

Evaluation of the oral hygiene of patients with COVID-19 in a hospital environment

Avaliação da higiene bucal de pacientes com COVID-19 em ambiente hospitalar

Evaluación de la higiene bucal de pacientes con COVID-19 en un entorno hospitalario

Received: 05/19/2021 | Reviewed: 05/30/2021 | Accept: 06/02/2021 | Published: 06/17/2021

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Abstract

There is sufficient evidence to support a relationship between the severity of periodontal disease and COVID-19 infections. This relationship may be caused by an increase in the immune response mediated by Galectin 3 (Gal-3) and an increase in viral adhesion. Thus, unsatisfactory and poor hygiene conditions determine risk factors in the worsening of the disease. The objective of this study was to analyze the oral hygiene index in patients diagnosed with COVID-19 admitted to the ward of a referral hospital in the metropolitan region of Santa Rita (Paraíba). This study can relate oral inflammatory problems and their outcome in the evolution of patients with COVID-19, contributing to a planning of continuing education actions in oral health care, and to a better evolution of patients with COVID-19. For data collection, a google forms form was used, built by the research team, based on the Oral Hygiene Index in Critical Patients (OHICP), with modifications. In the assessment of the oral hygiene condition of patients with COVID-19, it was observed that 74.1% of the patients presented unsatisfactory and / or precarious oral hygiene. Patients with COVID-19 presented more frequently tongue coating (74.3%), visible biofilm (41.6%) and food remains (35.5%). Poor oral hygiene can aggravate clinical conditions, worsening the outcome regarding the treatment of patients with SARS-CoV-2.

Keywords: SARS-CoV-2; COVID-19; Human virus infection; Periodontal disease; Galectin 3; Dental staff hospital.

Resumo

Existem evidências suficientes para apoiar uma relação entre a gravidade da doença periodontal e infecções por COVID-19. Esta relação pode ser causada pelo aumento da resposta imunológica mediada por Galectina 3 (Gal-3) e aumento da adesão viral. Assim condições insatisfatórias e precárias de higiene determinam fatores de risco no agravamento da doença. O objetivo desse estudo foi analisar o índice de higiene bucal em pacientes diagnosticados com COVID-19 internados em enfermaria de um hospital de referência da região metropolitana de Santa Rita (Paraíba). Esse estudo pode relacionar problemas inflamatórios bucais, e seu desfecho na evolução de pacientes com COVID-19, contribuindo para um planejamento de ações de educação continuada nos cuidados de saúde bucal, e para uma melhor evolução de pacientes com COVID-19. Para coleta de dados, foi utilizado um formulário do google forms, construído pela equipe de pesquisa, baseado no Índice de Higiene Oral em Pacientes Críticos (IHOPC) com modificações. Na avaliação da condição de higiene bucal dos pacientes com COVID-19 observou-se que 74,1% dos pacientes apresentaram uma higiene bucal insatisfatória e/ou precária. Os pacientes com COVID-19 apresentaram com maior frequência saburra lingual (74,3%), biofilme visível (41,6%) e restos alimentares (35,5%). A higiene bucal precária pode agravar os quadros clínicos, piorando o desfecho quanto ao tratamento de pacientes com SARS-CoV-2.

Palavras-chave: SARS-CoV-2; COVID-19; Infecção por vírus humano; Doença periodontal; Galectina 3; Equipe hospitalar de odontologia.

Resumen

Hay evidencias suficientes para soportar la conexión entre la severidad de la enfermedad periodontal y la infección por COVID-19. Esta conexión puede ocurrir por el aumento de la respuesta inmunológica intermediada por la Galectina 3 (Gal-3) y el aumento de la adhesividad del virus. De esta forma, condiciones insatisfatórias y precarias de higiene bucal, son factores determinantes de riesgo cómo agravante de la enfermedad. El objeto de este estudio fué la análisis del índice de higiene bucal en enfermos con diagnóstico de COVID-19, con internación en habitaciones de planta colectivas de la Red de Salud Pública en un Hospital de referencia, en la región metropolitana de Santa Rita (Paraíba). Este estudio hace una conexión entre factores inflamatorios bucales y su desfecho en la evolución de enfermos con COVID-19. Para obtener los datos, fué utilizada una encuesta por el Google Forms, elaborada por el grupo de investigación, basada en el Índice de Higiene Bucal de los Enfermos Críticos (IHBE) con modificaciones. En la evaluación de la higiene bucal de los enfermos con COVID-19 hemos visto que un 74,1% presentaron una higiene bucal insatisfactoria y/o precaria, un aumento de saburra lingual en un 74,3%, biofilme visible en un 41,6% y residuos alimentares en un 35,5%. La higiene bucal precaria puede agravar los cuadros clínicos, empeorando el desfecho del tratamiento del enfermo contaminado por el SARS-CoV-2.

