, malocclusion and diseases of the pulp, periapical tissues and periodontal were determined. To establish the influence of social and hygienic factors on the condition of the oral cavity, the survey responses of the study participants were analysed.

***RESULTS:*** In young people, the rates of dental caries, diseases of the pulp and periapical tissues and inflammatory periodontal diseases were 94.2%, 47.4% and 86.8%, respectively. Among the medical and social factors determining the high prevalence of dental diseases, unsatisfactory hygienic condition of the oral cavity, visits to the dentist less than once a year and professional oral hygiene less than once a year should be noted.

***CONCLUSION:*** The high prevalence of dental diseases in young people requires a differentiated approach to therapeutic and preventive measures, using medical and social factors.

**Keywords:** caries; gingivitis; diseases of the pulp; social factors; morbidity.

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# Распространённость стоматологических заболеваний и медико-социальная характеристика лиц молодого возраста

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## АННОТАЦИЯ

***Обоснование.*** Несмотря на проводимые лечебно-профилактические программы, распространённость стоматологических заболеваний остаётся высокой, что особенно актуально в группе лиц молодого возраста. На распространённость заболеваний полости рта влияют ряд социально-экономических факторов, а также возраст, место проживания, поступление фтора в организм, индивидуальный уход за полостью рта, характер питания, общесоматические заболевания и др. Изучение данных факторов является актуальным вопросом стоматологии.

***Цель исследования*** — изучить медико-социальную характеристику лиц молодого возраста и её влияние на распространённость стоматологических заболеваний.

***Методы.*** Исследование включало комплексную оценку состояния полости рта у 917 обследованных в возрасте 18–44 лет, при отсутствии предшествующего стоматологического лечения в течение не менее 6 мес. Определены индексы КПУ, Silness–Löe, Green–Vermillion, PMA, CPITN, выявлены некариозные поражения зубов, патологии прикуса, болезни пульпы, периапикальных тканей и пародонта. Для установления влияния социально-гигиенических факторов на состояние полости рта проанализированы результаты анкетирования участников исследования.

***Результаты.*** У лиц молодого возраста распространённость кариеса зубов составляет 94,2%, заболеваний пульпы и периапикальных тканей — 47,4%, воспалительных заболеваний пародонта — 86,8%. Среди медико-социальных факторов, определяющих высокую распространённость стоматологических заболеваний, следует выделить: неудовлетворительное гигиеническое состояние полости рта, посещение стоматолога реже одного раза в год, проведение профессиональной гигиены полости рта реже одного раза в год.

***Заключение.*** Высокая распространённость стоматологических заболеваний у лиц молодого возраста требует дифференцированного подхода к лечебно-профилактическим мероприятиям с учётом медико-социальных факторов.

**Ключевые слова:** кариес; гингивит; болезни пульпы; социальные факторы; заболеваемость.

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# BACKGROUND

According to the World Health Organization (WHO), dental caries and periodontal diseases are the most common pathologies among oral diseases worldwide [1–3]. Despite ongoing treatment and preventive programs, the prevalence of dental diseases remains high, which is important in young people (aged 18–44 years according to the WHO) [4, 5].

In the Russian Federation, in people aged <30 years, inflammatory periodontal diseases rank second after dental caries, and in people aged >30 years, they rank first, approaching 90% [6].

According to WHO objectives, by 2020, people aged 18 years should not have any extracted teeth, and by 2030, dental caries in children should be eliminated [7, 8], which is obviously unattainable in the Russian Federation because of the non-tendency toward reducing the prevalence of caries [9].

The prevalence of oral diseases is influenced by many socioeconomic factors (education, occupation, financial situation, etc.), as well as age, sex, place of residence, fluoride intake, individual oral care, diet, general somatic diseases, etc. [10, 11].

Thus, identifying the factors that determine the prevalence of oral diseases among young people is a pressing issue in dentistry.

**This study aimed to** analyze the medical and social characteristics of young people and their effect on the prevalence of dental diseases.

# METHODS

## Study design

An observational single-center study was conducted.

## Compliance criteria

The study enrolled 917 respondents, including 592 women and 325 men.

*Inclusion criteria:* Patients of both sexes, aged 18–44 years, who sought treatment or preventive examination and did not receive previous dental treatment for at least 6 months.

*Non-inclusion criteria:* Individuals aged <18 years and >45 years, presence of acute inflammatory diseases, exacerbation of chronic general somatic pathologies, somatic diseases in the decompensation stage, oncological diseases, and refusal to participate in the study.

