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Relationship between complete denture prosthesis and systemic disorder

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Abstract
In this article, the possible effects of Removable Prosthesis (RP) on patients' health who have specific systemic disorders is reviewed. The study employed keywords pertaining to correlations between RP and six pathologies, namely: HIV, Gastric-Helicobacter pylori infection, diabetic mellitus, lung disorders, cancer, and cardiovascular diseases. An examination of the literature revealed that the Candida albicans organism is more commonly detected in the oral flora of patients with dentures who have one or more of the six general diseases mentioned than in denture wearers who have good health. The sanitary procedures required to reduce the risk of many ill ness should be reinforced in case of these patients, especially in the presence of physical or psychological disability. Considering this, patients with compromised health may benefit from expert therapy to remove Candida albicans and careful attention to dental hygiene.

Keywords: Cardiovascular diseases, diabetes mellitus, gastrointestinal diseases, human immunodeficiency virus, pulmonary diseases, removable prosthesis

Introduction

In medically compromised patients, understanding the diseases associated with or potentially caused by prosthetic microbiological plaque is crucial to preserving oral health and preventing complications. Denture plaque (DP) is defined as a dense microbial layer comprised of microorganisms and their metabolites. The aim of this paper is to investigate the common risks related to medically compromised patients wearing a complete denture prosthesis [1]. Because majority of the population is older and more likely to seek dentures, it's critical to systematize information about their unique needs and responses. Total denture care is dependent on the analysis of the data that is currently accessible, so that a final treatment plan may be created, and the patient can be assessed. Treatment planning for denture health services is very difficult and complex process that needs to be customized to the patients' anatomical, biological, psychological, and instructional needs. Thus, the patient's attitude and the general state of the soft tissue area both have a significant role. Different systemic diseases are important considerations while making dental therapy option. It is crucial to measure the area for appropriate delivery before the placement of any prosthesis in place [2]. The interaction between the patient and dentist, the dentist's ability to provide care will sustain a tooth in function, and according to patient's preferences [3]. The state of one's oral health influences many aspects of life, including communication, comfort, eating, appearance, and emotional stability. Many Research has demonstrated the oral–systemic relationship. Individuals with joint replacement, coagulation disorders, and specific heart problems are believed to be susceptible to certain bacteria that inhabit the oral cavity [4]. As the need for complete denture increases, so does the predicted demand for them, nevertheless, there aren't many published standards for complete denture prosthesis maintenance and daily care [5]. The three most prevalent denture-related mucosal lesions in elderly people who wear complete dentures includes, traumatic ulcers, angular cheilitis, and denture stomatitis [6]. The most common type of microbe involved in complete denture wearers is Candida – a type of fungus. The condition is termed as Denture stomatitis [7]. As a result, they should always start with the elimination of denture faults, denture plaque control guidelines, and to discontinue wearing denture at night time [8].

Materials and Methods

In this work, we have chosen to treat the most documented systemic diseases associated with this problem. Based on recent publications, we limited our search to the major diseases that may be associated with complete dentures. Six diseases are considered common among prosthetic wearers and are major risk factors for survival in elderly patients.

Inclusion Criteria

- Articles written in English.
- Articles from 2011 till 2022 were collected and segregated which are related to complete denture prosthesis and systemic diseases.
- Articles on studies of the relationship between the complete denture and Human immunodeficiency virus infection (HIV), Diabetes mellitus (Type I and Type II), Pulmonary disease, Gastric –H pylori, Cancer and Cardiovascular Diseases.

Exclusion Criteria

- Articles written in languages other than English.
- Clinical case reports.
- Articles on the studies of denture other than complete denture.
- Articles about healthy patients' denture wearer.

Human Immunodeficiency Virus Infected Denture Wearer

The irregular surface of acrylic resin in dentures creates favourable conditions for microbial attachment, including the invasion of Candida. In HIV-infected patients carrying complete denture, this fact takes on particular importance due to their immunosuppression [9].

