

# GEORGIAN MEDICAL NEWS

ISSN 1512-0112

NO 9 (354) Декабрь 2024

ТБИЛИСИ - NEW YORK



ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

Медицинские новости Грузии  
საქართველოს სამედიცინო სიახლენი

## GEORGIAN MEDICAL NEWS

Monthly Georgia-US joint scientific journal published both in electronic and paper formats of the Agency of Medical Information of the Georgian Association of Business Press.  
Published since 1994. Distributed in NIS, EU and USA.

**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](http://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](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.nlm.nih.gov/bsd/uniform_requirements.html)  
[http://www.icmje.org/urm\\_full.pdf](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, ანათალების 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.

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## THE ORAL HEALTH STATUS AND PREVENTIVE MEASUREMENTS FOR CANCER PATIENTS

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### Abstract.

Oncology patients frequently face a variety of oral side effects as a result of cancer treatments like chemotherapy, radiation therapy, and targeted therapy. One common issue is periodontitis. Additionally, patients with COVID-19 have reported a range of oral symptoms, including necrotizing periodontal disease.

The objective of our study is to evaluate the oral health status of cancer patients during COVID-19 infection.

**Material and methods:** The research involved 213 Georgian citizens' aged 18 to 65, divided into four groups: Group I consisted of 120 healthy individuals (without cancer); Group II included 60 healthy individuals who had contracted COVID-19; Group III comprised 40 cancer patients; and Group IV included 85 cancer patients who also had COVID-19. We aimed to analyze the correlation between oral health characteristics and both COVID-19 status and cancer diagnosis, as well as the types of cancer treatments received.

**Results:** The study showed an increased signs in oral index scores in cancer and covid groups compared to healthy group. Bleeding index: in group I -  $0.20 \pm 0.41$ , in group II -  $0.85 \pm 1.13$ , in group III -  $0.48 \pm 0.85$  and in group IV  $0.95 \pm 1.20$   $p=0.079$ ). Loss of gingival attachment: 0-3 mm: in group I - 2 (10%), in group II - 33 (55%), in group III - 7 (14.58%), in group IV - 1 (12.94%) ( $p<0.0001$ ); 4-5 mm: in group I - 0, in group II - 20 (33.3%), in group III - 13 (27.08%), in group IV - 25 (29.41%) ( $p=0.2489$ ); 6-8 mm: in group I - 0, in group II - 6 (7.06%), in group III - 1 (2.08%), in IV group - 6 (7.06%) ( $p=0.2200$ ).

We diagnosed the 40 patients with periodontitis. Cancer and Cancer+Covid group show a significant positive correlation with periodontitis, ( $r=0.197$ ,  $p=0.004$ ; and  $r=0.144$ ,  $p=0.036$  respectively).

### Conclusions:

- Cancer patients exhibit a high incidence of periodontitis, which is exacerbated by COVID-19 transmission. However, receiving a booster vaccine dose can significantly reduce the risk of tooth loss.

- The oral health status of cancer patients must be prioritized, necessitating the development of an appropriate protocol during and after cancer treatment. Special attention should be given to those patients who have also contracted COVID-19.

- To prevent periodontitis and tooth loss during cancer treatment, it is crucial for patients, particularly those infected with COVID-19, to maintain regular dental follow-ups.

**Key words.** Post Covid, Cancer Patients, periodontitis, risk assessment.

### Introduction.

A healthy oral cavity is a key indicator of overall health and quality of life, playing a crucial role in general well-being at every life stage. A well-maintained mouth not only supports proper nutrition but also enhances social interactions, boosts self-esteem, and contributes to feelings of well-being. Additionally, the mouth acts as a "window" to the rest of the body, offering important clues about general health issues. Oncology patients frequently experience various oral side effects due to cancer treatments such as chemotherapy, radiation therapy, and targeted therapy. These side effects can range from mild to severe, with periodontitis being one of the most common complications [1].

