dents studying in medical and non-medical specialties have different attitudes towards the concept of a healthy lifestyle and, therefore, adhere to it in different ways. The conducted research has shown that modern students generally adhere to the basic principles of a healthy lifestyle. However, there are differences between students of medical and non-medical specialties in the observance of its individual components. Thus, there was a lower proportion of people with bad habits among doctors, and a greater number of students who adhere to the principles of healthy eating. At the same time, students of non-medical specialties are 2,48 times more likely to study in sports sections. Unfortunately, the implementation of such components of a healthy lifestyle as sleep duration, regular physical activity among students is difficult due to academic and socio-social stress, and psychophysiological stress.

After analyzing the students' attitude to a healthy lifestyle, it was found that there are students of non-medical specialties who do not perceive a healthy lifestyle as a success factor in various fields of human activity and consider compliance with the principles of a healthy lifestyle optional. This fact is alarming and dictates the need to popularize the versatility of a healthy lifestyle as a foundation for the formation of a full-fledged, harmonious personality in all spheres of life. It should be noted that the overwhelming majority of medical students consider the creation of an absolutely healthy nation to be a reality. The obtained result allows us to make a cautiously optimistic forecast that the younger generation of doctors will become the driver of the development of a new model of a "healthy nation" in the future.

The authors declare that there is no conflict of interest.

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DIET OF PATIENTS WITH PERIODONTAL DISEASES: ANALYTICAL DESCRIPTIVE STUDY

The article presents the results of a study of the nutritional characteristics of patients with chronic generalized periodontitis. According to the World Health Organization, more than one billion people in the world suffer from severe periodontal diseases. Periodontal pathologies are closely associated with a number of major chronic non-communicable diseases, which determine their high medical and social significance.

A cause-and-effect relationship was revealed between the degree of manifestation of periodontitis symptoms and nutritional factors of patients. It was found that the less essential nutrients in the diet, the more pronounced the clinical signs of periodontal damage become. Increased body weight can be considered as one of the signs of metabolic syndrome involved in the development of periodontitis. Thus, with an increase in body weight, the severity of the clinical course of periodontitis steadily increases, and the revealed dependence is statistically highly significant ($p = 0.01$). With an increase in the number of proteins, carbohydrates and dietary fiber in the diet, a decrease in the degree of periodontitis is observed. An increase in the number of vitamins (A, B1, C) and a number of macro- and microelements (Cu, Zn, K) has the same effect.

Healthy nutrition is a key element that has a significant impact on the general condition of the human body and helps maintain its well-being. Normalization of diet, including a balanced intake of essential nutrients, is a key element in the prevention of periodontal diseases and an important aspect of rehabilitation. The results of this study can be used to develop scientifically based methods aimed at improving the preventive activities of health care workers, including general practitioners, dentists and dental hygienists, increasing the motivation of the population to lead a healthy lifestyle and adhere to the principles of a balanced diet.

Keywords: Nutrition, population, dental morbidity, periodontitis, prevention

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Introduction. In modern society, in the context of urbanization and lifestyle transformation, there is a tendency towards an increase in the prevalence of major non-communicable diseases (NCDs) among the population. This problem is in the focus of both domestic and foreign researchers and is recognized as one of the key ones in ensuring health and sustainable development of mankind in the 21st century. Dental diseases, closely associated with major non-communicable diseases, affect almost half of the world's population throughout life, from early to old age. This makes the prevention of pathology of oral organs and tissues especially important in the context of solving the problem of NCDs in general, putting it among the priority health tasks [1]. According to the World Health Organization (WHO) report for 2024, more than three billion people worldwide are susceptible to dental diseases, the prevalence of which among people over 45 years of age is 90%. Among the adult population of the world, about 20% suffer from severe forms of periodontitis, which is equivalent to more than one billion cases. According to researchers, patients with chronic periodontitis are three times more likely to have an increased risk of developing heart attacks and strokes than patients with intact gums [14]. In addition, signs of periodontal damage may be potential risk factors for increased mortality [13]. It is known that periodontitis may be associated with both certain somatic pathologies [3] and with the nutritional characteristics of patients [10, 20].

