Connection Between Oral Health and COVID-19

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Summary:
Through the history mankind came a cross various types of epidemic or pandemic that dramatically increased the fatality of the population of the world or a region. From black death in 1346 (30-60 % population of the Europe), Spanish flue 1918 (1-5.4 population of the globe) or to the recent outbreak of the covid-19 (more than 2 million). The new coronavirus SARS-CoV-2 (Severe Acute Respiratory Syndrome-CoronaVirus 2) that is cause of COVID-19 is the seventh coronavirus known to infect human, specifically, it belongs to the family of Coronaviridae and have spread worldwide. As of June 19, 2020, World Health Organization (WHO) reported over 8.3 million total confirmed cases and still counting, making it a severe threat to public health. And still the mechanism involving virus proliferation and how the virus interacts with other microorganisms in the lung is unknown. This virus main focus area of attack are lungs and respiratory system and with the connection of the oral cavity with them, they can have significant impact on each other. Oral cavity is the second microbiota house in the body, that contains many types of fungi, bacteria, virus and archaea. This will make oral cavity an ideal hunting ground for opportunistic pathogens. Most of these were found in BALF (bronchoalveolar lavage fluid) of covid-19 patient. So due to this statement oral cavity hygiene plays crucial factor in this process. Due to co-infection of respiratory system and oral cavity there various manifestation can occur in both places. Oral manifestation can be included as ulcer, erosion, bulla, vesicle, pustule, fissured or atrophied tongue, macule, papule, plaque, pigmentation, halitosis, Soft tissue white lesions, hemorrhagic crust, necrosis, petechiae, swelling, erythema, and spontaneous bleeding. The focused sites were tongue, labial mucosa and palate. Maintaining a good and proper oral hygiene can help to reduce the infection of the respiratory system. Other factors such as age and immunosuppressed individuals can be effected in considerably sever manner.

კავშირი პირის ღრუს ჯანმრთელობასა და COVID-19- ს შორის

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რეზიუმე
კაცობრიობამ, თავისი ისტორიის განმავლობაში, ბევრჯერ გაიარა სხვადასხვა სახის ეპიდემიის ან პანდემიის გზა, რამაც მკვეთრად გაზარდა მსოფლიოს ან რეგიონის მოსახლეობის სიკვდილიანობა: 1346 წელს შავი სიკვდილი (ევროპის 30-60% მოსახლეობა), 1918 წელს ესპანური გრიპი (მსოფლიოს 1-5,4 მოსახლეობა) და ბოლოს კოვიდ-19-ის ბოლოდროინდელი აფეთქება (2 მილიონზე მეტი). ახალი კორონავირუსი SARS-CoV-2 (მძიმე მწვავე რესპირატორული სინდრომი -კორონავირუსი 2) არის COVID-19–ის მეშვიდე კორონავირუსი, რომელიც ცნობილია ადამიანის ინფიცირების უნარით. ის მიეკუთვნება კორონავირუსების ოჯახს და გავრცელდა მთელ მსოფლიოში. მსოფლიო ჯანდაცვის ორგანიზაციამ (WHO) 2020 წლის 19 ივნისის მონაცემებით დაადასტურა 8,3 მილიონზე მეტი დადასტურებული შემთხვევა, რაც საზოგადოების ჯანმრთელობისათვის სერიოზულ საფრთხეს წარმოადგენს. ჯერ კიდევ უცნობია მექანიზმი, რომელიც მოიცავს ვირუსის პროლიფერაციას და როგორ ურთიერთქმედებს ვირუსი ფილტვის სხვა მიკროორგანიზმებთან. ეს ვირუსი ძირითადად უტევს ფილტვებსა და სასუნთქ სისტემას და, პირის ღრუსთან ერთად, მნიშვნელოვან ურთიერთგავლენას ახდენს. ადამიანის სხეულში პირის ღრუ წარმოადგენს მეორე მიკრობიოტას მრავალი სახის სოკოების, ბაქტერიების, ვირუსების და არქეების შემცველობით. ეს ფაქტი პირის ღრუს ანიჭებს იდეალური ადგილის სტატუსს ოპორტუნისტული პათოგენებისათვის. მათი უმეტესობა აღმოჩენილია კოვიდ-19-ით ინფიცირებული პაციენტის ბრონქოალვეოლურ სითხეში. ამ ფაქტის გამო პირის ღრუს ჰიგიენა გადამწყვეტ როლს თამაშობს ამ პროცესში. რესპირატორული სისტემისა და პირის ღრუს თანადაინფიცირების გამო, ორივე ადგილას შეიძლება მოხდეს სხვადასხვა სახის მანიფესტაცია. პირის ღრუს გამოვლინება შეიძლება იყოს წყლული, ეროზია, ბულა, ვეზიკულა, პუსტულა, ნახეთქი ან ატროფიული ენა, მაკულა, პაპულა, ნადები,

Key Words: COVID-19, SARS, oral health, prevention, infection, respiratory diseases, pandemic.

