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ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

Медицинские новости Грузии
საქართველოს სამედიცინო სიახლენი

GEORGIAN MEDICAL NEWS

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GMN: Georgian Medical News is peer-reviewed, published monthly journal committed to promoting the science and art of medicine and the betterment of public health, published by the GMN Editorial Board since 1994. GMN carries original scientific articles on medicine, biology and pharmacy, which are of experimental, theoretical and practical character; publishes original research, reviews, commentaries, editorials, essays, medical news, and correspondence in English and Russian.

GMN is indexed in MEDLINE, SCOPUS, PubMed and VINITI Russian Academy of Sciences. The full text content is available through EBSCO databases.

GMN: Медицинские новости Грузии - ежемесячный рецензируемый научный журнал, издаётся Редакционной коллегией с 1994 года на русском и английском языках в целях поддержки медицинской науки и улучшения здравоохранения. В журнале публикуются оригинальные научные статьи в области медицины, биологии и фармации, статьи обзорного характера, научные сообщения, новости медицины и здравоохранения. Журнал индексируется в MEDLINE, отражён в базе данных SCOPUS, PubMed и ВИНТИ РАН. Полнотекстовые статьи журнала доступны через БД EBSCO.

GMN: Georgian Medical News – საქართველოს სამედიცინო სიახლენი – არის ყოველთვიური სამეცნიერო სამედიცინო რეცენზირებადი ჟურნალი, გამოიცემა 1994 წლიდან, წარმოადგენს სარედაქციო კოლეგიისა და აშშ-ის მეცნიერების, განათლების, ინდუსტრიის, ხელოვნებისა და ბუნებისმეტყველების საერთაშორისო აკადემიის ერთობლივ გამოცემას. GMN-ში რუსულ და ინგლისურ ენებზე ქვეყნდება ექსპერიმენტული, თეორიული და პრაქტიკული ხასიათის ორიგინალური სამეცნიერო სტატიები მედიცინის, ბიოლოგიისა და ფარმაციის სფეროში, მიმოხილვითი ხასიათის სტატიები.

ჟურნალი ინდექსირებულია MEDLINE-ის საერთაშორისო სისტემაში, ასახულია SCOPUS-ის, PubMed-ის და ВИНТИ РАН-ის მონაცემთა ბაზებში. სტატიების სრული ტექსტი ხელმისაწვდომია EBSCO-ს მონაცემთა ბაზებიდან.

WEBSITE

www.geomednews.com

К СВЕДЕНИЮ АВТОРОВ!

При направлении статьи в редакцию необходимо соблюдать следующие правила:

1. Статья должна быть представлена в двух экземплярах, на русском или английском языках, напечатанная через **полтора интервала на одной стороне стандартного листа с шириной левого поля в три сантиметра**. Используемый компьютерный шрифт для текста на русском и английском языках - **Times New Roman (Кириллица)**, для текста на грузинском языке следует использовать **AcadNusx**. Размер шрифта - **12**. К рукописи, напечатанной на компьютере, должен быть приложен CD со статьей.

2. Размер статьи должен быть не менее десяти и не более двадцати страниц машинописи, включая указатель литературы и резюме на английском, русском и грузинском языках.

3. В статье должны быть освещены актуальность данного материала, методы и результаты исследования и их обсуждение.

При представлении в печать научных экспериментальных работ авторы должны указывать вид и количество экспериментальных животных, применявшиеся методы обезболивания и усыпления (в ходе острых опытов).

4. К статье должны быть приложены краткое (на полстраницы) резюме на английском, русском и грузинском языках (включающее следующие разделы: цель исследования, материал и методы, результаты и заключение) и список ключевых слов (key words).

5. Таблицы необходимо представлять в печатной форме. Фотокопии не принимаются. **Все цифровые, итоговые и процентные данные в таблицах должны соответствовать таковым в тексте статьи**. Таблицы и графики должны быть озаглавлены.

6. Фотографии должны быть контрастными, фотокопии с рентгенограмм - в позитивном изображении. Рисунки, чертежи и диаграммы следует озаглавить, пронумеровать и вставить в соответствующее место текста **в tiff формате**.

В подписях к микрофотографиям следует указывать степень увеличения через окуляр или объектив и метод окраски или импрегнации срезов.

7. Фамилии отечественных авторов приводятся в оригинальной транскрипции.

