

## The Effect of Oral Microbes on Human

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### Abstract

The goal of the current study is the effect of oral microbes on humans. What are the microbes that are present in the mouth area, and what is the extent of their impact on the upper area of humans (mouth, teeth, upper and lower jaw)? The questionnaire was created electronically via the Google Drive program, and then distributed via mobile phone to Social Media Program (The target population is residents of the city of Makkah, who are between the ages of 25-55 years. The social network WhatsApp was used to distribute 450 questionnaires, and the researcher received electronic responses to 440 questionnaires via email.

**Keywords:** *The effect, oral microbes, on human*

### Introduction

In 1891, the first oral microbiologist Willoughby D. Miller put forward the theory of oral focal infections, suggesting that oral microbial infection can affect other parts of the body, related to a variety of systemic diseases.(1) Frank Billings speculated that the infection of teeth may be the cause of

rheumatoid arthritis, nephritis, endocarditis, and other diseases.(2) Proponents of this theory believe that dental plaque and its metabolites can enter the blood circulatory system and cause a variety of systemic or degenerative changes. Therefore, the treatment of systemic diseases by extracting the affected tooth is not only popular in dentistry, but also entire medical field. However, the theory of oral focal infection has

not received enough attention and theoretical support. With the advances of microbiome research, the association between oral microbes and a variety of human chronic diseases has been studied, including inflammatory bowel disease, (3) cancers, (4) cardiovascular diseases, (5) Alzheimer's disease, (6) diabetes, (7)

rheumatoid arthritis, (8) and preterm birth (9). In addition, the changes of oral microbiota in the state of systemic diseases are gradual and repeatable. Therefore, oral microbes can reflect human health and disease status in real-time and have important value in disease risk early warning and curative effect prediction. Over 700 kinds of microorganisms are colonized in the human oral cavity.(10) The oral microbiome is one of the most important and complex microbial communities in the human body and is also one of the five research priorities (oral cavity, nasal cavity, vagina, intestine, skin) of the human microbiome project (HMP).(11) With the consummation of the human microbiome project, the understanding of oral microbes has become more in-depth, and it is not limited to further understanding the role of oral microorganisms in caries, periodontal diseases, and other oral diseases. Evidence is increasingly inclined to believe in the oral lesion theory proposed by Miller. The inflammation of periodontitis leads to the loss of connective tissues and bones.(12) Extensive inflammatory cell infiltration appears in the connective tissue near the periodontal pocket epithelium.(13) It is generally believed that this low-grade inflammation will disturb the health of the whole body or worsen other systemic diseases.(14) Therefore, in the general population, chronic periodontitis may be an important source of invisible peripheral inflammation. Thus, periodontitis is also called "lowgrade systemic disease", affecting a variety of systemic diseases. Particularly, a large amount of evidence has proved that bacteria are closely related to tumor development in the past two decades.(15) For example, the role of human papillomavirus in oral cancer,(16) *Helicobacter pylori* in gastric cancer,(17) *Chlamydia pneumoniae* in lung cancer,(18) *Salmonella typhi* in gallbladder cancer,(19) *Streptococcus bovis*, (20) *Bacteroides fragilis*(21), and