In recent years, there have been more and more studies on the impact of nutrition on public health. Many authors note that an unbalanced diet in 30–50% of cases is the cause of a number of non-communicable diseases: cardiovascular disease, diabetes, obesity, osteoporosis and other systemic disorders. The popularization of foods and drinks with a high sugar content in modern society, excessive caloric intake, and fat consumption with a simultaneous insufficient intake of essential nutrients are factors in the development of alimentary-dependent diseases [8, 11, 12, 15] and are prerequisites for the occurrence of inflammatory periodontal diseases [6].

The high prevalence of periodontal diseases, predominantly in people of working age and older, often with a progressive course and insufficient effectiveness of measures taken for prevention and treatment, is acquiring the status of one of the most pressing socially significant medical problems at the present stage of society development [3, 4, 9]. It is known that the main role of nutrition is in trophic, plastic and energetic support of the functional activity of the organism and, in particular, the immune system. Food components can have modifying properties in relation to cellular and humoral, as well as non-specific and native (natural) immunity [16]. Balanced nutrition is necessary both for local stability of tissue cells and for the functioning of the immune system of the oral cavity. Disturbances in the diet can lead to the development of pathological processes in the periodontium [17, 21, 22]. Studies aimed at studying the eating behavior of patients with dental diseases are mainly focused on the analysis of their ability to mechanically process food. In scientific literature, there is a lack of studies devoted to the analysis of the relationships between the qualitative characteristics of the diet of patients with periodontal pathology. An in-depth study of the characteristics of the diet of patients will provide scientifically substantiated data for the development of therapeutic and preventive measures aimed at preventing the development and progression of chronic periodontitis.

The aim of the study: to analyze the diet and identify the relationships between the clinical manifestations of chronic generalized periodontitis and the quality of nutrition in order to improve the effectiveness of treatment and preventive measures within the framework of primary health care.

Materials and methods of the study. The object of the study were 412 people of working age, 171 men and 241 women (mean age 42.6 ± 0.8 years), who had periodontal pathology of varying severity: chronic generalized periodontitis (CGP) (ICD-10 code: K05.31) or chronic gingivitis (K05.10), which was considered as the initial form of periodontitis. No statistically significant differences by gender and severity of periodontal disease were found (p> 0.05), which allowed them to be subsequently analyzed in general groups and cohorts.

An analytical descriptive study of the daily diet of patients with periodontal diseases was conducted and the relationships between the signs of periodontal damage and the quality of nutrition were studied.

During the analysis of dental examination data, all patients from the study group were divided into two subgroups. The first subgroup included patients with initial manifestations of periodontal diseases, such as gingivitis and mild chronic periodontitis, and the second included patients with moderate and severe chronic periodontitis. This division allowed us to exclude intermediate values from mathematical analysis and more clearly identify the differences between the initial signs of periodontal tissue damage and more severe forms of the disease.

For a comprehensive assessment of the dental status of the subjects, the main dental methods were used: patient survey (identification of complaints, collection of anamneses), clinical examination (visual and instrumental examination of the organs and tissues of the mouth). Patients were asked about the first manifestations of the disease, the dynamics of its development, the general well-being of the subject, and somatic status were taken into account. Clarification of this information made it possible to establish cause-and-effect relationships between general pathology and changes in dental health. When assessing the periodontal status, the severity of periodontitis, prevalence and intensity of signs of periodontal damage were determined: bleeding gums during probing, supra- and subgingival tartar, periodontal pocket of 4-5 mm, as well as 6 mm and more, pathological mobility of teeth. During the patient survey, nutrition was assessed taking into account the existing somatic status, including the following

data: a sharp and unexpected increase or decrease in body weight, weakness, nausea, dyspeptic disorders, as well as intolerance to certain foods, poor health after eating, eating habits (including negative ones), adherence to dietary nutrition instructions, deviations in the diet due to changes in the taste or olfactory perception of food, difficulty chewing or swallowing food, refusal to eat for any other reasons.

The study of actual nutrition was carried out using the 24-hour (daily) reproduction method. Based on data on the nature and amount of food consumed per day, the nutritional and energy value of the diet was calculated using the Nutri-prof software package, developed using the reference book of the chemical composition of food products and dishes prepared from them [7]. The degree of rationality of nutrition was assessed in accordance with MR 2.3.1.0253-21. The amount of daily intake of added salt was compared with the volume recommended by WHO [19]. To quantitatively assess the nutritional status of the subjects (the presence of deficiency or excess body weight), the Quetelet index (BMI) was calculated.