Abbreviation:
BALF - bronchoalveolar lavage fluid
SARS - Severe acute respiratory syndrome coronavirus
ECMO - Extracorporeal membrane oxygenation
ICU - Intensive Care Unit

Feedback: before we start talking about the issue in hand, it's convenient to give some background about some of the factors we about to discuss.

Coronavirus: Coronavirus, any virus belonging to the family Coronaviridae. Coronaviridae is generally considered to contain two genera, Coronavirus and Torovirus, which differ in nucleocapsid morphology, the former being helical and the latter being tubular(Zhu N. et al., 2020). Coronaviruses are important agents of gastrointestinal disease in humans, poultry, and bovines. In humans, a species known as SARS coronavirus (or Severe acute respiratory syndrome coronavirus) causes a highly contagious respiratory disease that is characterized by symptoms of fever, cough, and muscle ache, often with progressive difficulty in breathing (Shi et al., 2018).The new coronavirus SARS-CoV-2 (Severe Acute Respiratory Syndrome - CoronaVirus 2) that is cause of COVID-19 is the seventh coronavirus known to infect humans, Specifically, it belongs to the same family (Shen et al., 2020) (Dhama K et al,. 2019).

Oral hygiene: This term can be defined in many different way but we can simply define it as accurate and efficient state of the oral cavity health (Mayers S.L et al., 2014). To maintain that we can brush at least twice a day, flossing to avoid plaque accumulation and using mouth washes. Also healthy diet can effect oral cavity in numerous way (Avery D.R et al., 2016) Respiratory diseases: The main function of the respiratory system is gas exchange in which oxygen is transferred from the environment to the blood and carbon dioxide is moved out of the system. Type of disease that affects the lungs and other parts of the respiratory system. Respiratory diseases may be caused by infection, by smoking tobacco, or by breathing in second-hand tobacco smoke, radon, asbestos, or other forms of air pollution. These diseases can be fatal in some cases (Constable P.D et al.2017).

Co-infection: The simultaneous presence of two or more infections, which may increase the severity and

საკვანძო სიტყვები: COVID-19, SARS, პირის ღრუს ჯანმრთელობა, პროფილაქტიკა, ინფექციები, რესპირატორული დაავადებები, პანდემია.

პიგმენტაცია, ჰალიტოზი, რბილი ქსოვილების თეთრი დაზიანება, ჰემორაგიული ქერქი, ნეკროზი, პეტექიები, შეშუპება, ერითემა და სპონტანური სისხლდენა. ფოკუსირებული ადგილები იყო ენა, ტუჩის ლორწოვანი გარსი და სასა. შეიძლება ვივარაუდოთ, რომ პირის ღრუს კარგი და სათანადო ჰიგიენის დაცვა დაგვეხმარება რესპირატორული სისტემის ინფექციის შემცირებაში.

duration of one or both (McArdle A.J et al., 2018).

Introduction: Right now we are dealing with worldwide pandemic that effects all mankind in this planet. With this outbreak all the health organizations in the globe, either big or small held hand together for controlling and preventing of spreading this virus further. Due to outbreak of covid-19 many occupations were shut down but health related occupations working 24/7, none-stop to providing health services for the population. As of June 19, 2020, World Health Organization (WHO) reported over 8.3 million total confirmed cases and still counting (WHO 2020). Dental field is consider one of these health related occupations. Many complications and infection of this virus manifest from the oral cavity, due to a process called co-infection Oral cavity have direct contact with the respiratory system, the main area of the focus of these virus. Any infection from oral cavity can find its way in the lungs and respiratory system and make the situation more severe and complicated. Further we discuss some of the factors playing a big part in this assessment like way of spreading, effectiveness of oral hygiene and preventive measurements (Constable P.D. et al.2017; Zhu X., et al 2019).

Spreading factors (infection): Oral cavity has direct connection with the respiratory system, the co-infections can be produced by both of these organs' systems. Due to the corona virus, the lungs (respiratory system) are already under the infection due to the etiology of the virus (Dhama K et al., 2019). Bacterias' can be secondary invaders in these case, they exist in our oral cavity and with each aspiration of the oxygen these bacteria find their way into the respiratory system (McCullers J. A. 2014; Bao L. et al., 2020). Other routes can be through blood and saliva in other organs. The main complications of COVID-19 include "blood clots, pneumonia, sepsis, septic shock, and ARDS" (Mandal A., 2020). Co-infection was one of the major complications, especially in those who underwent extended hospitalization and long-term mechanical ventilation. Some conditional pathogens such as Enterococcus faecalis, Klebsiella pneumonia, Acinetobacter baumannii, Stenotrophomonas maltophilia, and Candida albicans could come from hospital environment, nosocomial infection, but the majority inhabit the oral cavity (Bao L et al,.2020).