## Conditions

The study was conducted at the Clinical Diagnostic Center for Therapeutic Dentistry of the N.I. Pirogov Russian National Research Medical University. The clinical examination included a comprehensive assessment of the oral cavity condition and determination of the medical and social characteristics of young people. All participants gave voluntary informed consent to participate in the study.

## Study duration

The study was conducted in 2018–2023.

## Description of the medical intervention

A clinical examination protocol and a questionnaire for the respondents were developed. The condition of the bone and periapical tissues was assessed using X-ray data (orthopantomogram). The characteristics of dental and somatic morbidity were performed in accordance with the International Classification of Diseases Tenth revision. Clinical examination included the determination of the number of carious (C), filled (F), and extracted (E) teeth (CFE), Silness–Löe, and Green–Vermillion indexes, papillary–marginal–alveolar (PMA) index, and community periodontal index of treatment needs and identification of non-carious lesions of teeth, bite pathology, and diseases of the pulp, periapical tissues, and periodontium. To establish the influence of social and hygienic factors on the condition of the oral cavity, the results of the survey were analyzed.

## Subgroup analysis

To reveal factors influencing the maintenance of oral health, two groups were identified: group 1 included 150 young patients with oral diseases (64 men, 86 women) by random sampling, and group 2 (comparison) consisted of 54 patients with good oral hygiene (15 men, 39 women).

## Ethical examination

The study was approved by the local ethics committee of the N.I. Pirogov Russian National Research Medical University (Protocol No. 215 of February 21, 2024).

## Statistical analysis

Statistical data analysis was performed using Microsoft Office Excel (Microsoft Corporation, VA, USA) and Statistica 6.0 (Stat Soft Inc., USA). Relative values were calculated, and descriptive statistics were used to determine the arithmetic mean, average error, and mean-square deviation, as well as nonparametric analysis methods. The sample size was not previously calculated. *P*-values of <0.05 indicated significance.

# RESULTS

## Study participants

At the time of examination, all respondents lived in Moscow or in a region in Moscow. The study involved 917 respondents, including 592 women (mean age, 31.0±2.4 years) and 325 men (mean age, 34.0±2.1 years).

In this study, 61.3% of the respondents examined lived in Moscow or in a region in Moscow until 18 years of age, and the remaining 38.7% lived in other regions of the Russian Federation (Kirov, Samara, Smolensk, Tula, Tver, Kostroma, Lipetsk, Astrakhan, Rostov, Ryazan, Vladimir, Volgograd, Voronezh, Belgorod, Oryol, Tyumen, Novosibirsk regions, Republic of Buryatia, Mordovia, Tyva, Tatarstan, and the republics of the North Caucasus) or Commonwealth of

Independent States. Moreover, 18.4% of the respondents were students during the survey period, 76.6% were employed, and 5.0% were unemployed.

## Main research results

Despite the availability of dental care in state medical institutions in Moscow and its regions under the compulsory medical insurance system, 91.2% expressed a preference for commercial medical organizations. Moreover, 49.7% of the respondents noted the financial accessibility of treatment in commercial clinics.

Dental caries was detected in 94.2% of the respondents, pulp and periapical tissue diseases in 47.4%, gingivitis in 52.9%, and periodontitis in 33.9% (Table 1).

In the examination of the soft tissues of the oral cavity, 6.8% of the respondents had pathologies of the cords/frenulum of the lips. In addition, the mixed periodontal biotype predominated (5.3%). Gum recession was detected in 10.2%, and pathological mobility of a tooth (or several teeth) was found in 5.9% of the respondents.

In this study, 37.3% of the respondents in group 1 ($n$=150) lived in Moscow or in one of its regions and were <18 years of age. In group 2 ($n$=54), this figure was 80.6%. The results showed a significant social difference between patients with oral diseases and healthy ones.

The CFE index in group 1 exceeded that in group 2, mainly due to the "C" (3.7±0.8 in group 1 and 0 in group 2; $p$ <0.05) and "E" (1.6±0.4 and 0.9±0.2 in groups 1 and 2, respectively; $p$ <0.05) components (Table 2).

The results of the clinical examination showed marked differences in the indexes measured in the oral cavity of the study groups. Individual oral hygiene was satisfactory in group 1 and good in group 2. In group 1, inflammation was noted in the soft periodontal tissues, and the majority of the respondents required professional oral hygiene and elimination of factors that contribute to plaque retention.

