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Major clinical findings of the oral hygiene relationship and increase in the predisposition to COVID-19: a systematic review

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Abstract

Introduction: The disease caused by the novel coronavirus 2019 (COVID-19) is caused by a newly identified virus Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). The risk of nosocomial transmission is a reality that requires the development of guidelines by the dental community to reduce the chances of infection by the new coronavirus. In particular, poor oral hygiene, opportunistic infections, stress, immunosuppression, vasculitis, and a hyperinflammatory response secondary to COVID-19 are the most important predisposing factors for the appearance of oral lesions in patients with COVID-19. **Objective:** It was to highlight the main clinical studies on the relationship between hygiene and care in the oral cavity to reduce the chances of contamination with COVID-19, as well as to observe the interrelation between poor oral hygiene and the increased risk of this contamination. **Methods:** The rules of the Systematic Review-PRISMA Platform were followed. The research was carried out from March 2022 to May 2022 and developed based on Scopus, PubMed, Science Direct, Scielo, and Google Scholar. The quality of the studies was based on the GRADE instrument and the risk of bias was analyzed according to the Cochrane instrument. **Results and Conclusion:** A total of 124 articles were found. In total, 42 articles were fully evaluated and 10 were included and evaluated in this study. Considering the Cochrane tool for risk of bias, the overall assessment resulted in 42 studies that were excluded with a high risk of bias (studies with small sample size). Also, 30 studies were excluded because they did not meet the GRADE. COVID-19 affects oral health most likely in patients with serious illness, which may be due to the disease itself, immune response, and lack of motivation for personal hygiene measures. Furthermore, the results indicated that gargling with mouthwashes composed of unique antiseptic agents may play a minor role in potentially reducing transmission rates, and therefore these findings are of utmost importance when considering alternative COVID-19 prevention strategies.

Keywords: Oral hygiene. Lack of oral hygiene. Contamination. Dental care. COVID-19.

Introduction

The disease caused by the novel coronavirus 2019 (COVID-19) is caused by a newly identified virus Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) causing several systemic manifestations. The oral cavity is also not spared and the symptoms appear independently, concomitantly or sequentially [1]. Thus, the risk of nosocomial transmission is a reality that requires the development of guidelines by the dental community to reduce the chances of infection by the new coronavirus [1,2].

In this context, the risk of transmission of COVID-19 in dental offices was considered very high, especially for aerosol-generating procedures (risk of approximately 95%) [3-5]. In this context, clinical studies have evaluated the effectiveness of pre-dental mouthwashes in reducing salivary SARS-CoV-2 viral load [6-8]. Although relevant key expressions such as triage, prioritization, commitment and difficult decision-making have become an everyday reality at this time of a pandemic, these actions can make a difference and improve our service, especially with teleconsultations

[9-14].

In this regard, as reported by the New York Times [15], dentistry is one of the professions most exposed to the contagion of COVID-19. It is necessary to establish a clinical protocol to be applied in the work environment to prevent new infections and progressive spread of the virus [16,17].

In this setting, oral manifestations may include ulcer, erosion, blister, vesicle, pustule, fissured or depapilated tongue, macula, papule, plaque, pigmentation, halitosis, whitish areas, hemorrhagic crust, necrosis, petechiae, edema, erythema, and spontaneous bleeding. The most common sites of involvement are the tongue (38%), labial mucosa (26%) and palate (22%). Thus, the lesions were diagnosed as aphthous stomatitis, herpetiform lesions, candidiasis, vasculitis, Kawasaki-like, EM-like, mucositis, drug eruption, necrotizing periodontal disease, bullous-like angina, angular cheilitis, atypical Sweet's syndrome and Melkerson's syndrome. Furthermore, oral lesions can be symptomatic in 68% of cases, both in men and women. In particular, poor oral hygiene, opportunistic infections, stress, immunosuppression, vasculitis and secondary hyperinflammatory response to COVID-19 are the most important predisposing factors for the appearance of oral lesions in patients with COVID-19 [18].

Therefore, the present study aimed to highlight the main clinical studies on the relationship between hygiene and care in the oral cavity to reduce the chances of contamination with COVID-19, as well as to observe the interrelation between poor oral hygiene and the increased risk of this contamination.

Methods

Study Design

The rules of the Systematic Review-PRISMA Platform (Transparent reporting of systematic reviews and meta-analysis-HTTP://www.prisma-statement.org/) were followed.

Data sources and research strategy

The search strategies for this systematic review were based on the keywords (MeSH Terms): *"Oral hygiene. Lack of oral hygiene. Contamination. Dental care. COVID-19*". The research was carried out in March 2022 to May 2022 and developed based on Scopus, PubMed, Science Direct, Scielo, and Google Scholar. Also, a combination of the keywords with the booleans "OR", "AND", and the operator "NOT" were used to target the scientific articles of interest.