8. При оформлении и направлении статей в журнал МНГ просим авторов соблюдать правила, изложенные в «Единых требованиях к рукописям, представляемым в биомедицинские журналы», принятых Международным комитетом редакторов медицинских журналов - <http://www.spinesurgery.ru/files/publish.pdf> и http://www.nlm.nih.gov/bsd/uniform_requirements.html В конце каждой оригинальной статьи приводится библиографический список. В список литературы включаются все материалы, на которые имеются ссылки в тексте. Список составляется в алфавитном порядке и нумеруется. Литературный источник приводится на языке оригинала. В списке литературы сначала приводятся работы, написанные знаками грузинского алфавита, затем кириллицей и латиницей. Ссылки на цитируемые работы в тексте статьи даются в квадратных скобках в виде номера, соответствующего номеру данной работы в списке литературы. Большинство цитированных источников должны быть за последние 5-7 лет.

9. Для получения права на публикацию статья должна иметь от руководителя работы или учреждения визу и сопроводительное отношение, написанные или напечатанные на бланке и заверенные подписью и печатью.

10. В конце статьи должны быть подписи всех авторов, полностью приведены их фамилии, имена и отчества, указаны служебный и домашний номера телефонов и адреса или иные координаты. Количество авторов (соавторов) не должно превышать пяти человек.

11. Редакция оставляет за собой право сокращать и исправлять статьи. Корректур авторам не высылаются, вся работа и сверка проводится по авторскому оригиналу.

12. Недопустимо направление в редакцию работ, представленных к печати в иных издательствах или опубликованных в других изданиях.

При нарушении указанных правил статьи не рассматриваются.

REQUIREMENTS

Please note, materials submitted to the Editorial Office Staff are supposed to meet the following requirements:

1. Articles must be provided with a double copy, in English or Russian languages and typed or computer-printed on a single side of standard typing paper, with the left margin of 3 centimeters width, and 1.5 spacing between the lines, typeface - **Times New Roman (Cyrillic)**, print size - 12 (referring to Georgian and Russian materials). With computer-printed texts please enclose a CD carrying the same file titled with Latin symbols.

2. Size of the article, including index and resume in English, Russian and Georgian languages must be at least 10 pages and not exceed the limit of 20 pages of typed or computer-printed text.

3. Submitted material must include a coverage of a topical subject, research methods, results, and review.

Authors of the scientific-research works must indicate the number of experimental biological species drawn in, list the employed methods of anesthetization and soporific means used during acute tests.

4. Articles must have a short (half page) abstract in English, Russian and Georgian (including the following sections: aim of study, material and methods, results and conclusions) and a list of key words.

5. Tables must be presented in an original typed or computer-printed form, instead of a photocopied version. **Numbers, totals, percentile data on the tables must coincide with those in the texts of the articles.** Tables and graphs must be headed.

6. Photographs are required to be contrasted and must be submitted with doubles. Please number each photograph with a pencil on its back, indicate author's name, title of the article (short version), and mark out its top and bottom parts. Drawings must be accurate, drafts and diagrams drawn in Indian ink (or black ink). Photocopies of the X-ray photographs must be presented in a positive image in **tiff format**.

Accurately numbered subtitles for each illustration must be listed on a separate sheet of paper. In the subtitles for the microphotographs please indicate the ocular and objective lens magnification power, method of coloring or impregnation of the microscopic sections (preparations).

7. Please indicate last names, first and middle initials of the native authors, present names and initials of the foreign authors in the transcription of the original language, enclose in parenthesis corresponding number under which the author is listed in the reference materials.

8. Please follow guidance offered to authors by The International Committee of Medical Journal Editors guidance in its Uniform Requirements for Manuscripts Submitted to Biomedical Journals publication available online at: http://www.nlm.nih.gov/bsd/uniform_requirements.html
http://www.icmje.org/urm_full.pdf

In GMN style for each work cited in the text, a bibliographic reference is given, and this is located at the end of the article under the title "References". All references cited in the text must be listed. The list of references should be arranged alphabetically and then numbered. References are numbered in the text [numbers in square brackets] and in the reference list and numbers are repeated throughout the text as needed. The bibliographic description is given in the language of publication (citations in Georgian script are followed by Cyrillic and Latin).

9. To obtain the rights of publication articles must be accompanied by a visa from the project instructor or the establishment, where the work has been performed, and a reference letter, both written or typed on a special signed form, certified by a stamp or a seal.

