

The Effect of Dental Prosthesis on Oral Normal Microbes and Life Span

Azadeh Sadeghi^{1*}, Ahmadrza Sarrafan², Abdollah Ebrahimi³, Nika Moghadamnia⁴, Parham Mohammadian Semnani⁵, Seyed Ahmadrza Rafiei Tekieh⁶, Abdullatif Modarresi⁷

1. *Assistant professor, Department of prosthodontics, Semnan dental faculty, Semnan University of Medical Science, Semnan, Iran. Corresponding Author* Email: azadesadeghi137@yahoo.com
2. Assistant professor, Department of endodontics, Semnan dental faculty, Semnan University of Medical Science, Semnan, Iran. Email: ahmadrzasarrafan5960@gmail.com
3. Dentistry student, Member of research committee, Semnan dental faculty, Semnan University of Medical Science, Semnan, Iran. Email: ebrahimi56@gmail.com
4. Dentistry student, Member of research committee, Semnan dental faculty, Semnan University of Medical Science, Semnan, Iran. Email: Nikmn2000@gmail.com
5. Dentistry student, Member of research committee, Semnan dental faculty, Semnan University of Medical Science, Semnan, Iran. Email: mohammadian.parham@gmail.com
6. Dentistry student, Member of research committee, Semnan dental faculty, Semnan University of Medical Science, Semnan, Iran. Email: h1337412raf@gmail.com
7. Physiotherapist, Bachelor of Physiotherapy, Semnan dental faculty, Semnan University of Medical Science, Semnan, Iran. Email: ambehsoodi@gmail.com

Abstract

Dental prosthesis are potent to modify the balance of oral microbes by decreasing the salivary flow as well as plaque and calculus accumulation on the denture. This leads to the increase of bacterial, viral and fungal competition which can cause oral and systemic diseases including periodontal disease, tooth caries, type 2 diabetes, colon cancer, and could cause a negative effect on the digestive system, because the oral microbiome can be transferred from the oral cavity to the rest of GIT and lead to intestinal inflammation and other gut related disorders which finally can end to death.

Keywords: Dental prosthesis, Oral microbiome, Systemic diseases, Diabetes, Colon cancer.

Introduction

human may lose some or all of his teeth during his life for various reasons[1], or might congenitally do not possess one or several teeth[2].

In order to compensate this lack, replacing dental prosthesis brings many uses and significant benefits in terms of functionality and aesthetics[3,4].

But on the other hand, these prosthesis have the ability to influence the diversity and alteration of natural microbes in such a way that they will number up in the oral cavity and can change this environment from a healthy state to a pathological state[5].

Therefore, in this article, by studying about the microbes in the oral cavity, which is referred to as natural flora, we intend to mention the changes caused by dental prosthesis and discuss their effects.

Presence of these living micro-organisms, which number up to several hundreds of species including bacteria, archaea, fungi, protozoa and viruses leads to stability of the oral cavity pH and also causes prevention of the accumulation and proliferation of pathogens[6,7]

Dental prosthesis, which are actually foreign objects, when placed in the oral cavity, can be a means for the accumulation of harmful microbes and subsequent plaque and calculus, as well as suitable barriers for sticking foreign objects such as food debris. This becomes even more intense when the person has problems keeping the oral cavity hygienic for any reason or the dental prosthesis are not made in a standard way. As a result, it is possible that a person would suffer from complications such as periodontal diseases, tooth caries, oral cancers, gingival diseases, systemic diseases including rheumatoid arthritis, pregnancy related complications, cardiovascular diseases, etc. A definitive control and treatment of these diseases become a serious challenge because we are facing a phenomenon in which the primary and main factor, which is the dental prosthesis, is needed to be in position[5,8].

Another important point is that the oral cavity has a very easy path for the transfer of microbes to the digestive system and all the alternation and imbalance created in harmful microbes are able to simply enter and effect to the GIT. We raise this issue because we declare that dental prosthesis not only change the balance of microbes in the mouth, but also cause the same

action in the rest of the digestive system. until now, researchers have tracked the different types of microbes transferred from the oral cavity to the gut and announced their definitive results, and in this article we will discuss some of the findings and types of microbes that are more relevant to the type and subject of this article, its desirable to conceder that it is obvious that we can include all types of microbes and their evolution in one article[9].

In a study which had been by Francesco D'Ambrosio et al. is clearly mentioned that there are various materials which are used to make dentures such as metal, acrylic products, polymers, etc, and findings show that metallic dentures are not as suitable as acrylic dentures for the patients who are suffering from periodontal diseases. Metallic dental prosthesis are also potent to cause tooth loss, hence it is much more recommended to avoid metallic materials in such patients, but still more information and researches are required to surely raise a voice in this regard[10]. But recent studies also didn't assure that what type of dentures alters the oral microbes and health of that organ due to limitation for investigation[11]. To begin with, we will take Candida as an example, which is a type of fungus, and the most common one in this regard, which is potent to significantly increase in coexistence with dentures, is the albicans type which can transmit to the gut and cause diseases such as type 2 diabetes, colon cancer and intestinal inflammation[12].

Materials and Methods:

We have concentrated on various sources and websites such as: PubMed, The British Dental Journal, Hindawi, MDPI, BMC, Scientific Reports, Springer Link, University of Plymouth, Frontiers and software & reference management tools to have an appropriate search to databases. About 120 articles were read by the group members and physical meeting & discussion had been done in that regard which finally resulted in obtaining our mentioned findings.