How can oral hygiene effect respiratory system rate of infection? Oral cavity is the second microbiota house of the body. Many micro-organism, viruses, fungi and bacteria are settled in this area. Increase in rate of these factors can cause further infection for the different organs (Dewhirst F. E., 2010; Bao L et al,.2020). Risk factors such as poor oral hygiene, cough, increased inhalation under normal or abnormal condition, and mechanical ventilation are the main routes by oral microbiota enter the airways. Depressing these elements through the saliva and aspiration of the oxygen, into the respiratory system and digestive system too (Bao L et al,.2020). This situation will make an ideal hunting ground for the opportunistic pathogens. Poor oral hygiene can cause colonizing of all these bacteria's in the oral cavity, due to that most of these elements can become pathogenic causing further infection and irregularity. Most of these infections can transmit to different organs through blood or other routes (Bao L et al,.2020). Some these bacteria or microorganism can cause some oral complications or diseases like periodontal diseases, gingivitis and etc. Individuals with periodontal disease show micro-ulcerated sulcular epithelia and damaged periodontal tissues, and thus seem more susceptible to bacteraemia. Complications of COVID-19 seen among those with poor oral health and periodontal disease. periodontitis or infection of the gums is one of the most prevalent causes of harmful bacteria in the mouth , without adequate oral hygiene the exchange rate of the these bacteria with the respiratory system will increase dramatically and it will be concluded in more infection rate. Together, these factors result in respiratory dysbiosis, and thus cause respiratory disease (Patel J et al., 2020).

Preventive measurement: Maintaining of adequate oral hygiene can be a crucial factor of these infection (we point it out in previous section).Poor oral hygiene habits can lead to the accumulation of many periodontal microorganisms in the oral cavity, and oral dysbiosis can accelerate lung function decline. For maintain these adequate hygiene, individuals must dedicate amount of time on cleaning they oral cavity (Patel J et al.,2020). These cleanings can be achievable by brushing the mouth at least twice a day, use of the mouth wash to sterilize the oral cavity, using flosses to avoid any deep accumulation of the food impactions or plaque accumulation and use of the tongue scrapers to clean the dorsal area of the tongue (Patel J. et al.,2020; Avery D.R. et al.,2016). With the hospitalized patient these process can be hard to achieve and other factors will be add up to these complications such as mechanical ventilations. Mechanical ventilation is generally used to assist or replace spontaneous breathing, involving two types,

invasive ventilation and non-invasive ventilation. The former refers to mechanical ventilation that involves any instrument entering the trachea through the oral cavity, like trachea intubation and ECMO (Bao L. et al., 2020; Barbier F. et al.,2013). Non-invasive ventilation, such as face or nasal masks, are generally appropriate for mild illnesses. In the process of oro-tracheal intubation, bacteria can rapidly migrate from the oral cavity and upper respiratory tract into the lungs. Another risk factor is that ICU mechanical ventilation patients find it difficult to clear oral secretions via swallowing or coughing (Barbier F.,et al 2013). These instruments must be sterile at all cost, neglecting this process can have fatal outcomes. Therefore, more attention should be paid to potential infections arising from oral microbiota before, and during, mechanical ventilation.

Discussion: Meanwhile this pandemic happens around us and all the health organizations in the world working together toward an absolute solution for either curing or preventing this disease. Is been nearly more than a year but still we are not totally able to understand and reason with this virus. Lately there are good news and we are able to get vaccinated for this virus. Result were accurate, maybe there is a good future ahead of us that we can overcome these elements but meanwhile we still have to control the public health. Every individual or organization play a big role in this process. For us - dentists must be vigilant and fearless, we should educate our patients and people around us on the best way to keep their oral health in an adequate state, make them take oral hygiene more seriously, teach them the most accurate ways of keeping they oral health intact. These simple steps can lead to outstanding outcomes for each individuals. We must embrace the adversity.

Conclusion: due to the connection of the oral cavity and respiratory system, any imbalance in these locations can have direct impact on each of these system. These co-infections can manifest orally and find its way down in the respiratory system through aspirations, blood and saliva (sputum). Due to this statement oral hygiene play a crucial factor in the oral cavity of the patient. Maintain the oral health can lower the infection rate in the individual. Prevention of spreading the infection is main goal, with a basic oral hygiene techniques we can achieve adequate and desirable state of oral health.

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