10. Articles must be signed by all of the authors at the end, and they must be provided with a list of full names, office and home phone numbers and addresses or other non-office locations where the authors could be reached. The number of the authors (co-authors) must not exceed the limit of 5 people.

11. Editorial Staff reserves the rights to cut down in size and correct the articles. Proof-sheets are not sent out to the authors. The entire editorial and collation work is performed according to the author's original text.

12. Sending in the works that have already been assigned to the press by other Editorial Staffs or have been printed by other publishers is not permissible.

**Articles that Fail to Meet the Aforementioned
Requirements are not Assigned to be Reviewed.**

ავტორთა საქურაღებოლ!

რედაქციაში სტატიის წარმოდგენისას საჭიროა დაიცვათ შემდეგი წესები:

1. სტატია უნდა წარმოადგინოთ 2 ცალად, რუსულ ან ინგლისურ ენებზე დაბეჭდილი სტანდარტული ფურცლის 1 გვერდზე, 3 სმ სიგანის მარცხენა ველისა და სტრიქონებს შორის 1,5 ინტერვალის დაცვით. გამოყენებული კომპიუტერული შრიფტი რუსულ და ინგლისურენოვან ტექსტებში - **Times New Roman (Кириллица)**, ხოლო ქართულენოვან ტექსტში საჭიროა გამოვიყენოთ **AcadNusx**. შრიფტის ზომა – 12. სტატიას თან უნდა ახლდეს CD სტატიით.

2. სტატიის მოცულობა არ უნდა შეადგენდეს 10 გვერდზე ნაკლებს და 20 გვერდზე მეტს ლიტერატურის სიის და რეზიუმეების (ინგლისურ, რუსულ და ქართულ ენებზე) ჩათვლით.

3. სტატიაში საჭიროა გაშუქდეს: საკითხის აქტუალობა; კვლევის მიზანი; საკვლევი მასალა და გამოყენებული მეთოდები; მიღებული შედეგები და მათი განსჯა. ექსპერიმენტული ხასიათის სტატიების წარმოდგენისას ავტორებმა უნდა მიუთითონ საექსპერიმენტო ცხოველების სახეობა და რაოდენობა; გაუტკივარებისა და დაძინების მეთოდები (მწვავე ცდების პირობებში).

4. სტატიას თან უნდა ახლდეს რეზიუმე ინგლისურ, რუსულ და ქართულ ენებზე არანაკლებ ნახევარი გვერდის მოცულობისა (სათაურის, ავტორების, დაწესებულების მითითებით და უნდა შეიცავდეს შემდეგ განყოფილებებს: მიზანი, მასალა და მეთოდები, შედეგები და დასკვნები; ტექსტუალური ნაწილი არ უნდა იყოს 15 სტრიქონზე ნაკლები) და საკვანძო სიტყვების ჩამონათვალი (key words).

5. ცხრილები საჭიროა წარმოადგინოთ ნაბეჭდი სახით. ყველა ციფრული, შემაჯამებელი და პროცენტული მონაცემები უნდა შეესაბამებოდეს ტექსტში მოყვანილს.

6. ფოტოსურათები უნდა იყოს კონტრასტული; სურათები, ნახაზები, დიაგრამები - დასათაურებული, დანომრილი და სათანადო ადგილას ჩასმული. რენტგენოგრამების ფოტოასლები წარმოადგინეთ პოზიტიური გამოსახულებით **tiff** ფორმატში. მიკროფოტოსურათების წარწერებში საჭიროა მიუთითოთ ოკულარის ან ობიექტივის საშუალებით გადიდების ხარისხი, ანათალებების შედეგების ან იმპრეგნაციის მეთოდი და აღნიშნოთ სურათის ზედა და ქვედა ნაწილები.

7. სამამულო ავტორების გვარები სტატიაში აღინიშნება ინიციალების თანდართვით, უცხოურისა – უცხოური ტრანსკრიპციით.

8. სტატიას თან უნდა ახლდეს ავტორის მიერ გამოყენებული სამამულო და უცხოური შრომების ბიბლიოგრაფიული სია (ბოლო 5-8 წლის სიღრმით). ანბანური წყობით წარმოდგენილ ბიბლიოგრაფიულ სიაში მიუთითეთ ჯერ სამამულო, შემდეგ უცხოელი ავტორები (გვარი, ინიციალები, სტატიის სათაური, ჟურნალის დასახელება, გამოცემის ადგილი, წელი, ჟურნალის №, პირველი და ბოლო გვერდები). მონოგრაფიის შემთხვევაში მიუთითეთ გამოცემის წელი, ადგილი და გვერდების საერთო რაოდენობა. ტექსტში კვადრატულ ფხიხლებში უნდა მიუთითოთ ავტორის შესაბამისი N ლიტერატურის სიის მიხედვით. მიზანშეწონილია, რომ ციტირებული წყაროების უმეტესი ნაწილი იყოს 5-6 წლის სიღრმის.