Palabras clave: SARS-CoV-2; COVID-19; Infección por virus humano; Enfermedad periodontal; Galectina 3; Personal de odontología en hospital.

1. Introduction

Galectin 3 (Gal-3) is a β -galactoside binding protein, it is present in many tissues and acts as a modulator of cytokine expression as well as associated with tissue damage (De Biasi et al., 2020). Recent discoveries related to viral infections have also started to make their activity more evident (Wang et al., 2019; Wang et al., 2020). Gal-3 induces patterns of unregulated expression of proinflammatory cytokines as tumor necrosis factor α (TNF α), interleukin (IL) -1 β and IL-6, important in the

inflammatory process (Nita-Lazar et al., 2015). Gal-3 is also a well-known toll like 4 (TLR4) receptor agonist, which are well-characterized and potent inducers of inflammation during infections (Zhou et al., 2018).

Patients suffering from severe coronavirus disease (COVID-19) demonstrate highly elevated levels of Gal-3, TNF α , IL-1 β and IL-6, compared to those with moderate disease expression (De Biasi et al., 2020; Huang et al., 2020; Wang et al., 2020). Inhibition of Gal-3 significantly reduces the levels of these cytokines and, therefore, can be promising in reducing inflammatory sequelae associated with COVID-19 (De Biasi et al., 2020; Kalfaoglu et al., 2020; Liu et al., 2020).

In a recent study, a relationship was found between coronavirus (CoV-19) and Gal-3. It has been determined that an important area in the peak protein of COVID-19 is almost exactly the same as the morphology of Gal-3, and these peak proteins are critical for the entry of the virus into host cells (Caniglia et al., 2020).

Another study found that structural similarities between SARS-CoV-2 and 16S1-NTD leads to a strong interaction with the ganglioside GM1, a molecule commonly found on the surface of cells. These data strongly support the binding model for SARS-CoV-2 to stabilize viral adhesion. (Fantini et al., 2020)

A high affinity in the link between galectins and the GM1 ganglioside has also been demonstrated. Therefore, it is possible that inhibition of Gal-3 could disrupt the binding of SARS-CoV-2 to the ACE-2 receptor and decrease the activity of the virus (Kara et al., 2020).

There is sufficient evidence to support a relationship between the severity of periodontal disease and COVID-19 infections. This relationship can be caused by an increase in the immune response mediated by Gal-3 and an increase in viral adhesion (Kara et al., 2020). Thus, unsatisfactory and poor oral hygiene conditions determine risk factors in the worsening of the disease. (Kara et al., 2020).

Thereby, the aim of this study was to analyze the oral hygiene index in COVID-19 patients admitted to the ward of a hospital in the metropolitan region of Santa Rita. Therefore, this study can relate oral inflammatory problems, and its outcome in the evolution of patients with COVID-19 and contribute to the planning of continuing education actions in oral health care, contributing to a better evolution of patients with COVID-19.

2. Methodology

An applied, field, exploratory, cross-sectional research with a quantitative approach was carried out (Pereira et al., 2018). This study was carried out at Metropolitan Hospital Dom José Maria Pires (MHDJMP). The hospital is located in the city of Santa Rita, in the Metropolitan Region of João Pessoa, state of Paraíba. The Hospital is a reference in the areas of cardiology and neurology. It currently has two wards and 04 ICUs COVID-19.

The population of the present study consisted of all patients diagnosed with COVID-19, over 18 years of age and interned in the MHDJMP COVID-19 wards from July 2020 to April 2021. Participated in the study, during this period, 397 patients. Patients who did not sign the Free and Informed Consent Form or who had a cognitive deficit that made it impossible to answer the questions were excluded from the research.

For data collection, a google forms form was used as a data collection instrument, built by the research team, based on the Oral Hygiene Index in Critical Patients (OHICP); the index was modified with the exclusion of the assessment on halitosis due to the risk of contamination (MOHICP) (Saldanha et al., 2015). The form was filled in with the information observed by a single examiner, dentist, qualified in Hospital Dentistry. After a clinical oral examination of each patient in the infirmary's beds, under artificial light and with the support of a flashlight and a wooden spatula, respecting all biosafety protocols for patient care with COVID-19. The instrument data were recorded on google forms in order to reduce the risk of contamination, using an electronic tablet device exclusively for data collection.