For these patients, the effect of complete or partial removable dentures (PDR) is to increase the frequency of Candida albicans infection isolated from the mouth. The use of removable denture prosthesis has an important factor in the isolation of C. albicans from HIV-infected patients and CD4 count appears to play a role in the presence of oral candidiasis [10].

Diabetic Denture Wearer

Between types I and II, the incidence of type II diabetes (non-insulin-dependent diabetes mellitus) is the most common form of the disease associated with denture wearer [11]. It can have serious health consequences if not properly cared for, and unfortunately, because one-third of diabetics are undiagnosed [12]. Dental professionals must play an important role in the diagnosis and management of diabetic patients [13]. Additionally, diabetes has a positive correlation with tooth loss [14]. Type II diabetes may be a factor in the development of Denture Stomatitis (DS) along with periodontal diseases.DS is more common and severe in patients with non-insulin-dependent diabetes compared with DW with normal glucose metabolism [15, 16].

The primary bacterial pathogen of DS is the yeast C. albicans, but non-albicans species have also been implicated in the disease, such as Candida glabrata which predominates as a notable mucosal pathogen mouth [17].

Both infections can increase the patient's risk of bacterial infection. This in turn may increase the risk of chronic and systemic inflammatory diseases such as atherosclerotic coronary artery disease, stroke and hypertension [18]. At present, C. glabrata was discovered which resembles non albicans candidia species was isolated from oral candidiasis in individuals suffering from advanced cancer, HIV infection and diabetes [19].

Increased blood glucose causes a higher incidence of oral candidiasis. By lowering the amount of Candida colonisation in the mucosa that supports dentures, oral hypoglycaemic medications can help uncontrolled Type II diabetic DWs maintain better health [20]. Patients should be informed the significance of maintaining blood glucose control, cleaning their dentures on a regular basis, and ensuring that they are kept dry overnight. It appears that taking this precaution will help to restrict the growth of Candida.

Cardiovascular diseases and denture wearer

The cardiovascular diseases comprise cardiovascular risk disorders (hyperlipidaemia, hypertension, diabetes, and tobacco use) as well as coronary heart disease. There is no clear correlation between the survival of cardiovascular disease and removable denture; nevertheless, cardiovascular survival may be positively impacted by the number and maintenance of surviving teeth, as well as by the elimination of potential inflammatory foci such as retained root tips or pericoronitis [21]. In a different study, the most prevalent ailment among the 400 individuals (aged 29 to 70) wearing RDs was hypertension [22]. Dentate individuals frequently suffer from periodontitis, a bacterial infection, while denture stomatitis is primarily a fungal infection in DWs [23]. Both infections may increase the patient's risk for bacterial infection dissemination. There could be a higher chance of developing long-term, inflammatory-based systemic illnesses such as hypertension, atherosclerotic coronary disease, and stroke [24].

Cancer and Denture wearer

Inflammation associated with multiple primary malignancies is particularly common in the upper aerodigestive tract [25]. Oral Candida albicans was more common in patients (both cancer and non-cancer) who had dentures than in those who did not. Patients using immunosuppressive medications, antibiotics, radiation therapy, or chemotherapy are more likely to develop Candida albicans [26]. Compared to patients without cancer, individuals with cancer had higher rates of Staphylococcus species and Gram-negative enteric bacteria isolated from their palate, dorsum of tongue, and dental pulp [27].

Pneumonia and denture wearer

Wearing dentures while sleeping is linked to developing the risk of pneumonia in addition to mouth irritation and microbial load. Dental care may be helpful in preventing pneumonia in elderly nursing home patients, in this way, a Japanese study of more than 400 institutional patients, 163 of whom wore dentures, daily oral hygiene, and denture hygiene performed by caregivers was reported to result in reduced pneumonia, febrile illness and deaths over a 2 year of supervision [28].

Poor oral health can lead to the entry of respiratory pathogens into dentures and serve as a reservoir for these organisms; conversely, a reduction in oral biofilm can reduce the risk of pneumonia in high-risk individuals. Denture Wearer, with chronic obstructive pulmonary disease, had a lower respiratory tract colonized by pathogenic bacteria during the stable phase of the disease and during exacerbations. Compared to healthy individuals, these individuals had a higher frequency of prosthetic stomatitis that was exacerbated by mucosal infections [29].