9. სტატიას თან უნდა ახლდეს: ა) დაწესებულების ან სამეცნიერო ხელმძღვანელის წარდგინება, დამოწმებული ხელმოწერითა და ბეჭდით; ბ) დარგის სპეციალისტის დამოწმებული რეცენზია, რომელშიც მითითებული იქნება საკითხის აქტუალობა, მასალის საკმაობა, მეთოდის სანდოობა, შედეგების სამეცნიერო-პრაქტიკული მნიშვნელობა.

10. სტატიის ბოლოს საჭიროა ყველა ავტორის ხელმოწერა, რომელთა რაოდენობა არ უნდა აღემატებოდეს 5-ს.

11. რედაქცია იტოვებს უფლებას შეასწოროს სტატია. ტექსტზე მუშაობა და შეჯერება ხდება საავტორო ორიგინალის მიხედვით.

12. დაუშვებელია რედაქციაში ისეთი სტატიის წარდგენა, რომელიც დასაბეჭდად წარდგენილი იყო სხვა რედაქციაში ან გამოქვეყნებული იყო სხვა გამოცემებში.

აღნიშნული წესების დარღვევის შემთხვევაში სტატიები არ განიხილება.

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INTEGRAL METHOD FOR ASSESSING THE EFFICIENCY OF DENTAL CARIES PREVENTION

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Abstract.

Different microbiological methods have appeared in the access of a modern dentists. Some of these methods allow assessing the content of cariogenic microorganisms - Streptococcus mutans and Lactobacillus.

The purpose of the study is to create an objective indicator based on microbiological studies and the DMF index, which gives an idea of the effectiveness of preventive measures in a group of people at the secondary prevention level.

As materials, we used research data of the therapeutic dentistry department, as well as microbiological, virological, and immunological data of the PSMU (Poltava). It was used mathematical methods of data analysis - approximation of graphs using the Excel 2010 program, as well as online methods for finding definite integrals.

In explaining the causes of dental caries, it is really important that carries its occur due to a violation of the dynamic balance between the forces of opposing biological objects - macro- and microorganisms. Based on this statement, we propose the most objective parameter taken into account in the prevention of dental caries, to position the interaction between the macroorganism and its oral microbiocenosis representatives. This parameter can be determined when considering together the number of carriers of cariogenic microorganisms in the examined people and the number of cariogenic microorganisms representatives in their oral liquid.

For realizing this idea, we will summarize in one table the number of carriers of Streptococcus γ -haemolyticus with the number of Streptococcus γ -haemolyticus in the oral liquid of the examined people. For creating an objective indicator based on microbiological studies and the DMF index, we made further transformations based on the use of a definite integral.

After that work, we noted the positive aspects of the proposed integral method for assessing the prevention of dental caries:

- when the studying area tends to decrease due to the reduction of the gaps along the abscissa, we have an idea about the reducing of tertiary preventive measures.

- when the studying area tends to decrease due to the reduction of gaps along the ordinate from above, we have an idea about the pathogen focused prevention.

- when the studying area tends to decrease due to the reduction of gaps along the ordinate from below, we have an idea about the carrier's focused prevention.

- when the studying area tends to decrease due to the reduction of gaps along the ordinate and abscissa, we have an idea about the prevention focused on both - carriers of the pathogen and the pathogen.

Based on DMF index and microbiological studies, an integral method for evaluating the effectiveness of caries prevention has been developed. The method is based on the use of an integral

indicator that takes into account the etiological marker of dental caries and the severity of the carious lesion. During calculating the indicator, interactions between cariogenic microorganisms and the host organism are also taken into account. The integrated method for evaluating the effectiveness of caries prevention allows you to adjust preventive measures in groups.

Key words. Dental, microbiological studies, DMF index.

Introduction.

