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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 ВИНИТИ 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 ВИНИТИ 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. Корректура авторам не высылается, 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 compu-ter-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 საყურადღებოდ!

რედაქციაში სტატიის წარმოდგენისას საჭიროა დავიცვათ 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 შეღებვის 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 ფჩხილებში 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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CLINICAL AND MICROBIOLOGICAL ASSESSMENT OF CHLORHEXIDINE IMPACT ON GINGIVAL TISSUE RESPONSE AND BIOFILM FORMATION RELATED TO MATERIAL COMPOSITION IN FIXED PROSTHODONTIC RESTORATIONS

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Abstract.

The success of FDP is dependent on the interplay between restorative materials, gingiva tissues, and oral biofilm. Chlorhexidine (CHX) has been accepted as the gold standard for chemical plaque control because of its effect on both plaque accumulation and gingival inflammation. Prosthetic materials' surfaces may be modified when in contact with CHX, which presents higher surface roughness, colour stability loss and more ion release. Thus, this study evaluated the clinical and microbiological effects of CHX on FDPs with metal-ceramic and monolithic zirconia restorations. Thirty participants were enrolled. Both plaque and gingival indices were recorded, and biofilm samples were collected at baseline and after 2 weeks of rinsing with 0.12%CHX mouthrinse. Surface characteristics and mechanical properties of the restoratives were assessed in vitro following CHX exposure using surface roughness measurements, color stability analysis, and standard mechanical testing. The study demonstrated that CHX lowered plaque and microorganism counts. Metal–ceramic restorations showed significant surface changes and reduction in strength, while zirconia retained stable surface roughness values and mechanical integrity. These results suggest that zirconia is more chemically stable in CHX than metal ceramic restorations.

Key words. Chlorhexidine, fixed dental prostheses, metal-ceramic restorations, monolithic zirconia, gingival tissue response, biofilm formation, surface properties.

Introduction.

Fixed dental prostheses (FDPs) are fundamental for restoring function and esthetics in partially or completely edentulous patients within restorative dentistry. Among the materials used, metal-ceramic restorations have been reported to possess reliable mechanical properties, whereas monolithic zirconia has gained popularity due to its excellent esthetic qualities and biocompatibility [1,2]. For this reason, the surface properties of these denture materials are very important in relation to biofilm formation and, consequently, to gingival inflammation or peri-prosthesis diseases [3,4].

Chlorhexidine (CHX) is the gold standard of chemical plaque control, tested to reduce plaque and improve gingival tissue response around dental restorations [5,6]. However, frequent or long-term use of CHX can induce alterations in the surface properties of prosthetic materials—such as increased surface roughness and colour changes—that may promote biofilm adhesion and re-colonisation [1,7]. Knowledge about the interplay of CHX, biofilm formation, and gingival response in patients with fixed dental prostheses is important for successful clinical results and durability of restorative materials. The objective of this randomised clinical trial is to analyse the hypothesis that CHX influences the clinical and microbiological surroundings of M-C and MZ monolithic restorations and their surface and structural properties. Table 1 represents the most important facts we know about biofilm development, gingival reaction, and how chlorhexidine can affect the different fixed prosthodontic materials.

Biological compatibility of fixed partial dentures, in particular, should not be compromised for oral and periodontal health. The interaction between the restorative materials and the adjacent gingiva has been found to have an impact on plaque accumulation and inflammatory response [8,9]. Studies have also demonstrated that metal–ceramic crowns generally present with higher surface roughness than monolithic zirconia crowns, which in the end results in increased biofilm accumulation and, as a result, greater rates of gingival inflammation [6,9]. Surface roughness of prosthetic materials, as well as surface energy, are factors facilitating the adhesion and colonisation of bacteria [7,8].

CHX is the 'gold standard' agent for plaque control, which has been found to reduce plaque and gingival indices in patients with fixed prostheses [7,10]. However, questions raised about bacterial resistance and biofilm reformation originated, as biofilms may recover from CHX application [8,9]. Thus, knowledge of the effect of CHX on biofilm formation and gingival tissue response is mandatory to obtain the best possible results during prosthodontic treatment.

Although CHX is known to be effective in plaque control, its influence on the physical and chemical properties of prosthesis materials is extensive. The continued use of CHX can produce more roughness, discolouration, and microstructural changes, especially in metal–ceramic restorations [3,6]. Such changes may generate ecological niches for microbial re-growth [11,12].