Periodontitis, defined as a chronic, multifactorial inflammatory disease, is intricately linked to dysbiotic plaque biofilms and is characterized by the progressive destruction of the structures that support the teeth. This condition exemplifies a complex interplay of factors leading to significant periodontal tissue degradation [2]. The potential association between periodontal pathologies and systemic diseases is of particular significance [3].

Indeed, periodontal pathogens and their byproducts, including inflammatory mediators such as IL-6, can infiltrate the bloodstream, contributing to various systemic diseases. Chronic periodontitis has been identified as a significant risk factor for conditions such as cardiovascular disease, diabetes, respiratory diseases, rheumatoid arthritis, and other related disorders [4].

Two potential mechanisms that may elucidate the association between periodontitis and COVID-19 are the direct exposure of the virus to periodontal tissues and the phenomenon known as the "cytokine storm" associated with COVID-19. For an extended period, the pathophysiology of periodontitis has been linked to a cytokine-mediated response [5].

The onset of a cytokine storm has been associated with the detrimental effects of the recent COVID-19 pandemic, and its components bear a resemblance to the cytokine expression observed in periodontitis [6]. Active viruses can interact with bacteria to create a more pathogenic microbial complex, potentially resulting in severe periodontitis. Given the shared characteristics of the virus, SARS-CoV-2 may contribute to periodontal infections. Patients with COVID-19 have exhibited a diverse array of oral manifestations, including necrotizing periodontal disease [7]. However, it is important to highlight that the majority of studies primarily concentrate on the impact of periodontitis on the severity of coronavirus disease [8].

Cancer patients are more susceptible to infections than the general population, primarily due to immunosuppression



resulting from both the malignancy itself and anticancer treatments. Furthermore, these individuals often exhibit inadequate health behaviors and frequently present with comorbid medical conditions. Consequently, cancer patients may experience a poorer prognosis and an elevated risk of mortality during COVID-19. Additionally, the pandemic has impacted all facets of cancer care, including diagnosis, treatment, and surgical interventions [9]. It is challenging to ascertain the extent to which the pandemic has exacerbated oral health issues among cancer patients [10].

The objective of our study is to evaluate the oral health status of cancer patients during COVID-19 infection.

### Materials and Methods.

213 Georgian citizens aged 18 to 65 were involved in the research. Among them: I group, 20 healthy (without cancer), II group - 60 - healthy + covid, III group - 40 - cancer, IV group - 85 - cancer + covid. We calculate the correlation of oral characteristics with covid status and cancer disease, likewise types of cancer treatment.

### Statistical analysis.

During the quantitative data assessment, we should calculate the average, mean square deviation. However, for qualitative data, we have calculated frequency and percentage.

The credibility of differences between groups in case of quantitative data will be detected using the students' criteria. We can also assess the equality of variances using Levene's Test prior to comparison. For qualitative data, discrepancies will be analyzed using Fisher's F-test. Spearman's rank correlation was employed to assess relationships among qualitative factors, while Pearson's correlation analysis was utilized for quantitative factors. A difference was deemed significant when  $p < 0.05$ .

We evaluated the diagnostic utility of inflammatory markers through ROC analysis. The clinical data were processed using the SPSS 23 software package.