Different microbiological methods have appeared in the access of a modern dentists. Some of these methods allow assessing the content of cariogenic microorganisms - Streptococcus mutans and Lactobacillus. Kits for conducting such rapid tests are produced in different countries all over the world. These are Dentocult SM Strip mutans (Orion Diagnostica, Finland; Vivadent, Liechtenstein), CRT-bacteria (Vivadent, Liechtenstein), Saliva-check mutans (GC Asia Dental Pte Ltd, Japan) and Dentocult LB (Orion Diagnostica, Finland; Vivadent, Liechtenstein). According to these tests, individual caries prevention programs have been created [1,2]. Prophylactic measures refer to primary prevention. It leads to some difficulties in using such tests for secondary and tertiary prevention.

In addition to primary prevention, there are rehabilitation programs that relate to secondary and tertiary prevention. In secondary prevention, it is used an indicator of changes in the intensity of caries growth over a certain period, which is considered sufficiently informative to assess the preventive effect of secondary prevention set measures. This indicator is based on the DMF index. This index has many varieties and can be used at the individual, group, and population levels [3,4]. After all, this indicator and its modifications also have negative aspects. The DMF index does not take into account the initial manifestations of caries and its etiology. This circumstance causes difficulties in the application of this index in primary prevention.

We have set several following tasks:

1. To develop a method for evaluating the dental caries prevention effectiveness using mathematical analysis.

2. On the basis of DMF index and microbiological studies, create an indicator that takes into account the etiological marker of caries and the severity of carious lesions.

3. This new indicator should take into account the interactions between cariogenic microorganisms and the host organism.

4. This new indicator should take into account the effectiveness of secondary prevention measures and their correction during implementation.

This direction is not fully developed. So, the study of this direction is relevant.

The purpose of the study is to create an objective indicator based on microbiological studies and the DMF index, which gives an idea of the effectiveness of preventive measures in a group of people at the secondary prevention level.

Materials and Methods.

As materials, we used research data of the therapeutic dentistry department, as well as microbiological, virological, and immunological data of the PSMU (Poltava). It was used mathematical methods of data analysis - approximation of graphs using the Excel 2010 program, as well as online methods for finding definite integrals.

Main part.

Microorganisms are causative agents of various diseases. This attitude to them lead to searching different methods of microorganisms destruction. However, in recent years, more and more attention has been paid to the study of the human microbiome, as well as the interactions of human microbiocenoses with each other and with the person himself.

Modern dentistry considers the microflora of the oral cavity as the cause of the carious process. Streptococci and lactobacilli are considered the most active in carious progress [4-6].

Rapid tests for the determination of *Streptococcus mutans* and *Lactobacillus* obviously have some disadvantages. According to the Saliva-check mutans test, the patient is considered to be at risk of caries when the amount of *S. mutans* in the oral fluid is 5×10^5 CFU/ml. The Dentocult LB test for revealing the presence of lactobacilli is considered positive at 105 CFU/ml. The exact number of microorganisms in these tests is not taken into account. This circumstance allows us to make only a supposition about the risk zone in which the subject is located.

New research methods have become more accurate and informative. In 2007, a large-scale international Human Microbiome Project was launched. Its first phase was focused on determining the human microflora and its characteristics [7]. To systematize the bacteria of the human oral cavity, the Human Oral Microbiome Database (HOMD) was created. The microbiota of the oral cavity is the most accessible for study. In particular, oral fluid can be used as a non-invasive, easily reproducible, and low-cost method for diagnosing and monitoring the body's physiological homeostasis and its destabilization [8].

Researchers of the Therapeutic Dentistry Department and the Department of Microbiology, Virology, and Immunology of the PSMU (Poltava, Ukraine) in 2013 studied the microbiocenosis of the oral cavity in young people aged 19-25 years with different intensity of the carious process. It was observed the percentage of carriers of the studied representatives of microflora and the quantitative content of microflora in carriers. In particular, in this study, indicators were determined regarding lactobacilli, streptococci (including γ -hemolytic streptococci, which include *S. mutans*). The results of the study showed that an increase in the intensity of dental caries is accompanied by changes in the balance of the oral microflora composition. Statistical analysis of the obtained results was carried out using a standard program software "Microsoft Excel 2003". The probability of differences in the results obtained for different groups was determined using Student's t-test of reliability [9].

As it had been mentioned before the DMF index does not take into account the initial manifestations of caries and its etiology. Also, the DMF index has another negative aspect.

- DMF index reflects the past dynamics of caries and only increases with the age of the patient.