It was observed in the clinical oral exam: presence of biofilm, gingivitis, coating, secretion / crust, blood and food scraps. The instrument was proposed to detect retention factors that impair a patient's good oral hygiene (Saldanha et al., 2015). According to the number of items detected, patients had their oral hygiene classified as: satisfactory (0-1), unsatisfactory (2-3) and very unsatisfactory (4-7). According to Kara et al. (2020), oral changes related to hygiene and consequently a periodontitis can determine an aggravation of COVID-19. Therefore, at MOHICP, unsatisfactory and very unsatisfactory patients with SARS-CoV-2 determine higher risks and were classified as precarious.

This study was assessed by the Human Research Ethics Committee of the Paraíba State Health Department with the Ethics Committee approval (722/2021). All volunteers were informed and signed the Free and Informed Consent Form.

The data were analyzed using the Statistical Package for Social Sciences software (IBM SPSS, v.22, IBM, Chicago IL), with descriptive and analytical analysis. The classification of oral hygiene was dichotomized as satisfactory (score from 0 to 1) and unsatisfactory (score from 2 to 7). The frequency of unsatisfactory oral hygiene was verified according to the frequencies of visible biofilm, gingivitis, tongue coating, crust or secretion, blood, food debris, patients with autonomy to perform oral hygiene and the presence of oral hygiene kit through the Chi-square test ($\alpha < 0.05$).

3. Results

In the assessment of the oral hygiene condition of patients with COVID-19, interned in a reference hospital in Paraíba, it was observed that 74.1% of the patients presented unsatisfactory and / or poor oral hygiene (scores from 2 to 7). Patients with COVID-19 presented with tongue coating more frequently (74.3%), visible biofilm (41.6%) and food remains (35.5%). In addition, most patients had autonomy to perform oral hygiene (54.7%) and did not have an oral hygiene kit (66.2%), as shown in Table 1.

Table 1. Description of the oral hygiene condition of patients with COVID-19 interns at a referral hospital. Santa Rita, PB, 2020-2021.

| Variables | n | % |
|--|----------|----------|
| Presence of visible biofilm? | | |
| Yes | 165 | 41.6 |
| No | 232 | 58.4 |
| Presence of gingivitis? | | |
| Yes | 69 | 17.4 |
| No | 328 | 82.6 |
| Presence of tongue coating? | | |
| Yes | 295 | 74.3 |
| No | 102 | 25.7 |
| Presence of crust or secretion? | | |
| Yes | 46 | 11.6 |
| No | 351 | 88.4 |
| Presence of blood? | | |
| Yes | 15 | 3.8 |
| No | 382 | 96.2 |
| Presence of food remains? | | |
| Yes | 141 | 35.5 |
| No | 256 | 64.5 |
| Critical Patient Oral Hygiene Index | | |
| Satisfactory (0 -1) | 103 | 25.9 |
| Unsatisfactory (2-3) | 201 | 50.7 |
| Very unsatisfactory (4-7) | 93 | 23.4 |
| Does it have an oral hygiene kit? | | |
| Yes | 134 | 33.8 |
| No | 263 | 66.2 |

Source: Own authorship.

Table 2 describes the frequencies of visible biofilm, gingivitis, tongue coating, crust or secretion, blood, food remains, patients with autonomy to perform oral hygiene and the presence of oral hygiene kit according to the classification of oral hygiene. It was observed that patients with unsatisfactory oral hygiene had more frequent visible biofilm, gingivitis, tongue coating, crusts and food scraps, with a significant difference ($p < 0.005$). Most patients with unsatisfactory oral hygiene had autonomy to perform oral hygiene and did not have oral hygiene kits ($p < 0.005$).