Mathematical analysis and statistical processing of the obtained data were carried out using the Matlab program, as well as Microsoft Office Excel 2021 software packages (Microsoft, USA). The variables under study were preliminarily tested for normal distribution using the Shapiro-Wilk (Shapiro S.S., Wilk M.B, 1965) and Epps-Pally (Epps T.W., Pulley, L.B., 1983) criteria. If the distribution of the parameters under study could not be considered normal, the median value was used; in case of normal distribution, the mean value and the error of the mean were used. To compare the medians of the parameters in different groups of patients, a nonparametric method for testing the equality of medians was used – the Mann-Whitney U-test. The moving average method was used to illustrate the nature of the interdependencies of the parameters. In the interpretation of this method, the probability was obtained using a two-sided test for equality of medians, the Wilcoxon rank sum test [2]. At $p<0.05$, the differences were considered statistically conditioned, at $p<0.15$, as a manifestation of a tendency.

Results and discussion. As part of a comprehensive examination of patients with chronic catarrhal gingivitis, 55 people were examined. Evaluation of the periodontal condition in patients of this group allowed us to establish bleeding gums in 89% of patients, in 58% of cases an insignificant amount of soft and hard plaque was detected.

In patients with a mild degree of periodontitis (n = 138), supragingival and subgingival dental deposits were found in all cases. Periodontal pockets with a depth of 4 to 5 mm were detected in 57% of patients. Bleeding gum when brushing teeth were noted in 76% of those examined.

In the group of people with chronic generalized periodontitis of moderate severity (n = 152), bleeding gums were observed in 62% of patients, in 87% of those examined the depth of periodontal pockets ranged from 4 to 5 mm. Pathological tooth mobility of grades I-II was detected in 33% of the examined patients. All of them had soft dental deposits and supragingival/subgingival tartar.

When examining patients with severe chronic generalized periodontitis (n=67), 71% had bleeding gums, 27% had tooth mobility, purulent discharge and swelling of the gums. All patients had abundant supragingival/subgingival dental deposits, soft plaque and bleeding gums upon probing. Tooth mobility reached grades II-III, the depth of periodontal pockets was 6 mm or more with purulent exudate.

Based on the results of the anthropometric parameters assessment of patients with CGP, 11% of respondents were found to be overweight, 18% to be obese grades 1–3, 21% to be underweight, and 50% of respondents had a body mass index within the normal range. Statistically significant differences were found between the observation groups: weight and BMI were 1.2 times higher in the group of patients with the developed form of CGP ($p = 0.01$). The diet of the examined patients is characterized by reduced consumption of such foods as milk, fish, eggs, fruits, vegetables, and increased consumption of bread products and potatoes.

The energy value of the diet in the group of patients with the initial form of periodontal pathology (gingivitis and mild chronic periodontitis), calculated based on the results of the actual diet study, is slightly below the limit of the physiological energy requirement, regulated for both women and men. In the group with the developed form of the disease (moderate and severe), the daily energy requirement is met. Moreover, the differences between the groups are statistically significant ($p\leq0.001$) (Table 1).

The protein content in the diet of both groups is at the lower limit of the norm, the share of the daily energy requirement in the group with the initial form of CGP is 21% higher than the upper limit of the range, and in the developed form it is within the reference range. Fats in the daily diet, without significantly different values among the groups of subjects, are insufficient and do not exceed the consumption standards as a percentage of the caloric content of the diet. The content of saturated (SFA) and monounsaturated fatty acids (MUFA) in both groups exceed physiological norms, and the amount of essential polyunsaturated fatty acids (PUFA) is 50-60% of the daily requirement. No significant differences were found between the groups either. In the diet of subjects in the first group (mild gingivitis and periodontitis), the carbohydrate content is close to the minimum, both in absolute terms and as a percentage of the total caloric content. Patients with moderate and severe periodontitis are characterized by carbohydrate consumption as a percentage of calories that is 10% higher, the differences between the groups are statistically significant ($p\leq0.001$). Dietary fiber, which is known to participate in the mechanism of preventing dental diseases, is 1.5 times less than the lower limit of physiological need in the diet of the subjects of the first group, and at a minimum level in the group with the developed form of CGP. The differences between the groups are also significant ($p\leq0.05$). Cholesterol in the diet, without significantly differing between the groups of subjects, is within the NFP, which is probably due to the low level of consumption of such products as cheeses, processed meat and animal fats.