- DMF index and its modifications are unreliable with an increase in tooth lesions due to the formation of new cavities in the treated teeth, the occurrence of secondary caries and the loss of fillings.

Approximation is used in a number of different prognostication methods. Approximation helps researchers to make approximate calculations and calculate the planned indicators by replacing the original objects with simpler ones [10].

The definite integral is one of the basic concepts of mathematical analysis. The geometric meaning of a definite integral is the expression of the "curvilinear trapezoid" area bounded by the graph of a function [11].

In the study of oral microbiocenosis, indicators were determined regarding lactobacilli and streptococci (including γ -hemolytic streptococci, to which *S. mutans* belongs), as well as the number of *Streptococcus* γ -haemolyticus and *Lactobacillus* in the oral liquid in individuals with different caries intensity (Table 1).

The percentage of carriers of the above-mentioned oral microflora representatives among the examined people is shown in Table 2.

Table 1. The amount of *Streptococcus* γ -haemolyticus and *Lactobacillus* in the oral liquid of people with different caries intensity, lg CFU/ml.

Microflora	DMF=0	DMF≤6	DMF≥6
<i>S. γ-haemolyticus</i>	6,0±0,10	6,7±0,06	7,3±0,07
<i>Lactobacillus</i>	4,1±0,05	4,4±0,13	4,9±0,18

Table 2. The number of carriers of *Streptococcus* γ -haemolyticus and *Lactobacillus* with different intensity of caries, %.

Microflora	DMF=0	DMF ≤6	DMF ≥6
Carriers of <i>S. γ-haemolyticus</i>	100	100	100
Carriers of <i>Lactobacillus</i>	43	55	70

In explaining the causes of dental caries, it is really important that carries it occur due to a violation of the dynamic balance between the forces of opposing biological objects - macro- and microorganisms [12]. Based on this statement, we propose the most objective parameter taken into account in the prevention of dental caries, to position the interaction between the microorganism and its oral microbiocenosis representatives. This parameter can be determined when considering together the number of carriers of cariogenic microorganisms in the examined people and the number of cariogenic microorganisms representatives in their oral liquid.

For realizing this idea, we will summarize in one table the number of carriers of *Streptococcus* γ -haemolyticus with the number of *Streptococcus* γ -haemolyticus in the oral liquid of the examined people. For more convenient calculations, 100% carriage will be taken in account like 1 and the DMF index will be represented as rigidly fixed units (Table 3). Then we remake these data into graphs and approximate them using Excel 2010 (Figure 1).

We have done exactly the same manipulations with the number of *Lactobacillus* microorganisms and their carriers (Table 4 and Figure 2).

Table 3. The number of carriers of *Streptococcus γ-haemolyticus* with different intensity of caries (%) and the content of *Streptococcus γ-haemolyticus* in the oral liquid of these individuals (Ig CFU / ml).

Indexes	DMF=0	DMF =3	DMF =6
<i>S. γ-haemolyticus</i>	6,0	6,7	7,3
% of carriers	1	1	1

Table 4. The number of carriers of *Lactobacillus* with different caries intensity (%) and the content of *Lactobacillus* in the oral liquid of these individuals (Ig CFU / ml).

Indexes	DMF=0	DMF =3	DMF =6
<i>Lactobacillus</i>	4,1	4,4	4,9
% of carriers	0,43	0,55	0,70

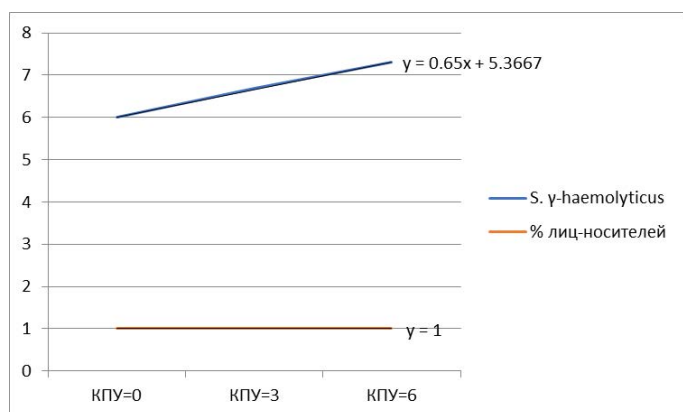


Figure 1. Graph of the remaking of table 3 data into a visual form.