### Results.

A study examining the oral health status of post-COVID oncology patients in a control group revealed that those who had not suffered from COVID-19, at various stages of oncological treatment, exhibited similar types of soft tissue lesions in the oral cavity. Moreover, the loss of gingival attachment was significantly more pronounced in cancer patients compared to their healthy counterparts. The research included both actively treated patients and those in remission. The coexistence of cancer and COVID-19 infection in the same individual raised concerns regarding their potential synergistic effects on prognosis. The study demonstrated an increase in oral index scores among the cancer and COVID-19 groups when compared to the healthy group. Bleeding index: in group I -  $0.20 \pm 0.41$ , in group II -  $0.85 \pm 1.13$ , in group III -  $0.48 \pm 0.85$  and in group IV  $0.95 \pm 1.20$  ( $p=0.079$ ). Loss of gingival attachment: 0-3 mm: in group I - 2 (10%), in group II - 33 (55%), in group III - 7 (14.58%), in group IV - 1 (12.94%) ( $p < 0.0001$ ); 4-5 mm: in group I - 0, in group II - 20 (33.3%), in group III - 13 (27.08%), in group IV - 25 (29.41%) ( $p=0.2489$ ); 6-8 mm: in group I - 0, in group II - 6 (7.06%), in group III - 1 (2.08%), in IV group - 6 (7.06%) ( $p=0.2200$ ) (Table 1).

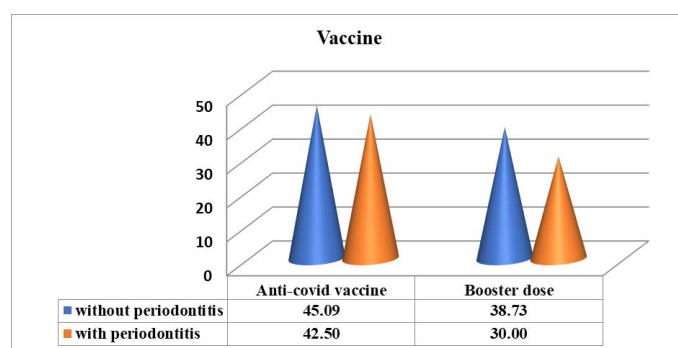
**Table 1.** Correlation analysis revealed a significant association between cancer and periodontitis.

Disease	Correlation with periodontitis	
	r	p
Cancer+covid	0.197**	0.004
Cancer	0.144*	0.036
Healthy	-.155*	0.024
healthy+covid	-.194**	0.004

We diagnosed periodontitis in 40 patients.

The Cancer and Cancer + COVID groups exhibited a significant positive correlation with periodontitis, whereas the Healthy and Healthy + COVID groups demonstrated a significant negative correlation with the condition.

The influence of the anti-COVID vaccine on the progression of periodontitis is illustrated in Figure 1.

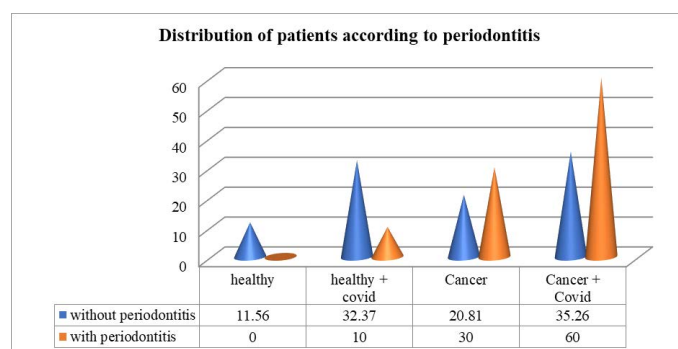


**Figure 1.** The influence of the anti-COVID vaccine on the progression of periodontitis.

The effect of vaccination on periodontitis has not been conclusively established, although a non-significant reduction in the incidence of periodontitis has been observed with the administration of a booster dose.

There is a correlation between cancer and poor oral hygiene, with a correlation coefficient of  $r = 0.389$  ( $p < 0.001$ ).

A comparative analysis of patients with and without periodontitis is presented in Figure 2.