Table 2 presents the results of the study of the provision of the diet of the subjects with micronutrients and minerals.

In general, the diet of patients with chronic periodontitis is deficient in several micronutrients: B vitamins (B1, B2) contain from 39 to 53% of the NFP, vitamin C 42-45%, vitamin E 40-49%. Vitamin A in the diet of both groups is at the lower limit of the norm. The need for niacin is satisfied in both groups by 111-130%, the differences between the groups are statistically significant ($p\leq0.05$).

The daily diet of the subjects showed a deficiency of the macronutrient's calcium (51-63% of the NFP), magnesium (47-53%), potassium (72%), an optimal level of phosphorus (101-116%) and a slight excess of sodium (106-18%). The intake of added salt in both groups of subjects does not exceed the recommended norms. No statistically significant differences were found between the groups. The level of microelements (iron, zinc, copper and iodine) in the diet of the subjects is generally insufficient, manganese

Table 1

Daily consumption of energy and nutrients by the surveyed

Indicators (per day)	Norms of physiological requirements (NFPs) for energy and nutrients (MR 2.3.1.0253-21)	The actual diet	
		the initial form of CGP	the developed form of CGP
		M±m	M±m
Energy value (kcal)	M 2150-3800; W 1700-3000	1634±58	2346±121**
of Protein, g	M 75-114; W 60-90	68±2	78±8
of Protein, % of kcal	12-14	17±1	13±1
Fats, g	M 72-127; W 57-100	51±3	54±6
Fats, % of kcal	He > 30	28±2	21±3
NLC, % of kcal	He > 10	16±1	13±2
MNFA, % of kcal	He > 10	15±1	17±2
PUFA, % of kcal	6-10	4±1	3±1
Carbohydrates, g	M 301-551; W 238-435	223±13	375±31**
Carbohydrates, % of kcal	56-58	55±3	64±6
Dietary fiber, g	20-25	13±3	20±3*
Cholesterol, mg	He > 300	182± 35	145±31
Added salt, g	5	3.4±0.5	3.8±0.4

Note: M – men, W – women. The differences between the groups with initial and advanced forms of CGP are statistically significant: * - p<0.05; ** - p<0.001.

Table 2

Daily intake of micronutrients and minerals by the surveyed

Показатели (в сутки)	Standards of physiological requirements SPR (MR 2.3.1.0253-21)	The actual diet			
		the initial form of CGP		the initial form of CGP	
		M±m	% NPN	M±SD	% NPN
Vitamin A, mcg pet. eq	M 900; W 800	736±118	-	809±255	-
Vitamin E, mg current eq.	15	6.1±0.6	40	7.3±0.8	49
Vitamin B1, mg	1,5	0.7±0.1	47	0.8±0.1*	53
Vitamin B2, mg	1,8	0.7±0.1	39	0.7±0.1	39
Vitamin C, mg	100	45±4	45	42±9	42
Niacin (vitamin PP), mg niac. eq	20	22±1	111	26±1*	130
Calcium, mg	1000	513±44	51	632±87	63
Magnesium, mg	420	198±10	47	225±21	53
Phosphorus, mg	700	707±25	101	809±66	116
Potassium, mg	3500	2515±130	72	2511±253	72
Sodium, mg	1300	1374±189	106	1532±245	118
Iron, mg	M 10; W 18	12±1	-	16±1***	-
Zinc, mg	12	9.6±0.5	80	12.6±1.0**	105
Iodine, mcg	150	53.5±5.3	36	60.3±11.5	40
Copper, mg	1	0.74±0.07	74	1.13±0.12**	113
Manganese, mg	2	2.19±0.35	110	3.52±0.50*	176

Note. M – men, W – women The differences between groups with initial and advanced forms of CGP are statistically significant: * - p<0.05; ** - p<0.01; *** - p<0.001.