Regarding the regularity of examinations, 7.2% of the respondents in group 1 and 18.1% in group 2 visit the dentist once every 6 months, which is necessary for oral disease prevention. Most respondents in group 1 visit the dentist once every few years (53.8%), whereas a slightly higher number (57.3%) of respondents in group 2 visit the dentist once a year (Table 3).

In the analysis of the questionnaire and medical history, the nature and prevalence of complaints among respondents were established (Table 4). The absence of any complaints on the oral

**Table 1.** Characteristics of the surveyed patients by sex parameters and prevalence of oral diseases

| Oral diseases | Respondents | | |
|---|---|---|---|
| | Total ($n$=917) | Men ($n$=325) | Women ($n$=592) |
| Dental caries | 864 | 310 | 554 |
| Non-carious lesions of teeth | 78 | 17 | 61 |
| Diseases of the pulp and periapical tissues | 435 | 174 | 261 |
| Endemic mottling (fluorosis) of teeth | 83 | 11 | 72 |
| Dental hyperesthesia | 101 | 23 | 78 |
| Increased tooth wear | 37 | 15 | 22 |
| Malocclusions | 413 | 199 | 214 |
| Gingivitis | 486 | 185 | 301 |
| Periodontitis | 312 | 113 | 199 |
| No diseases (oral sanitation) | 54 | 15 | 39 |

**Table 2.** The results of a comparative analysis of the index assessment of the oral cavity in young people (M±sd)

| Index | Group 1 | Group 2 |
|---|---|---|
| CFE | 13.2±1.9 (C — 3.7±0.8; F — 7.9±0.6; E — 1.6±0.4) | 8.7±0.6 (C — 0; F — 7.8±0.3; E — 0.9±0.2) |
| Silness–Löe | 2.20±0.41 | 0.50±0.34 |
| Green–Vermillion | 1.50±0.35 | 0.70±0.19 |
| PMA, % | 32.6±4.1 | 0.05±0.01 |
| CPITN | 2.70±0.53 | 0.500±0.067 |

***Note.*** The probability of an error-free forecast is $p$ <0.05.

**Table 3.** Regularity of visits to the dentist among the examined (%)

| Regularity of visits | Group 1 | Group 2 |
|---|---|---|
| Once every 6 months or more often | 7.2 | 18.1 |
| Once a year | 17.6 | 57.3 |
| Once every few years | 53.8 | 17.2 |
| Only in case of complaints | 21.4 | 7.4 |
| Total | 100 | 100 |

***Note.*** The probability of an error-free forecast is $p$ <0.05.

**Table 4.** Nature and prevalence of complaints (per 100 surveyed) (%)

| Nature of complaints | Group 1 | Group 2 |
|---|---|---|
| No complaints | 22.4 | 73.9 |
| Bleeding gums | 18.6 | 3.2 |
| Soreness of hard dental tissues from temperature and chemical irritants | 36.2 | 6.5 |
| Tooth pain when chewing/biting | 10.2 | 2.1 |
| Increased tooth sensitivity | 9.6 | 6.2 |
| Gum pain | 9.1 | 1.3 |
| Tooth mobility | 5.3 | 0 |
| Fetid breath | 8.9 | 4.2 |
| Missing tooth (teeth) | 7.3 | 2.1 |
| Other complaints, including esthetics, chips/defects of restorations, fillings, malocclusions, gingival regression, food impaction, TMJ complaints, etc. | 15.7 | 8.1 |

***Note.*** TMJ — temporomandibular joint; the probability of an error-free forecast is $p$ <0.05.

cavity was noted by 22.4% and 73.9% of young people in groups 1 and 2, respectively ($p$ <0.05). Moreover, 27.5% and 7.4% of the respondents in groups 1 and 2 had more than one oral complaint. In group 1, the most common complaints were pain in the hard tissues of the teeth in response to irritants (temperature and chemical) and bleeding gums, and in group 2, complaints were unsatisfactory dental esthetics, chips/defects of restorations (fillings, artificial crowns, and veneers), malocclusions, gum recession and food entrapment, and temporomandibular joint (TMJ) disorders presented by 8.1% of the respondents.

Considering the need for regular removal of dental plaque to prevent periodontal diseases and hard dental tissues, items about professional oral hygiene were included in the questionnaire. Specifically, 6.5% and 16.7% of the respondents in groups 1 and 2, respectively, underwent professional hygiene at the dentist once every 6 months (Table 5).