Study Quality and Bias Risk

The quality of the studies was based on the GRADE instrument and the risk of bias was analyzed according to the Cochrane instrument.

Results and Discussion

A total of 124 articles were found. Initially, duplication of articles was excluded. After this process, the abstracts were evaluated and a new exclusion was performed, removing the articles that did not address the theme of this article. In total, 42 articles were fully evaluated and **10** were included and evaluated in this study (**Figure 1**). Considering the Cochrane tool for risk of bias, the overall assessment resulted in 42 studies that were excluded with a high risk of bias (studies with a small sample size). Also, 30 studies were excluded because they did not meet the GRADE.

Figure 1. Flow Chart - Systematic Review (N=10 studies).

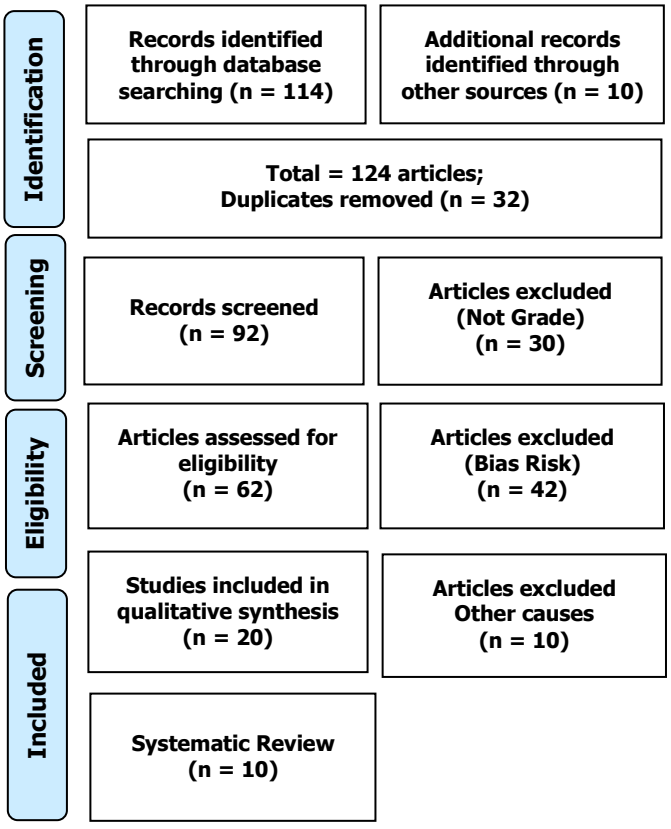
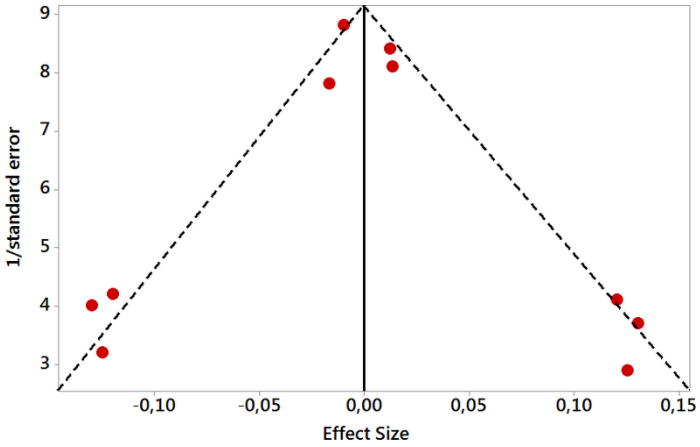


Figure 2 presents the results of the risk of bias in the studies using the Funnel Plot, through the calculation of the Effect Size (Cohen's Test). The sample size was determined indirectly by the inverse of the standard error. The number of clinical studies evaluated was n=10. The graph showed symmetric behavior, not suggesting a significant risk of bias in studies with small sample sizes, which are shown at the bottom of the graph.

Figure 2. The symmetric funnel plot does not suggest a risk of bias between the small sample size studies that are shown at the bottom of the graph (N=10 studies).



Results and discussion

According to the main literary findings and clinical studies, totaling 10 articles that are described below, a study evaluated the prevalence of oral manifestations in individuals confirmed for COVID-19 through a systematic review involving 21 observational, 3 case series, and 10 case reports. These observational studies included approximately 14,003 patients from 10 countries. As a result, the oral and dental manifestations most commonly found in COVID-19 were loss of taste acuity, xerostomia, and anosmia. High incidence of opportunistic infections such as mucormycosis and aspergillosis have been reported during treatment due to prolonged steroid intake. Immunosuppression and poor oral hygiene led to secondary manifestations such as erythematous lesions [19].