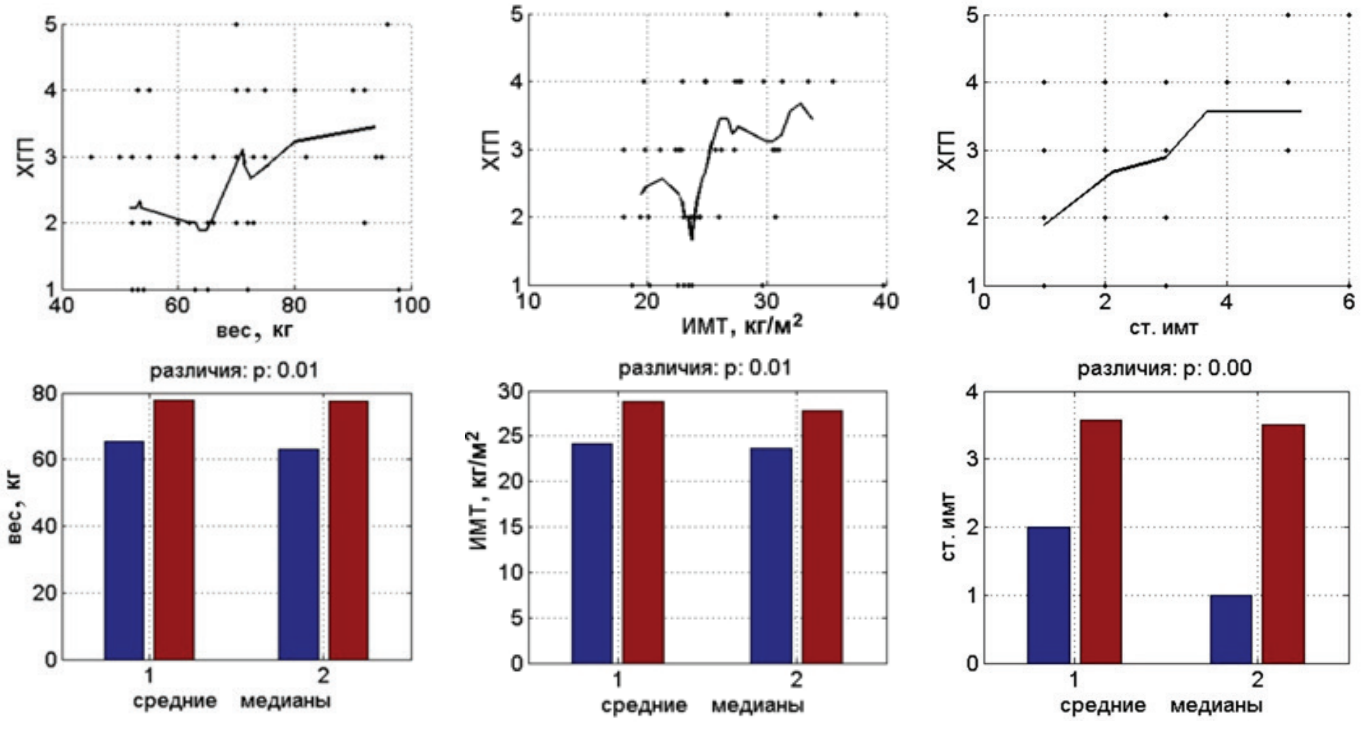
content is 110-176% of the NFP, while the indicators, except for iodine, differ significantly between the groups, in patients with an advanced form of CGP their content is higher.

A comparative analysis of the diet of patients with periodontal pathology of varying severity showed statistically significant differences in the groups in the energy value of the diet, the amount of carbohydrates and dietary fiber, as well as in the content of several micronutrients (vitamins) and minerals. However, the use of a methodological approach based on a moving average made it possible to identify statistical relationships between the degree of development of CGP (by signs), weight and BMI of the subjects (Fig. 1). Thus, with an increase in body weight and, accordingly, the BMI value, the severity of the clinical course of periodontitis steadily increases, and the identified dependence is statistically highly significant (p=0.01), a decrease in the degree of periodontitis is observed with the normalization of proteins, carbohydrates and dietary fiber in the diet. An increase in the amount of vitamins (A, B1, C) and a number of macro- and microelements (Cu, Zn, K) in the diet has the same effect.