Monolithic zirconia demonstrates higher chemical stability; however, minor changes in optical and mechanical properties have also been reported after exposure to CHX [2,5]. Furthermore, the response of CHX to metal alloys could alter corrosion and ion release, ultimately resulting in compromised longevity or biocompatibility for restorations [6,13]. Novel strategies, such as CHX-loaded nanoparticle coatings, have been introduced to improve antibacterial effects and minimise material degradation; however, standard clinical data for long-term studies are missing [12,14].

Materials and Methods.

Study design: The current study was divided into 2 branches: a clinical phase, regarding the gingival tissue reaction and biofilm on the FDPs after CHX application and a laboratory phase about how the restorative materials were changed following application of CHX.

Clinical Phase.

Participants: Thirty periodontally healthy individuals, 18–60 years of age with FDPs in function for a minimum of 6 months, were chosen. Patients were divided into two subgroups based on the restoration type: group A (metal–ceramic types/restorations, n = 15) and group B (monolithic zirconia types/restorations, n = 15). Patients with good oral hygiene and no active periodontal disease were enrolled. Exclusion criteria included systemic disease, smoking, being pregnant and having used antibiotics or antiseptics recently (in the past 3months).

Clinical Evaluation: PI and GI were recorded on the abutments at baseline (T0), and biofilm samples for microbial analysis were obtained from prosthetic margins using sterile paper cones. The patients had to rinse with 0.12% CHX mouthwash twice daily for 14 days. At the end of this period (T1), clinical indexes and biofilm samples were collected again.

Microbiological Analysis: Quantitative cultures for aerobic and anaerobic bacteria were obtained from biofilm samples using selective media. Colony-forming units per millilitre (CFU/ml) were counted and compared between T0 and T1 within each group.

Laboratory Phase.

Specimen Preparation: Specimens of metal–ceramic and monolithic zirconia materials (dimensions: 10 × 10 × 2 mm), corresponding to clinical sizes, were prepared. Specimens were stored in 0.12% CHX at 37°C for 14 days with daily solution changes.

Surface and Mechanical Testing.

- **Surface Roughness:** assessed using atomic force microscopy (AFM).
- **Colour Stability:** evaluated by measuring colour changes (ΔE) using digital spectrophotometry.
- **Flexural Strength:** determined by the three-point bending test according to ISO standards.

Statistical Analysis: Data were analysed using SPSS software. Normality was tested with the Shapiro-Wilk test. Within-group comparisons (pre- and post-treatment) were performed using paired t-tests, while independent t-tests were used for between-group comparisons. A p value < 0.05 was considered statistically significant.

Results.

Clinical Results:

At baseline (T0), there were no statistically significant differences between Group A (metal–ceramic) and Group B (monolithic zirconia) in either plaque index (PI) or gingival index (GI) ($p > 0.05$) (Figure 1).

After 14 days of using 0.12% chlorhexidine mouthrinse (T1):

- Both groups showed a significant decrease in PI and GI ($p < 0.05$).

The decrease was greater in Group A than in Group B.

Microbiological Results: Quantification of the biofilm clearly disclosed a decrease in bacterial counting for aerobic and anaerobic (CFU/mL) after CHX application ($p < 0.05$). This reduction was more pronounced in the metal–ceramic group than in the zirconia group.

Laboratory Results.

Surface Roughness.

- **Metal–ceramic specimens:** Significant increase in surface roughness after 14 days of CHX immersion ($p < 0.05$).
- **Zirconia specimens:** No statistically significant change ($p > 0.05$).

Color Stability

- **Colour change (ΔE):** Greater in metal–ceramic specimens compared to zirconia specimens.
- All changes remained within clinically acceptable limits ($\Delta E < 3.3$).