especially the periodontal pathogen *Fusobacterium nucleatum* in colon cancer.(22) These studies have led to the possible role of bacteria in the occurrence of tumors, and the subsequent research results do provide some evidence to support it. There is a lot of evidence that oral microorganisms can induce cancer through direct or indirect factors.(23) For example, oral microorganisms can secrete polysaccharides or use their flagella to accumulate on the surface of tumor cells in large numbers, induce chronic inflammation, and the secretion of cytokines directly promotes the growth of tumor cells. Increasing evidence supports the association between the oral microbiome and human systemic diseases. (24) This association may be attributed to the ability of many oral microbes to influence the inflammatory microenvironment. Excluding unfavorable factors such as physical activity, poor oral condition is closely related to unhealthy body index. Clinical and basic research on oral health the digestive system.(25) For example, the colonization of oral microbes affects the metabolism of butyrate of intestinal microbes(26); oral microbes, especially periodontitis pathogens, can enter the bloodstream through periodontal inflammation tissues and enter the systemic circulation, thereby acting on the whole body.(27) As mentioned in the study of colorectal cancer, *F. nucleatum* colonizes the intestine and acts through the blood pathway.(28) In addition, the metabolites of oral microorganisms enter the systemic circulation through the blood, which makes a low-grade inflammation in the human body, and promotes the occurrence and development of chronic inflammatory diseases in the digestive system.(29) This approach is gradually supported by the evidence of oral microbiome research, and it is widely recognized in the research of systemic diseases caused by the imbalance of the intestinal flora. Therefore, this approach may also be the main role of oral microbes in the digestive tract and an important way to affect systemic diseases. Oral microbes and inflammatory bowel disease. Adults produce more than 1000 mL of saliva every day, almost all of which enter the gastrointestinal tract. (30) Therefore, oral microbes, as an important reservoir of intestinal

microbes, play an important role in maintaining the internal stability of the intestinal microecosystem. The virulent strains in the oral cavity migrate to the intestine through the digestive tract or blood, which affects the process of many intestinal inflammatory diseases.(31) Inflammatory bowel disease (IBD) is a global disease, especially in developed countries, the prevalence in developing countries is also increasing year by year, the prevalence in China is about 3.44 per 100,000 persons.(32) Chronic non-specific intestinal inflammatory diseases, whose etiology is not well understood, are believed to be determined by genetic and environmental factors.(33) The intestinal microbiome also plays an important role during IBD.(34) At the same time, recent studies found a correlation between oral microbes and IBD.3Periodontal disease is considered to be a risk factor for a variety of systemic diseases.(35) Porphyromonas gingivalis and F. nucleatum are the main pathogens of periodontal disease.(36) The inflammation caused by P. gingivalis in the oral cavity can lead to the disorder of the intestinal microbial community structure, the destruction of the intestinal barrier, the induction of endotoxemia, and the systemic inflammatory response.(37) Under normal circumstances, F. nucleatum is almost impossible to detect in the intestine, but the bacteria can migrate to the intestine, inhibit the immune response mediated by T cells, thus promoting the progress of IBD.(38) In addition, Streptococcus salivarius is an early colonizer in the oral cavity, which also can colonize the intestinal tract, down-regulate the nuclear transcription factor NFκB of small intestinal epithelial cells and participate in the process of intestinal inflammation and homeostasis.(39) Through population surveys, it is found that poor oral care behaviors related to alteration of the oral flora, cause an imbalance of intestinal microbes, and lead to the occurrence of IBD.(40) Cariogenic bacteria can also participate in intestinal inflammation. Streptococcus mutans TW295 is a serologically κ type (distributed in less than 5% of the population). The bacteria can express the collagen binding protein (CBP), which is more common in patients with bacteremia after tooth extraction and infective endocarditis.(41)

Animal experiments have found that jugular vein injection of Streptococcus mutans TW295 can aggravate the degree of inflammation in a mouse model of colitis.(42) According to clinical research, the detection rate of this strain in patients with colitis is also higher than that of healthy people Oral microbiome studies have found that the oral flora of IBD patients is significantly different from that of healthy people.(43,44) The number of oral dominant bacteria in patients with IBD has changed, including Streptococcus, Prevotella, Neisseria, Haemophilus, and Veillonella. (45) Oral bacteria, such as Campylobacter and diseases. Oral microbes affect the process of systemic diseases through the inflammatory response caused by oral infection or the ectopic colonization of oral microorganisms in other organs or tissues of the human body, such as tumor, gut, heart, blood, brain, joint, placenta. and systemic diseases.