Table 2. Distribution of patients with COVID-19 with satisfactory and unsatisfactory oral hygiene according to oral conditions, autonomy to perform oral hygiene and presence of oral hygiene kit. Santa Rita, PB, 2020-2021.

| Variables | Classification of oral hygiene | | p value |
|--|--------------------------------|---------------------|---------|
| | Satisfactory % (n) | Precarious % (n) | |
| Presence of visible biofilm? | | | |
| Yes | 6.1 (10) | 93.9 (155) | 0,000 |
| No | 40.1 (93) | 59.9 (139) | |
| Presence of gingivitis? | | | |
| Yes | 0.0 (0) | 69.0 (100) | 0,000 |
| No | 31.4 (103) | 68.6 (225) | |
| Presence of tongue coating? | | | |
| Yes | 13.6 (40) | 86.4 (255) | 0,000 |
| No | 61.8 (63) | 38.2 (39) | |
| Presence of crust or secretion? | | | |
| Yes | 6.5 (3) | 93.5 (43) | 0,001 |
| No | 28.5 (100) | 71.5 (251) | |
| Presence of blood? | | | |
| Yes | 0.0 (0) | 15.0 (100) | 0,019 |
| No | 27.0 (103) | 73.0 (279) | |
| Presence of food remains? | | | |
| Yes | 1.4 (2) | 98.6 (139) | 0,000 |
| No | 39.5 (101) | 60.5 (155) | |
| Does it have an oral hygiene kit? | | | |
| Yes | 53.0 (71) | 47.0 (63) | 0,000 |
| No | 12.2 (32) | 87.8 (231) | |

Chi-square test ($\alpha < 0,05$). Source: Own authorship.

4. Discussion

The results of the study allow us to state that the hygiene of patients admitted to wards is significantly precarious (74.1% of patients). Several studies show that oral inflammation can potentiate the action of SARS-CoV-2 by increasing Gal-3 (Wang et al. 2019; Caniglia et al., 2020; De Biasi et al., 2020; Kalfaoglu et al., 2020; Liu et al., 2020), enabling the evolution of the patient with COVID-19 to the serious condition of the disease.

Patients diagnosed with COVID-19 presented tongue coating (74.3%), visible biofilm (41.6%) and food remains (35.5%) more frequently, all statistically significant when we relate these values to the precarious condition of oral hygiene. Additionally, the interaction of ACE-2 receptors with SARS-CoV-2 and the reduction of lymphocytes can be etiogenic mechanisms for the appearance of several oral manifestations, present in most clinical cases (Baeder et al., 2021). Care for hospitalized patients depends on the interaction of multiprofessional work, the result of the sum of complementary care. Interdisciplinarity related to health actions is necessary for a good performance with oral care (Blum et al. 2018; Baeder et al., 2020; Serrão et al., 2020; Cardoso et al., 2021).

Studies relating low oral health conditions and socioeconomic indicators have taken into account only isolated factors, not highlighting the fact that oral health has a complex relationship with numerous conditions related to the physical and social environment, which vary over time and that its interpretation requires a more comprehensive analysis. Thus, given the need for collective understanding related to high rates of oral diseases, the focus related to the social dimension is extremely important (da Silva, Machado & Ferreira, 2015; Sfreddo et al., 2019; Silva Júnior, Sousa & Batista, 2019). The results of this research corroborate the studies described, since 54.7% of patients with COVID-19 had autonomy to perform oral hygiene, however 66.2% did not have a hygiene kit, which contributed significantly ($p < 0.000$) to a poor oral condition.

As limitations, we must understand that the socio-political conditions related to Brazil determine difficulties in the guidance and information processes regarding the importance of oral health and its relationship with COVID-19. It is known that poor oral hygiene can aggravate the clinical conditions of debilitated patients. Thus, it may be indirectly suggested that poor oral hygiene can influence the worsening of the outcome regarding the treatment of patients with COVID-19.

Inhibition of Gal-3 can disrupt the binding of SARS-Cov2 to the ACE-2 receptor and decrease the activity of the virus (Kara et al., 2020). Therefore, it is possible that optimizing and minimizing Gal-3 levels through preventive actions and hygiene guidance can reduce the chances of the disease progressing to more severe conditions or even reducing the length of hospital stay. The results of the study allow us to state that the hygiene of patients admitted to wards is significantly precarious (74.1% of patients). Several studies show that oral inflammation can potentiate the action of SARS-CoV-2 by increasing Gal-3 (Wang et al. 2019; Caniglia et al., 2020; De Biasi et al., 2020; Kalfaoglu et al., 2020; Liu et al., 2020), enabling the evolution of the patient with COVID-19 to the serious condition of the disease.

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5. Conclusion

The results of this study demonstrate a statistically significant prevalence of poor oral hygiene condition in inpatients with COVID-19. However, it is necessary to carry out further studies that can show whether the preventive action of oral hygiene is able to determine the reduction and the chances of the disease progressing to more severe conditions or even reducing the length of stay.

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