How dental prosthesis affect on the natural flora of the mouth:

Decreased salivary volume in the oral cavity:

By placing a prosthesis in the mouth, the flow of saliva to this environment is reduced[13]. As a result, with the decrease in acidity of this environment, harmful microorganisms especially bacteria have the opportunity to grow and reproduce excessively. In addition, useful enzymes that have decreased due to reduced saliva, disrupt the breakdown of proteins and carbohydrates. When the carbohydrate load is increased, streptococci will become more saturated, and their transfer to the intestine will cause inflammation in that organ[14, 15].

Formation of plaque and calculus:

When complete or partial dentures come into contact with the oral mucosa or teeth, especially when there are defects in them, and also because the denture itself is a sticky surface for microbes, it provides a place for plaque accumulation, which causes the oral environment to be exposed to more bacteria and fungi, thus increases the saturation of microbes. It is desirable to mention that, the microbe *p. gingivalis* is more saturated when the gingiva is exposed to plaque, and research has proven that this microbe causes esophageal, stomach, and intestinal cancers. Pancreatic cancer has also been discussed and researched in connection with *p.gingivalis* and the result has proven a connection between this microbe and this disease[16]. calculus is also a hard structure which is potent to accumulate and adhere to tooth surface and gingiva, which is a result of plaque accumulation and mineralization during time[17].

Lowering the pH of oral cavity:

When the flow of saliva into the oral cavity is reduced, this phenomenon causes the enzymes that are responsible for the breakdown of protein and carbohydrates to decrease, and it also causes the increase of harmful bacteria, which itself can be a cause of prosthetic stomatitis, Also, this risk arises to create an environment with a lower pH, i.e. more acidic. Periodontal diseases are one of the results of this. Also a direct relationship between the microbe *prevotella* overload and this disease has been proven by researchers[18].

Infection in the oral cavity:

When the prosthesis is not prepared by experienced forces and has winning parts or is not made correctly according to the anatomical level of the recipient, which is abundantly seen, or in cases where the mucous membrane shows severe inflammation, the chance of wounding increases and then the possibility of infection is provided. therefore, the microorganisms increase severely and the balance of microbes undergoes extensive transformation[19,20].

When the oral environment is injured, it is more necessary to keep it clean and it is no longer permissible to treat it like a healthy mucosa, because a direct path has been provided for the transmission of infection to the bloodstream, now when the balance of microbes is irregular and even disturbed, this phenomenon will be much more challenging[22,22].

The consequences of the evolution of oral cavity microbes on oral and dental health:

As we said, a change in this natural flora that has been formed due to the use of dental prosthesis can bring the physiological life of the oral cavity and its internal organs into a pathological and diseased state in such a way that both the hard tissue, i.e. tooth structure, and the soft tissue, i.e. cheek mucosa, gingiva, palate, tongue, etc. at risk, the most obvious of which can be

periodontal and periapical problems, tooth caries, as well as creating bad breath, which is called halitosis, and subsequently, as mentioned in the above paragraphs, the path of microbes to transfer from the oral cavity to the GIT is simple, and occurrence of the above-mentioned systemic diseases is easy in this way[23,24,25]

The effect of dental prosthesis on human life span:

In this article, we discussed various aspects of the effects of dental prosthesis, and it is interesting to say that due to the changes that are caused by them, the lifespan of a person will be affected. It is noteworthy that in the above paragraphs we have mentioned diseases such as intestinal inflammation, colon cancer, diabetes and cases such as periodontitis and how they are caused by dental prosthesis[26,27,28], and let's see what the statistics show regarding the survival and mortality rates of these diseases:

Mortality rate of colon cancer: 8.9 per 100.000[29].

5-year survival rate of pancreatic cancer in the world: about 6%[30].

Diabetes death rate: 11.3% in the world[33].

Mortality rate of inflammatory bowel disease: 17.1 per 1000 person-years overall for IBD cases[34].

Ways to prevent the transformation of the natural flora of the mouth by dental prosthesis:

At the beginning of this paragraph, we consider it necessary to mention that not all people who use dental prosthesis experience such microbial changes that cause systemic diseases[35]. An important factor which matters a lot in oral health while using dental prosthesis is personal sense of coherence in such a way that a stronger sense in this way brings a better oral health[36].

We found it desirable to mention that is it true that the individuals who are using dental prosthesis and aren't maintaining a good hygienic state will be improved once they are educate in this matter[37].

It is very important for the patient to be diligent in the proper cleaning and maintenance of his dental prosthesis and to report anything that bothers him in this regard, such as lack of fit or looseness, weariness, roughness, etc., to his dentist. This field is useful and includes the 5 following items:[38,39,40,41].

1. Using relevant mouthwashes and disinfectants in order to clean the oral cavity as well as the prosthesis.
2. Taking the prosthesis out of the mouth while sleeping at night in order to rest and supply blood to the tissues of those areas, as well as to allow saliva to flow easily to the oral cavity.
3. Using toothpaste and toothbrush as well as dental floss to mechanically disinfect the prosthesis surface.
4. Not manipulating the prosthesis by the patient, because any damage to it can create a platform for the accumulation of microbes or the ability of causing injury to soft tissue.

5. visiting to the dentist according to the order and time intervals will be very helpful in preventing any diseases and leads to early diagnosis of any rising disorder.

6. Occlusal force improvement helps the salivary flow to be increased in order to prevent the above mentioned side effects . It can be done by receiving various professional aid and practices by a physiotherapist.

Conclusion:

The role of dental prosthesis in transforming the oral normal microbes of the mouth is much more potent to be concerned than what has been thought so far, and their pathogenicity and sometimes their subsequent death due to what happens during the increase and transmission of harmful microbes is far more important than what has been considered until today.

therefore, more modern, advanced and also more professional approaches are necessary to be taken than before in order to preserve human health in this regard.

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