Gastric helicobacter pylori and Denture wearer inflammation

Bacterial or fungal oral cavity inflammation may be accompanied by gastritis, especially in the presence of dental stomatitis, and fibrous and papillary hyperplasia is observed in almost 100% of H gastric infections. This suggests that H. pylori infection in the stomach affects the oral mucosa remotely, yet the mechanism remains unknown [29].

Eradicating H. pylori from the oral cavity is more challenging than from the stomach; if the bacteria survive antibacterial therapy in the oral cavity, it could re-infect the stomach within a few weeks. DP management may aid in the prevention of gastric disease or re-infection caused by H. pylori. H. pylori in dental plaque may pose a risk factor for gastrointestinal re-infection and ulcer relapse even after antibiotic therapy [30].

Discussion

Several articles about prosthesis and systemic diseases have been published [31]. Despite its different location and composition of dental plaque, the microbiology of denture plaque has not attracted as much research as that of dental plaque [32]. Diabetes Mellitus is one of the most common and widespread systemic illnesses among people who wear dentures, according to our research. The condition is a

complex metabolic one that is typified by hypo- or nonfunctioning beta cells in the islets of Pancreatic Langerhans, which causes elevated blood glucose levels and urine excretion of sugar [33]. Diabetes mellitus patients may experience periodontal disease breakdown, abscess formation, xerostomia, which can cause mucosal abrasion and ulceration, and progressive bone resorption over time [34]. When a patient has xerostomia, they should be urged to drink water throughout the day, as well as any water-soluble jelly, an ethanol-free rinse containing lanolin or aloe, or a saliva substitute comprising Mammalian mucin or carboxymethyl cellulose may also be administered.

Periodontal disease known as "Denture related stomatitis," which can result in respiratory [35] and/or digestive infections [36], and requires be kept under observation. The examination and medical history of the ailment are necessary for the systematic screening of at-risk individuals. These individuals need to be given extra care after they are recognised [37].

Patients with compromised immune systems and those on many medications may have decline in their quality of life due to ingesting or inhaling bacteria from the prosthetic microbial plaque [38]. As a result, we need to be watchful and keep an eye on the flora while using the proper hygienic techniques to control it over time [39, 40]. It is true that DP, dental plaque, and biofilms cannot be removed. By reducing the total microbial burden and using suitable oral hygiene techniques, such as daily brushing, flossing, and mouthwash, the pathogenic character of these biofilms can only be reduced [41]. The avoidance and care of any related aftereffects, such as denture diseases, support the potential influence on particular systemic illness [42].

According to clinical research, breaking up the biofilm may be more crucial for treating and preventing denture stomatitis than using antifungal or antibacterial medications [43, 44]. The oral microbial ecology of many elderly, susceptible persons who wear dentures is influenced by their diet, which is typically heavy in sugar. The conversations amongst the resident's vegetation and the recent arrivals, which either encourage or inhibit the growth and survival of each distinct species [45]. Among the sources of nutrients, carbs are crucial for the pathophysiology of infections caused by fungi [46, 47]. Carbohydrates in diet can controls the growth of C. albicans biofilms on the denture material surface [48]. Nutrition may affect the ratios of certain bacterial species in the biofilm's formation [49].

Conclusion

An individual's overall health throughout their life has an impact on their oral ecology. Initial denture compatibility with the surrounding environment may eventually result in tissue harm either directly or indirectly.

There are two complimentary therapeutic techniques that work together to prevent the growth of microorganisms in relation to complete denture prosthesis. Limiting the adhesion phenomenon on entire denture surfaces is the first step. The second is to get rid of frequent deposits by creating and keeping good oral hygiene.

Ultimately, more clinical research is required to gain a deeper understanding of how prosthesis affect patients' health, particularly those who are most susceptible. It appears that patient education and information campaigns are crucial for reducing this risk.

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