**Table 5.** Regularity of professional oral hygiene in the examined persons (%)

| Regularity of professional oral hygiene | Group 1 | Group 2 |
|---|---|---|
| Once every 6 months or more often | 6.5 | 16.7 |
| Once a year | 15.4 | 56.5 |
| Once every few years | 34.5 | 14.1 |
| Irregular | 28.3 | 7.6 |
| No professional oral hygiene | 15.3 | 5.1 |
| Total | 100 | 100 |

***Note.*** The probability of an error-free forecast is $p$ <0.05.

The survey also enabled the evaluation of the features of individual oral care. Most participants in groups 1 and 2 brush their teeth regularly twice a day (78.1% and 85.2%, respectively) (Table 6).

All respondents used toothpaste (or toothpowder) and a toothbrush (100%) for individual oral hygiene. Additional means (dental floss, irrigator, rinsers, interdental brushes, etc.) were regularly used by 20.7% and 91.2% of respondents in groups 1 and 2, respectively ($p$ <0.05). Approximately 2/3 of the participants used a medium-hard toothbrush.

A larger number of respondents (40.9% and 49.7% in groups 1 and 2, respectively) predominantly used toothpastes with fluoride ($p$ >0.05). Toothpastes with calcium (26.7% and 23.1%, $p$ >0.05), therapeutic and prophylactic toothpaste (8.4% and 7.9%, $p$ >0.05), whitening toothpaste (11.4% and 10.2%, $p$ >0.05), and desensitive toothpaste (12.6% and 9.1%, $p$ >0.05) were used by respondents of groups 1 and 2, respectively. Thus, no significant differences in the type of toothpaste used were identified between the groups.

Brushing teeth only with a toothbrush and toothpaste (without using additional hygiene products) in group 1 took 1–2 min for more than half of the respondents (63.7%). In group 2, most respondents (55.8%) brushed their teeth for 2–3 min (Table 7).

The overwhelming majority of the respondents (93.6% in group 1 and 95.7% in group 2) considered good individual oral hygiene a necessary factor in maintaining health, which indicates high motivation among young people.

General somatic diseases were also identified. In groups 1 and 2, 16.3% and 14.6% of the respondents had more than one concomitant pathology, respectively (Table 8).

**Table 6.** Regularity of individual oral hygiene in young people (%)

| Regularity of individual oral hygiene | Group 1 | Group 2 | Probability of an error-free forecast, $p$ |
|---|---|---|---|
| Twice a day | 78.1 | 85.2 | $p$ >0.05 |
| Three times a day or more | 7.5 | 13.5 | $p$ <0.05 |
| Once a day | 9.2 | 1.3 | $p$ <0.05 |
| Irregularly | 5.2 | 0 | $p$ <0.05 |
| Total | 100 | 100 | |

**Table 7.** Time of brushing teeth with a toothbrush and paste in the study groups (%)

| Time, min | Group 1 | Group 2 |
|---|---|---|
| <1 | 20.6 | 3.2 |
| 1–2 | 63.7 | 21.3 |
| 2–3 | 10.6 | 55.8 |
| >3 | 6.1 | 19.7 |
| Total | 100 | 100 |

***Note.*** The probability of an error-free forecast is $p$ <0.05.

**Table 8.** Structure of concomitant somatic diseases (%)

| Somatic pathology | Group 1 | Group 2 |
|---|---|---|
| No diseases | 39.4 | 45.8 |
| Allergic diseases and immunopathologies | 17.6 | 14.5 |
| Digestive diseases | 14.5 | 10.7 |
| Endocrine diseases | 12.3 | 9.4 |
| Cardiovascular diseases | 9.6 | 7.9 |
| Respiratory diseases | 7.2 | 6.7 |
| Other diseases | 17.9 | 15.8 |

***Note.*** The probability of an error-free forecast is $p$ >0.05.

**Table 9.** Frequency of sweet food consumption (%)

| Frequency of consumption of sweet foods | Group 1 | Group 2 |
|---|---|---|
| Once a day | 12.8 | 16.4 |
| Several times a day | 75.1 | 70.8 |
| Once every 2–3 days | 6.3 | 4.6 |
| Irregularly | 3.6 | 4.5 |
| No consumption | 2.2 | 3.7 |
| Total | 100 | 100 |

***Note.*** The probability of an error-free forecast is $p > 0.05$.

No significant differences in the distribution of somatic diseases were found between the study groups.

Regarding the nutritional pattern of the respondents, approximately two-thirds of the respondents in both groups consume sweet foods several times a day (Table 9). Thus, no significant differences in the frequency of consumption of sweet foods (which is considered one of the factors contributing to caries development) were noted between the study groups.