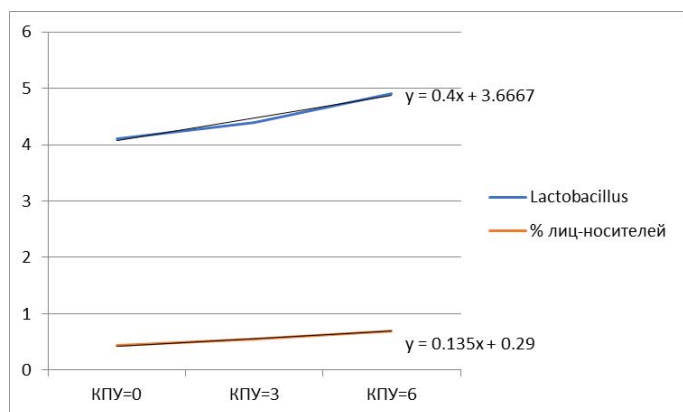


Figure 2. Graph of the remaking of table 4 data into a visual form.

Approximation allowed us to obtain, on the basis of the Excel 2010 program, close to the original data formulas for the interaction functions of representatives of the oral microbiota, which has cariogenic properties, with persons-carriers of these microorganisms: $y=0.65x+5.3667$ for the number of *Streptococcus γ-haemolyticus* and $y=0.135x + 0.29$ for the number of persons carrying them in the surveyed contingent; $y=0.4x+3.667$ for the number of *Lactobacillus* and $y=0.135x+0.29$ for the number of their carriers in the surveyed population. As a result of the operations performed, we obtained mathematical and graphical models suitable for deriving further conclusions based on them. In addition, these models can be

used for further transformations in the mathematical analysis of the studied data.

For creating an objective indicator based on microbiological studies and the DMF index, we made further transformations based on the use of a definite integral. The geometric idea of a definite integral is the area. Therefore, it is used to find the area of figures enclosed within the specified limits of functions [13,14].

Because of the microbiological study converted into mathematical formulas, we made further transformations. We imagined that during the first examination of the group of respondents, their DMF index was equal to zero, the number of carriers of these microorganisms in percentages and the content of the microorganisms themselves in CFU / ml corresponded to those given in tables 1 and 2 with DMF = 0. During the second examination of the group of respondents, the average DMF index was less than or equal to 6, the number of carriers of these microorganisms in percentages and the content of the microorganisms themselves in CFU / ml corresponded to those given in tables 1 and 2 with DMF = 3. After some time, during the third examination of the group of respondents, their average DMF index was already more than or equal to 6, the number of carriers of these microorganisms in percent and the content of the microorganisms themselves in CFU / ml corresponded to those given in tables 1 and 2 with DMF =6. The obtained data were approximated to those which specified in tables 3 and 4. Then, using the Excel 2010 program, trend graphs were built, and the trend functions were approximated, as shown in figures 1 and 2. As a result, the numerical values of the areas enclosed between the found functions at certain intervals of DMF values were determined. For realizing this, we used the method of calculating the areas of flat figures using a definite integral (formula 1).

$$S = \int_a^b f(x)dx - \int_a^b \varphi(x)dx \quad (1)$$

where: S is the area of the desired figure; a, b - limits of the DMF, in which it is necessary to find the area of the desired figure; f(x) is the upstream function; $\varphi(x)$ is the underlying function; dx is the differential of the function.

To find the required area, we used the help of an online calculator, which greatly simplified the task.

Results.

We used an online calculator to find the area with the help of a definite integral for the interactions between *Streptococcus γ-haemolyticus* and the examined contingent in the range of DMF index from 0 to 3, we obtained a value of 16.025 conventional square units [15]. For the interval DMF index from 3 to 6, a numerical value of 21.8751 conventional square units was obtained [16].

We have done the same operations with using an online calculator to find the area with the help of a definite integral for the interactions between *Lactobacillus* and the examined

contingent in the range of DMF from 0 to 3, we obtained a value of 11.3235 conventional square units [17]. For the interval DMF from 3 to 6, a numerical value of 13.7083 conventional square units was obtained [18].

After analyzing the situation of interactions between *Streptococcus γ-haemolyticus* and the examined contingent, we saw that the area of interaction increases by 5.8501 conventional square units. This circumstance led to the assumption that ineffective preventive measures were chosen, or the diet and lifestyle of the examined contingent led to an increase of the carious in the group. This increase is associated with the vital activity of *Streptococcus γ-haemolyticus*.