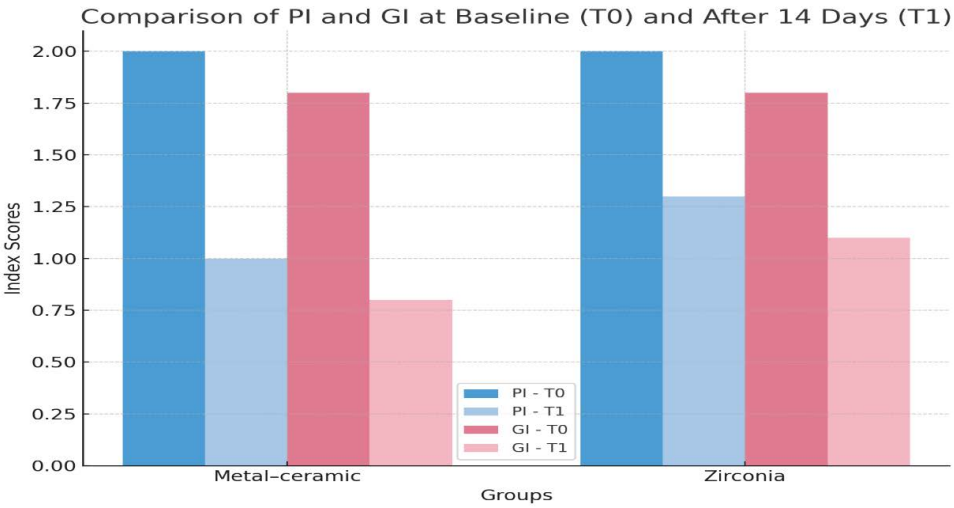

Figure 1. *Plaque index (PI) and gingival index (GI) scores between the metal-ceramic and zirconia groups at time 0 (T0), baseline, and after 14 days of use of chlorhexidine solution were compared.*

Table 1. *Fixed prosthesis biofilm inhibition by two chlorhexidine gels.*

Concept	Key Points
Gingival response to fixed prostheses	Biofilm accumulation and surface roughness affect gingival inflammation.
Material type	Metal–ceramic restorations have rougher surfaces; zirconia is smoother and more biocompatible.
Biofilm and microbial colonisation	Surface properties strongly influence bacterial adhesion and biofilm formation.
Role of chlorhexidine	A gold-standard antiseptic that reduces plaque and gingivitis, but biofilm recolonisation may occur.
Effects of CHX on restorative materials	May cause changes in surface roughness, colour stability, and mechanical properties.

Table 2. *Effects of patient factors on gum health and chlorhexidine performance.*

Patient Factors	Impact on Gingival Health and Prosthetic Materials	Effect on Chlorhexidine Efficacy	References
Pre-existing Periodontal Diseases	Increased inflammation, altered healing, and more biofilm accumulation	Potentially reduced effectiveness due to biofilm	[7,8]
Smoking	Immune suppression, increased inflammation, and altered oral microbiota	Decreased antiseptic efficacy	[7,8]
Immunocompromised Status (Cancer)	Impaired healing, xerostomia, disrupted microbial balance	Variable; may reduce effectiveness, increase risk	[8,10]

- **Zirconia specimens:** Minimal changes were observed, and surfaces remained relatively smooth.

Flexural Strength.

- **Metal–ceramic specimens:** A significant reduction in flexural strength was recorded after 14 days of CHX immersion ($p < 0.05$). The reduction in flexural strength of metal–ceramic specimens suggest material degradation following CHX exposure.
- **Zirconia specimens:** No significant changes in flexural strength were observed.

Metal–ceramic samples exhibited signs of chemical degradation inferred from mechanical and surface roughness changes, whereas zirconia samples demonstrated greater resistance to CHX exposure [4].

Discussion.

The significant decrease in PI and GI scores in both groups is also confirmed by other investigations, which stated that CHX is a very effective antiseptic for plaque control and gingival inflammation [7,8,10,15]. Though the present study assessed the impact of 0.12% CHX mouthrinse, it is noteworthy that various other concentrations might have separate clinical, microbial and material properties. Higher concentrations, like 0.2%, have been shown in earlier research to be more efficacious on plaque accumulation and gingival inflammation; also, these could cause differences on the surface of prosthetic materials and thereby lead to increased roughness or colour alterations. On the other hand, lower concentrations (e.g., 0.06%) with milder impact on materials may be less efficacious in exterminating microorganisms. Thus, the concentration of CHX chosen should reflect a compromise between the desired degree of clinical antibacterial activity and maintaining restoration integrity or aesthetics [15,16].

These results are in accordance with the systematic review of Van Strydonck et al, who also found CHX to be effective for plaque control and prevention of gingivitis [7]. Recent clinical trials also showed that CHX 0.2% significantly reduces plaque accumulation and gingival inflammation at the site of fixed prosthetic restorations [15,16].