### **Material and Methods:**

The study started in (the holy city of Mecca in Saudi Arabia), began writing the research and then recording the questionnaire in January 2022, and the study ended with data collection in June 2022. The researcher used the descriptive analytical approach that uses a quantitative or qualitative description of the social phenomenon (The effect of oral microbes on human). This kind of study is characterized by analysis, reason, objectivity, and reality, as it is concerned with individuals and societies, as it studies the variables and their effects on the health of the individual, society, and consumer, the spread of diseases and their relationship to demographic variables such as age, gender, nationality, and marital status. Status, occupation (46), And use the Excel 2010 Office suite histogram to arrange the results using: Frequency tables Percentages (47). A questionnaire is a remarkable and helpful tool for collecting a huge amount of data, however, researchers were not able to personally interview participants on the online survey, due to social distancing regulations at the time to prevent infection between participants and researchers and vice versa (not coronavirus

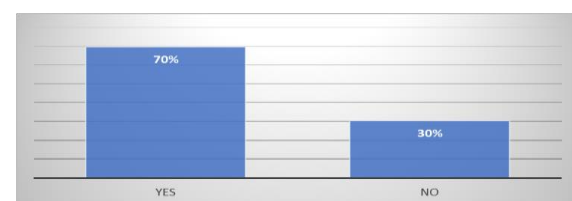
participation completely disappearing from society). He only answered the questionnaire electronically, because the questionnaire consisted of ten questions, all was opened. The online approach has also been used to generate valid samples in similar studies in Saudi Arabia and elsewhere (48)

### Results and discussion:

The percentage of approval to participate in the questionnaire was 100%, and the percentage of participants' ages was as follows: 25-34 years old, 25%, 35-44 years old, 40%, and 45-55 years old, 35%. As for their gender, the percentage of males was 80%, and the percentage of females was 20%, and their nationalities were mostly Saudi men and women, 100%. As for their professions, they were as follows: 90% government employee, 5% private sector employee and freelancer (equal), housewife and self-employed, freelance work 0% (equal). As for the educational status, it was as follows: holders of primary school certificates: 0%, middle school, doctorate, and master's degrees: 4.7%, secondary schools: 9.5%, university degree holders: 47.6%, and diplomas: 28.6%. When moving to the questionnaire questions, the responses were as follows: The first question: Is dental inflammation related to rheumatoid arthritis, kidney inflammation, etc.? Yes 57.1% and no 42.9%. The second question: Is there a relationship between the oral microbiome and a variety of chronic diseases in humans? Yes 85.7% and no 14.3%. The third question is: Can the oral microbiome reflect human health and disease status in real time? Yes 95.2% and no 4.8%. The fourth question: Does early warning of oral infections indicate the risks of diseases and predict the therapeutic effect? Yes 81% and no 19%. The fifth question: Is the oral microbe one of the most important elements in the complex microbial communities in the human body? Yes 95.2% and no 4.8%. The sixth question: Is the role of oral microbes limited to caries, gum disease, and other oral diseases? Yes 61.9% and no 38.1%. The seventh question: Gingivitis leads to the loss of the body's connective tissues and bones? Yes 81% and no 19%. The eighth question: Is there a

relationship between oral disease and cancers and oral bacteria? Yes 66.7% and no 33.3%. The ninth question: Is poor oral health closely linked to unhealthy body index? Yes, 90.9% and No, 9.1%. The tenth question: The human oral microbiome leads to the following: disturbance in the environment of the intestinal microbial community, destruction of the intestinal barrier, induction of endotoxemia, systemic inflammatory response, etc.? Yes 86.4% and no 13.6%. (figure No.10).

Figure No.1: the effect of oral microbes on humans



### Conclusion:

The microbes present in the human mouth should not be neglected or underestimated, as they can turn into a simple infection in the gums and teeth, and then move to all parts of the body, transmitting many diseases to them, as they transmit viruses and thus the condition may develop. To serious diseases such as cancer.

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