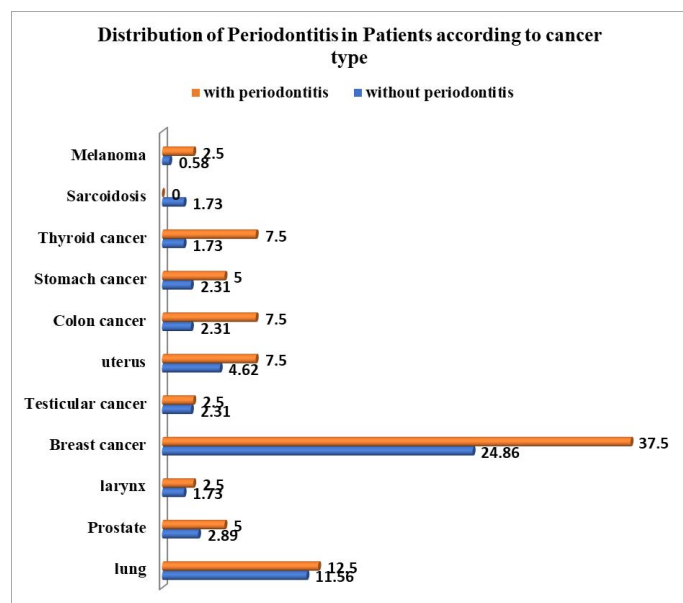


**Figure 2.** A comparative analysis of patients with and without periodontitis.

In the first group, comprising healthy individuals, we observed no cases of periodontitis ( $p = 0.0239$ ). In the second group

(healthy + COVID), there were significantly fewer patients with periodontitis compared to those without it ( $p = 0.0044$ ). The incidence of periodontitis was higher in both the third (COVID) and fourth groups (Cancer + COVID), with the difference in the fourth group being statistically significant ( $p = 0.0038$ ). These findings allow us to conclude that cancer increases the likelihood of periodontitis, a risk that is further exacerbated under COVID-19 conditions.

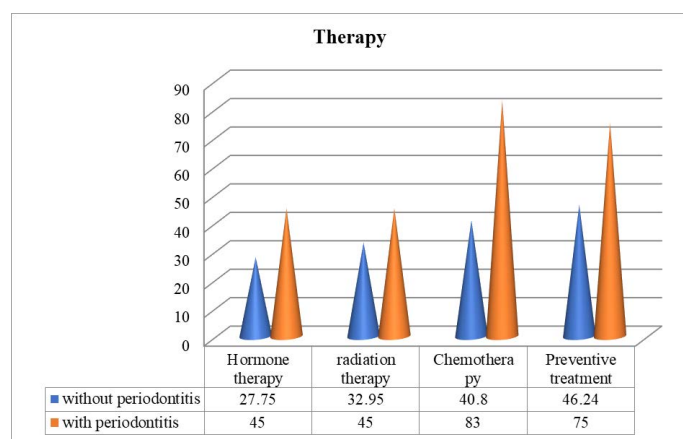
The distribution of periodontitis among the patients we studied, categorized by cancer type, is illustrated in Figure 3.



**Figure 3.** The distribution of periodontitis among the patients we studied, categorized by cancer type.

According to the diagram, there is an observed increase in the frequency of periodontitis across all cancer types; however, a significant difference between the groups with and without periodontitis was noted exclusively in patients with thyroid cancer ( $p = 0.0473$ ).

The impact of cancer treatment on the development of periodontitis is illustrated in Figure 4.



**Figure 4.** The impact of cancer treatment on the development of periodontitis.

A study examining the effect of cancer treatment on the development of periodontitis revealed that the frequency of chemotherapy, hormone therapy, and preventive treatment is significantly elevated among patients with periodontitis.

In the subsequent phase of the study, we assessed the characteristics of periodontitis development in both groups (Tables 2 and 3).