Furthermore, an analytical cross-sectional study with 500 qualitative patients with COVID-19 confirmed by RT-PCR was performed to assess and understand the pattern of oral lesions. This study included a total of 367 (73.4%) male and 133 (26.6%) female patients with a mean age of 53.46 ± 17.50 years. Almost 51.2% of patients had taste disorders, 28% had xerostomia and 15.4% of patients had oral findings such as erythema, ulcers, and tongue depapilation. There was a statistically significant correlation between oral manifestations and disease severity. Therefore, COVID-19 affects oral health more likely in patients with serious illnesses, which may be due to the disease itself, immune response, and lack of motivation for personal hygiene measures [20].

Besides, a randomized placebo-controlled clinical study evaluated a wide variety of antiseptic agents that can be used as mouthwashes for their in vitro antiviral effects and their respective modes of action. One of the most promising antiseptics (benzalkonium chloride, BAC) was used in a randomized placebo-controlled clinical trial with subsequent analysis of viral loads by RT-qPCR and virus rescue in cell culture. The analysis showed that treatment with BAC and other antiseptic agents efficiently inactivated SARS-CoV-2 in vitro, mainly disrupting the viral envelope, without affecting the integrity of the viral RNA. However, clinical application resulted in only a slight reduction of viral loads in the oral cavity [21].

Also, a randomized controlled clinical trial evaluated the effectiveness of 2 types of pre-procedure mouthwash in reducing salivary SARS-CoV-2 viral load and compared the results of mouthwash with a control group. Sixty-one adherent participants (36 women and 25 men) with a mean age of 45.3 ± 16.7 years were enrolled. A significant difference was observed between the delta Ct of the distilled water wash and each of the 2 solutions of 0.2% chlorhexidine and 1% povidone-iodine. No significant difference was found between the delta Ct of patients using 0.2% chlorhexidine and 1% povidone-iodine solutions. A significant difference in the mean value of Ct was found between the paired samples in the Chlorhexidine group (n = 27) and also in the Povidone-iodine group (n = 25). In contrast, there was no significant difference before and after the experiment in the control group (n = 9). Therefore, oral solutions of 0.2% chlorhexidine and 1% povidone-iodine are effective against salivary SARS-CoV-2 in dental treatments [7].

Besides, another randomized controlled clinical trial evaluated the efficacy of three types of commercial mouthwashes such as povidone-iodine (PI), chlorhexidine gluconate (CHX), and cetylpyridinium chloride (CPC) in reducing SARS-CoV-2 salivary viral load in patients. with COVID-19 compared to water. A total of 36 SARS-CoV-2 positive patients were recruited, of which 16 patients were randomly assigned to four groups - PI groups (n = 4), CHX group (n = 6), CPC group (n = 4), and water as a control group (n = 2). As a result, it was observed that the effect of reducing the salivary load with mouthwashes with CPC and PI was maintained after 6 hours [8]. In addition, one study evaluated nasal and oral antiseptic formulations of PVP-I against SARS-CoV-2. Nasal antiseptic formulations of povidone-iodine and antiseptic oral rinse formulations of PVP-I at concentrations from 1% to 5% were studied, as well as controls. PVP-I nasal and oral antiseptic solutions are effective in inactivating SARS-CoV-2 over a range of concentrations after exposure times of 60 seconds [22].

Despite these clinical findings, the effects of the novel coronavirus in vivo still need more randomized clinical trials to prove its efficacy [23]. In this regard, the American Academy of Implant Dentistry (AAID) reported on how COVID-19 affects dental care through guidelines

for dentistry in general [24]. Furthermore, European guidelines and expert opinion have shown the control and prevention of infections in dentistry during the pandemic [25].

Finally, a randomized controlled clinical study evaluated the effectiveness of an air purifier (professional XXl inn-561) with a HEPA 14 filter in reducing the number of suspended particles generated during dental procedures as a vector of transmission of COVID-19. The research was carried out on 80 individuals who underwent Oral Surgery with Oral Hygiene Procedures. In addition, contamination was reduced by 69-80%. Adding the equipment to existing safety measures is significantly effective in further reducing microbiological risk [26].

Conclusion

COVID-19 affects oral health most likely in patients with serious illness, which may be due to the disease itself, immune response, and lack of motivation for personal hygiene measures. Furthermore, the results indicated that gargling with mouthwashes composed of unique antiseptic agents may play a minor role in potentially reducing transmission rates, and therefore these findings are of utmost importance when considering alternative COVID-19 prevention strategies.

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Data sharing statement
No additional data are available.

Conflict of interest
The authors declare no conflict of interest.

Similarity check
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