The research conducted established that the most common complaint in the group of subjects was bleeding gums (87%), which may be associated with a deficiency of potassium and vitamins B1, B2, E in the body (potassium intake is 72% of the NFP, vitamins less than 50%). The identified significant calcium deficiency (51-63% of the NFP) may affect the condition of the enamel and lead to disruption of the bone structure of the periodontium. Deficiency of vitamin A in the daily diet demonstrates a tendency for patients to develop the most pronounced signs of periodontitis, such as a periodontal pocket 6 mm or more deep, pathological mobility of teeth, characteristic of a severe stage of the disease. With a deficiency of vitamin A, the thickness of the dentin layer decreases, the tendency to develop caries increases, yellow pigmentation of the enamel appears, and its hypoplasia develops. Deficiency of ascorbic acid contributes to the disruption of the collagen structure, leads to the development of pathological periodontal pockets and, subsequently, to tooth mobility [5], which is confirmed by our studies - the provision of the diet of patients with chronic periodontal disease with vitamin C is less than half of the daily NFP.

Microelement balance in the body is the most important aspect of homeostatic regulation. The identified deficiency in the diet of such elements as potassium, magnesium, iron, zinc, iodine, copper can lead to defects in the hard tissues of the teeth, the mucous membrane of the oral cavity, the occurrence and progression of periodontal diseases [18].

It should be noted that patients with initial manifestations of chronic generalized periodontitis (CGP) have an imbalance in the consumption of a number of nutrients, which can contribute to the progression of the disease. At the same time, some patients with an adequately balanced diet were found to have clinical signs of severe periodontitis. These observations may indicate manifestations of malabsorption syndrome. To confirm this assumption and exclude possible pathologies, additional diagnostic measures and consultation with specialized specialists are recommended. The established deficiency in the intake of a number of macro- and micronutrients partially explains the increased susceptibility of periodontal tissues to infection, slowdown in reparative activity. Lack of protein, dietary fiber, vitamins and minerals leads to a weakening of the body's defense mechanisms against external negative influences and can contribute to the development of most chronic non-infectious diseases. The frequency and severity of signs of periodontal damage are associated with impaired intake and absorption of nutrients, which play a key role in many processes of cellular metabolism. Providing



Dependence of the presence of CGP signs (1- bleeding gums, 2 – tartar, 3 – periodontal pocket 4-5 mm, 4- periodontal pocket 6 mm or more, 5- tooth mobility) it depends on the weight of the examined, the BMI value and its degree

the body with the necessary nutrients is one of the key aspects of periodontal disease prevention, since an unbalanced diet contributes to the development of chronic periodontitis [15, 17, 20, 21].

Conclusions. 1. The established cause-and-effect relationship between patients' nutritional factors and the degree of periodontitis confirmed that an unbalanced diet can lead to more severe pathological processes in the periodontium and aggravate the course of the disease. The fewer essential nutrients in the patients' diet, the more pronounced the clinical signs of periodontal damage become. Increased body weight can be considered as one of the signs of metabolic syndrome involved in the formation of periodontitis. Normalization of the diet, including balanced consumption of proteins, fats, carbohydrates, dietary fiber, vitamins (A, B1, B2, C, E) and a number of macro- and microelements (Ca, Mg, K, Fe, Cu, Zn), is a key element in the prevention of periodontal diseases and an important aspect of patient rehabilitation during treatment and observation.

2. The practical significance of this study is determined by the possibility of using its results to develop scientifically based methods for preventing alimentary-dependent diseases in patients with chronic periodontal pathologies. This will provide additional tools for general practitioners, dentists and hygienists in implementing preventive measures and motivating the population to lead a healthy lifestyle, including adherence to the principles of rational nutrition.

3. The implementation of this approach is carried out within the framework of the national project "Long and Active Life", the key event of which is an in-depth study and correction of diets of the population in the constituent entities of the Russian Federation in order to eliminate the deficiency of macro- and micronutrients, taking into account regional characteristics.

The authors declare no conflict of interest.

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