**Table 2.** Evaluation of Periodontitis Characteristics.

Factors	Without periodontitis		With periodontitis		F	p
	Abs	%	Abs	%		
Female	19	10,98	0	0,00	4,89	0,0281
18-35	28	16,18	3	7,50	1,97	0,1619
35-50	62	35,84	13	32,50	0,16	0,6920
51-60	37	21,39	10	25,00	0,24	0,6215
>60	45	26,01	15	37,50	2,12	0,1468
<0.6 - good level of hygiene	33	17,92	1	2,50	6,80	0,0097
0.7-1.6 - satisfactory	106	61,27	28	67,50	0,53	0,4659
1.7-2.5 - unsatisfactory	27	15,61	9	22,50	1,09	0,2967
>2.6 - bad	7	4,05	2	5,00	0,07	0,7882
Systemic diseases	61	35,26	10	25,00	1,54	0,2166
No	110	63,58	30	75,00	1,88	0,1720
Cardiovascular system pathology	5	2,89	1	2,50	0,02	0,8937
Diabetes	9	5,20	1	2,50	0,53	0,4689
other	46	26,59	8	20,00	0,74	0,3903
Mild covid	82	47,40	21	52,50	0,34	0,5628
Moderate covid	18	10,40	4	10,00	0,01	0,9399
severe covid	15	8,67	3	7,50	0,06	0,8115
Anti-covid treatment	78	45,09	17	42,50	0,09	0,7681
Booster dose	67	38,73	12	30,00	1,06	0,3053
Cancer - more than 1 year	39	22,54	20	50,00	12,85	0,0004
The presence of metastases	30	17,34	10	25,00	1,25	0,2658
surgical intervention	75	43,35	28	70,00	9,57	0,0023
4 courses of chemotherapy	13	7,51	2	5,00	0,31	0,5775
Chemotherapy 6 courses	48	27,75	18	45,00	4,58	0,0335
Chemotherapy 8+ courses	25	14,45	9	22,50	1,57	0,2122
It has not been conducted	11	6,36	8	20,00	7,64	0,0062
Hormone therapy	48	27,75	18	45,00	4,58	0,0335
radiation therapy	57	32,95	18	45,00	2,07	0,1518
Preventive treatment hormone	80	46,24	30	75,00	11,22	0,0010
Bisphosphonate	39	22,54	13	32,50	1,74	0,1882
immunotherapy	7	4,05	2	5,00	0,07	0,7882
Does not undergo prophylactic treatment	41	23,70	18	45,00	7,55	0,0065
relapse	17	9,83	5	12,50	0,25	0,6186
The treatment is still not over	16	9,25	6	15,00	1,16	0,2836
	39	22,54	18	45,00	8,62	0,0037

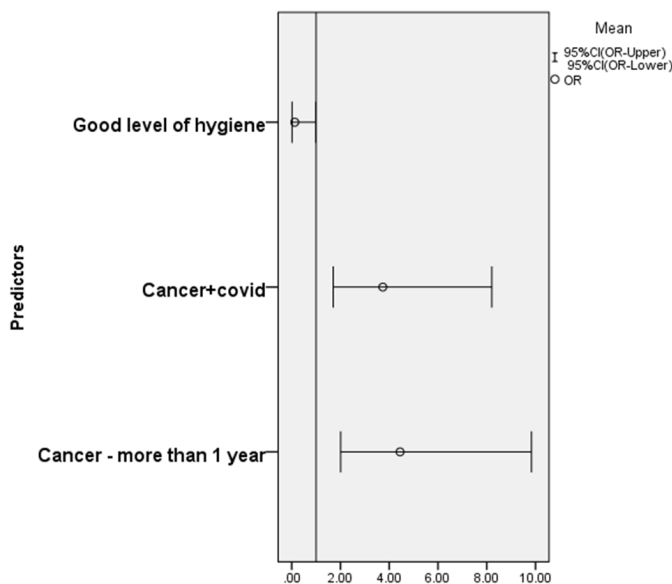
Relapse + 5 years	9	5,20	5	12,50	2,83	0,0941
less than 5 years	8	4,62	1	2,50	0,36	0,5494
remission	44	25,43	18	45,00	6,14	0,0140
Continuously treated without remission/ or recently started treatment	56	32,37	18	45,00	2,29	0,1318