Metal–ceramic had a significantly more noticeable surface alteration compared to zirconia. This might be due to higher pretreatment surface roughness and porosity of metal–ceramic materials leading to more biofilm accumulation and thus more pronounced reductions after the application of antiseptics [3,9]. On the other hand, zirconia has a lower roughness of surface and higher energy of cutaneous surface and also is chemically stable, which is resistant to surface degradation processes inferred from quantitative surface roughness and mechanical findings, making it an ideal biocompatible material to be used in a prosthesis for a longer period [4,9,14,17]. Microbiological evaluation showed a significant decrease in bacterial colonisation with CHX for both material types. Nevertheless, the reformation of biofilm over time underlines that mechanical plaque control with chemical antisepsis should be continually used to maintain optimum periodontal health [7,8,18].

Mechanically and esthetically, exposure to CHX caused surface roughness to increase, flexural strength was reduced slightly in metal–ceramic samples with zirconia retaining its mechanical properties and overall surface integrity [1,11,12]. The observed increase in surface roughness and reduction in flexural strength indicate surface degradation, particularly in metal–ceramic restorations, following CHX exposure.

Shifts in colour were somewhat greater for metal–ceramic restorations, but still well below the clinically perceptible threshold (<3.3) [2,3]. These findings underscore the need for materials being selected for prosthetic devices to be chemically resistant while providing optimal function and esthetics [7,8].

Patient factors significantly influence both clinical outcomes and material behaviour in prosthetic dentistry. Periodontal condition, smoking status, and systemic health can alter the response of the gingival tissue and thereby affect biofilm adherence on prosthetic appliances. Knowledge of these factors

is pertinent to comprehending the effectiveness of antiseptics like CHX and further aiding clinician and patient well-being. The impact of these characteristic patient factors in relation to the interaction between gingival tissues and prosthetic materials is described in this article. In addition, the tissue inflammation and bacterial colonisation of diseases such as gingivitis and periodontitis can also be influenced by these conditions. Biofilm formation has been proven on the prosthetic material, and the magnitude of healing response is disturbed in patients with these diseases; this would be expected to have a bearing on the activity of CHX [7,8]. Smoking down-regulates immunoresponsiveness, thereby predisposing individuals to gingival inflammation and periodontal destruction. It changes the oral flora, possibly leading to less effective antiseptic treatments and clinical results [7,8]. Cancer patients undergoing chemotherapy and radiotherapy experience immunosuppression and mucosal conditions such as xerostomia (dry mouth). These changes disrupt oral microflora balance and may increase susceptibility to infections. Such factors can alter the binding of CHX to prosthetic biomaterials, impacting both clinical and material outcomes [8,10] (Table 2).

There are a number of limitations to this study that must be taken into account when interpreting the findings. The sample size included was moderate, and the generalizability of findings may be constrained. The 14-day postoperative period was too short to evaluate the latency action of CHX on prosthetic materials and gingival tissues [7]. It is not certain if the laboratory conditions can mimic the oral environment perfectly, specifically saliva composition, biting forces, and patient factors (e.g., smoking, pre-existing periodontal diseases, and systemic conditions) [7,8]. The single concentration of CHX (0.12%) studied does not permit conclusions about other concentrations or delivery systems. Immunosuppressed patients, including patients receiving chemotherapy for malignancy, were excluded, and these may also influence the response of tissues and patterns of microbial colonization [8,10]. Larger sample sizes in future studies are required to increase statistical power and allow results to be generalised. Long-term studies are required to assess the clinical and material effects of CHX [7]. It is desirable that comparative studies be carried out to establish the procedure with the best type and concentration of CHX [8].

Conclusion.

The CHX 0.12% mouth rinse showed a marked reduction in both plaque and gingivitis among the fixed prosthesis wearers. The metal–ceramic restorations showed surface alteration and alteration in mechanical property after CHX application, but clinical improvement was seen in plaque index and gingival index. On the other hand, in zirconia crowns, colour and surface stability as well as mechanical properties were maintained, indicating that a better chemical/structural resistance was promoted under CHX exposure. This information indicates that not only the clinical success of such works, but likewise long-term stability of the material have to be a consideration in choosing metal-free at fixed prosthetic works material with special emphasis when antiseptics like CHX are employed. These findings need to be confirmed by larger and longer-term studies that are relevant to chronic use in the clinical setting.

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