After analyzing the interactions between *Lactobacillus* and the examined contingent, we saw that the interaction area increased by 2.3848 conventional square units. This circumstance led to the assumption that either ineffective preventive measures were chosen, or the diet and lifestyle of the examined contingent led to an increase in the intensity of the carious process in the group. Again, this increase is due to the activity of *Lactobacillus*. However, in numerical terms, the activity of *Lactobacillus* is inferior to the activity of *Streptococcus γ-haemolyticus*, which could indicate the auxiliary role of lactobacilli in the caries-forming process.

After that work, we noted the positive aspects of the proposed integral method for assessing the prevention of dental caries:

- when the studying area tends to decrease due to the reduction of the gaps along the abscissa, we have an idea about the reducing of tertiary preventive measures.
- when the studying area tends to decrease due to the reduction of gaps along the ordinate from above, we have an idea about the pathogen focused prevention.
- when the studying area tends to decrease due to the reduction of gaps along the ordinate from below, we have an idea about the carrier's focused prevention.
- when the studying area tends to decrease due to the reduction of gaps along the ordinate and abscissa, we have an idea about the prevention focused on both - carriers of the pathogen and the pathogen.

Conclusion.

Based on DMF index and microbiological studies, an integral method for evaluating the effectiveness of caries prevention has been developed. The method is based on the use of an integral indicator that takes into account the etiological marker of dental caries and the severity of the carious lesion. During calculating the indicator, interactions between cariogenic microorganisms and the host organism are also taken into account. The integrated method for evaluating the effectiveness of caries prevention allows you to adjust preventive measures in groups.

REFERENCES

1. Caries Risk Test – ru – VivaDens. <https://vivadens.eu/ru/caries-risk-test-ru/>.
2. Modrinskaya YV. Assessment of the risk of occurrence and prediction of dental caries: textbook. Manual. Minsk: BGMU;2013:23.
3. Борисенко АВ, редактор. Терапевтическая стоматология: в 4 томах. Том 2. Кариес. Пульпит. Периодонтит. Учебник (ВУЗ IV уровня. Издание 2-е, перераб. и доп. Киев: Медицина; 2013:576.
4. Ніколішин АК, редактор. Терапевтична стоматологія: підручник для студентів стоматологічного факультету вищих медичних навчальних закладів IV рівня акредитації. Вид 2-ге, виправлене і доповнене. Вінниця: Нова Книга; 2012:680.
5. Боровский ЕВ, Леонтьев ВК Биология полости рта. Москва: Медицина; 2001:301.
6. Іваницький Ю, Іваницька ОС, Петрушанко ТО. Гіперчутливість зубів: навчальний посібник для студентів стоматологічних факультетів вищих медичних навчальних закладів IV рівня акредитації. Полтава: Дивосвіт; 2019:108.
7. Проект «Микробиом человека»-Википедия.html. https://ru.wikipedia.org/wiki/Проект_«Микробиом_человека». 2022.
8. Stepanova TYu, Tymofeeva AV. Mykrobyota rotovoj polosty cheloveka. *Sovremenni problemy nauky u obrazovanuu*. 2016;5.
9. Зайцев АВ, Котелевська НВ, Бойченко ОМ, Ніколішин АК Обчислення міжмікробних взаємин орального біотопу. Український стоматологічний альманах. 2021;2:6-10.
10. Зайцев АВ, Котелевська НВ, Бойченко ОМ, Ніколішин АК Обчислення міжмікробних взаємин орального біотопу. Український стоматологічний альманах. 2021;2:6-10.
11. Определённый интеграл — Википедия. 2022.
12. Окушко ВР Основы физиологии зуба: Учебник для врачей-стоматологов и студентов медицинских университетов. Тирасполь: Изд-во Приднестр. ун-та. 2005:240.
13. Определенный интеграл. Примеры решений. 2022.
14. Зельдович ЯБ Высшая математика для начинающих и ее приложения к физике. Москва: Физматгиз. 1960;460.
15. $\int (0.65x+5.3667)-1 dx$ Решение определённых интегралов - Калькулятор Онлайн.
16. $\int (0.65x+5.3667)-1 dx$ Решение определённых интегралов - Калькулятор Онлайн.
17. $\int (0.4x+3.667)-(0.135x+0.29) dx$ Решение определённых интегралов - Калькулятор Онлайн.
18. $\int (0.4x+3.667)-(0.135x+0.29) dx$ Решение определённых интегралов - Калькулятор Онлайн.