# DISCUSSION

## Summary of main research result

In respondents aged 18–44 years, dental caries (94.2%), gingivitis (52.9%), periodontitis (33.9%), and diseases of the pulp and periapical tissues (47.4%) were highly prevalent oral diseases. Unsatisfactory hygienic condition of the oral cavity ($p < 0.05$), visiting the dentist less than once a year ($p < 0.05$), and undergoing professional oral hygiene less than once a year ($p < 0.05$) are among the medical and social factors that determine the high prevalence of dental diseases. Maintaining oral hygiene is facilitated by the use of additional personal hygiene products ($p < 0.05$), and brushing teeth with a toothbrush for >2 min ($p < 0.05$).

## Discussion of the main research result

The prevalence of dental caries among the respondents was 94.2%. In addition, teeth with fillings predominate in the CFE structure in both people in need of treatment (F 7.9±0.6) and those with good oral hygiene (F 7.8±0.3). Moreover, high "F" values indicate that dental services in Russia are focused on treatment and not on caries prevention [12]. In group 1, the "C" value was 3.7±0.8.

The prevalence of dental caries among medical university students aged 18–25 years reaches 96%. Moreover, in a previous study, the CFE value of 7.58, which is lower than the indicators obtained in the present study, can be due to the presence of professional education and greater motivation [12]. The caries prevalence rates obtained in the present study (94.2%) are similar to the data from a 2009 study (among Moscow students aged 16–25 years) (98%) [13], which indicates the absence of a clear trend in reducing the incidence.

In this study, the rates of diseases of the pulp and periapical tissues and inflammatory periodontal diseases were 47.4% and 86.8%, respectively.

The comparison of our results with those of other authors is limited by the partial differences in age and social indicators of the studied groups.

According to J.C. Carvalho and U. Schiffner [14], the dental caries rate among the adult population in European countries is >92%, and the CFE values range from 6.6 to 17.6, with an average of 12.1.

In a previous study [15], in Slovenia, 42% of the respondents had good oral hygiene, compared with 5.9% in the present study.

According to epidemiological studies, inflammatory periodontal diseases are present in 90% of the adult population in Russia, approximately 80% in European countries and America, and up to 95% in Southeast Asia [16]. In the present study, the prevalence rates of gingivitis and periodontitis were 86.8%. However, the partial difference in the age of the respondents must be considered when comparing studies.

According to the 2021 WHO recommendations, to reduce the prevalence of oral diseases, a shift should be made from a treatment-oriented approach to a preventive approach [17].

This study identified several medical and social factors that determine the high prevalence of dental diseases, specifically unsatisfactory hygienic condition of the oral cavity ($p < 0.05$), visiting the dentist less than once a year ($p < 0.05$), and professional oral hygiene less than once a year ($p < 0.05$).

Maintaining oral hygiene is facilitated by using additional personal hygiene products ($p < 0.05$) and brushing teeth with a toothbrush for >2 min ($p < 0.05$). Analysis of indicators such as concomitant general somatic pathology, motivation to maintain oral health, and frequency of consumption of sweet foods did not reveal significant differences ($p > 0.05$).

## Study limitations

Study limitations include insufficient comparison of our results with those of other authors, which is due to partial differences in the parameters studied, social factors, and age of the participants.

## CONCLUSION

In people aged 18–44 years, dental caries (94.2%), inflammatory periodontal diseases (86.8%), and diseases of the pulp and periapical tissues (47.4%) are highly prevalent oral diseases.

Approximately 40.0% of the respondents had no concomitant pathology. Among existing diseases in both groups (17.6% and 14.5%, respectively), allergic diseases and immunopathologies rank first, followed by digestive organs and endocrine system diseases.

Moreover, the majority (91.2%) of the respondents expressed a preference for treatment and follow-up in commercial organizations; however, this is financially accessible to only 49.7% of the respondents. In addition, 80.6% of respondents with good oral hygiene lived in Moscow or in a region in Moscow until 18 years of age, and 37.3% of the respondents were living in regions of the Russian Federation or CIS countries until 18 years of age.

The high prevalence of oral diseases indicates the need to improve a differentiated approach to treatment and preventive measures.

## ADDITIONAL INFORMATION

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**Authors' contribution.** I.S. Kopetskiy, N.V. Polunina — revised the article critically for important intellectual concept; L.V. Pobozhieva — performed the acquisition, clinical research, drafted the article, performed analysis and interpretation of data for the article; Yu.V. Sheveluk — made a substantial contribution to the concept and design of the article, performed the acquisition and analysis of the data for the article; M.K. Makeeva — drafted the article and performed clinical analysis.

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