**Table 3.** The results of the regression analysis.

	B	S.E.	Wald	p	OR	95% C.I. for OR	
						Lower	Upper
Cancer+covid	1.318	.401	10.775	0.001	3.736	1.701	8.206
Good level of hygiene	-2.083	1.054	3.904	0.048	0.125	.016	.983
Cancer - more than 1 year	1.492	.405	13.545	<0.001	4.444	2.008	9.835
Constant	-2.464	.369	44.654	<0.001	0.085		

In patients with periodontitis, the following factors are significantly more prevalent: a cancer duration of over one-year, surgical intervention, six courses of chemotherapy, hormone therapy, preventive treatment, and immunotherapy. Conversely, there is a notable decrease in the prevalence of periodontitis among females and those with a hygiene level of less than 0.6 (Figure 5).

According to the regression analysis, the relative risk of developing COVID-19 increases with a cancer history exceeding one year, particularly in the Cancer + COVID-19 group, while a high level of good hygiene is associated with a reduced risk.



**Figure 5.** The results of the regression analysis.

### Discussion.

Increasing evidence supports the correlation between periodontitis and COVID-19. It is evident that COVID-19 may exacerbate periodontitis through mechanisms of immunosuppression. Furthermore, patients with COVID-19 exhibit a higher prevalence of calculus formation and bleeding

[11]; our study indicates that a higher bleeding index is observed following the transmission of coronavirus infection.

Prospective studies affirm the association between cancer and periodontal disease, particularly in cases of lung and upper digestive tract cancers [12]. In relation to our study, we established a significant positive correlation between cancer and periodontitis, while a noteworthy difference between the periodontitis and periodontitis-free groups was identified specifically in cases of thyroid cancer.

There is emerging evidence suggesting an association between periodontal disease and the incidence and progression of breast cancer. Both conditions share several common pathogenic factors. Furthermore, periodontal health can influence breast cancer outcomes during radiotherapy, chemotherapy, and hormone therapy [13]. Our study demonstrated a significant correlation between cancer and poor oral hygiene, as well as between cancer and periodontitis.

Cancer therapy is frequently associated with both acute and chronic complications, as well as physiological alterations in oral tissues [14]. Our data revealed a significantly higher incidence of periodontitis among patients undergoing cancer chemotherapy and hormone therapy, as well as during preventive treatment.

Certain oral complications associated with cancer therapy can be mitigated by modifying the oral environment prior to treatment. This includes addressing acute and potential dental and periodontal lesions, actively involving patients in their oral care, and enhancing the awareness of these cancers among dentists and oncologists. Consequently, patients necessitate specialized oral care.

Due to the interaction between SARS-CoV-2 and periodontal bacteria, the oral cavity serves as a reservoir for the virus. The removal of dental calculus and biofilm can effectively prevent oral colonization by SARS-CoV-2 and subsequently reduce the risk of bacterial infections [14].

Conversely, periodontitis heightens susceptibility to and severity of COVID-19, highlighting the critical importance of maintaining oral and periodontal health for overall well-being during the pandemic [15].

### Conclusion.

Patients with cancer demonstrate a notably high prevalence of periodontitis, a condition that is further intensified by COVID-19 transmission. Fortunately, the administration of a booster vaccine dose has been shown to effectively diminish the risk of tooth loss. Therefore, it is crucial to incorporate oral health considerations into cancer care and to establish an appropriate protocol for managing oral health during and after treatment, particularly for those cancer patients who have also been infected with COVID-19. To mitigate the risks of periodontitis and tooth loss, it is vital for these patients to maintain regular dental consultations, especially those who have experienced COVID-19 infection.

In conclusion, the elevated prevalence of periodontitis among cancer patients, exacerbated by COVID-19, necessitates the integration of comprehensive oral health protocols and regular dental consultations into cancer care to effectively reduce the risk of tooth loss, particularly for those with a history of COVID-19 infection.

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