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Review Article

Correlation between Edentulism, Nutrition, and Diabetes- An Overview

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Abstract
With rising of the general global population there also an increase in the number of elderly people which ultimately increase in the edentulism. Moreover, the elderly population is affected by systemic and metabolic diseases, most commonly being Diabetes Mellitus along with nutritional deficiency. Also, nutritional deficiency may develop due to the inability of the elderly population to chew food properly due to loss of teeth following various reasons and leading to complete or partial edentulism. This review is aimed to find a correlation between, edentulism, nutrition, and diabetes and can the treatment of edentulism has an effect on the improvement of nutritional status in diabetic patients.
Keywords: *diabetes mellitus, edentulism, nutrition.*

Introduction

The ability to chew a wide variety of foods of different textures and nutritional values is the principal benefit provided by the teeth. As tooth loss occurs, masticatory efficiency declines, and it is natural for humans to alter their dietary intake to compensate for the greater difficulty of eating certain foods and have difficulty chewing foods that are hard or tough in texture, even when wearing well-made dentures. Among the people who were living independently, the intake of a variety of nutrients was significantly higher indentate than in edentulous individuals: vitamin C, vitamin E, calcium, protein, fibre, non-heme iron, thiamin, riboflavin, niacin, pantothenic acid, and intrinsic and milk sugars. It is assumed that there are pathogenic collagenic mechanism that stimulate the most intensive progression of periodontal disease in diabetes.[2] The consequences of periodontal disease and subsequent tooth loss not only are important considerations for the quality of life of patients with diabetes, but they may also affect significantly overall health by compromising patients' ability to maintain healthy diets and proper glycemic control.[3] Complete dentures (CDs) are widely used in restoration of completely edentulous dental arches. The resulting shape and size of the residual ridge influence the degree of stability and retention of the denture and affect the amount of applied load and furthermore, it is found that DM also reduces healing of wounds and causes bone resorption contribute to failure in dental treatment.[4] Patients with diabetes are likely to have more severe

periodontitis in terms of average plaque index (PI), average gingival index (GI), and clinical attachment loss, but exhibit the same extent of periodontal disease.[5] A cross-sectional study reported that functionally edentulous (6 or fewer teeth) older men had 4.06times greater risk of developing type 2 diabetes, regardless of age or race, than those with partial or complete dentitions.[6] Teeth have an important role in facial appearance, speech, and eating ability. There is overwhelming evidence showing the negative effect of edentulism on Oral and General health. Edentulism negatively influences not only oral function, but also social life and day-to-day activities[96].Compromised oral function has been linked to decreased self-esteem and a decline in psychosocial well-being.[8]

Edentulism and mastication

Edentulous individuals report significantly more chewing difficulties than dentate people, and they therefore constitute the group most likely to change their diets. Harder and more coarse foods such as fruits, vegetables and meats, which are typically major sources of vitamins, minerals and proteins, come to be regarded as either difficult or nearly impossible to chew. Consequently, a tendency to favour softer, more processed foods develops. However, these latter foods are typically fairly high in fat and cholesterol content and may also be lacking in vitamins and minerals.[1]

Diabetes and elderly population

Diabetes mellitus is a chronic and metabolic disorder that affects more than 100 million people worldwide.[3] India leads the world with the largest number of diabetic patients and has been declared as the ‘‘Diabetic Capital of the World’’ by the WHO. Type 2 diabetes generally occurs after the age of 40, and its prevalence increases with age, with a maximum peak between 65 and 74 years. In India, more than half of the diabetics (53 %) are above 60 years and more than 85 % are above 45 years ofage.[6]

Edentulism and elderly population

Edentulism is prevalent among older people all over the world. In developing countries limited access to oral health services often results in tooth extraction because of pain or discomfort, or because of lack of materials for dental treatment. Removable dentures are particularly frequent among the older people[23]. In India; prevalence of edentulousness of elderly has been reported as 19 % in the age group of 65–74 years. A WHO study conducted in Delhi reported that in 35–44 year age group, 8 % of the study population were using partial dentures and 1 % were using complete dentures while in 65–74 year age group, 8 % were using partial dentures and 20 % were using complete dentures. Use of prosthesis was more common in urban than rural population.[6]

Diabetes and edentulism

Studies on relationship between diabetes and complete edentulism are sparse. One study investigating the relationship of edentulism to diabetes reported that edentulous patients had 1.82 times greater risk of having diabetes than the dentate patient[27]. A cross-sectional study reported that functionally edentulous (6 or fewer teeth) older men had 4.06 times greater risk of developing type 2 diabetes, regardless of age or race, than those with partial or complete dentitions. A large portion of denture wearing diabetic population remains undiagnosed of their underlying systemic condition posing them to increased risk of developing oral diseases and denture-related complications.[6]

Impact of edentulism on oral health

Edentulism was found to have a significant effect on residual ridge resorption, which leads to a reduction in the height of alveolar bone and the size of the denture bearing area. This reduction affects face height and facial appearance, which are altered following total tooth loss. Edentulism canbe accompanied by functional and sensory defciencies of the oral mucosa, oral musculature, and the salivary glands. Decreased tissue

regeneration and decreased tissue resistance are expected in the edentulous population, which can impair the protective function of the oral mucosa. Associations have been reported between aging, denture use, and oral mucosal disorders, including denture stomatitis, an inflammatory condition of the palatal mucosa seen in complete denture wearers, angular cheilitis, oral candidosis, and traumaticulcers.[8]

Impact of Edentulism on General Health

According to several studies, tooth loss can affect general health in several ways as indicated as follows:

(a) Lower intake of fruits and vegetables, fber, and carotene and increased cholesterol and saturatedfats, in addition to a higher prevalence of obesity,can increase the risk of cardiovascular diseases and gastrointestinal disorders ;

(b) Increased rates of chronic inflammatory changes of the gastric mucosa, upper gastrointestinal and pancreatic cancer, and higher rates of peptic or duodenal ulcers ;

(c) Increased risk of noninsulin-dependent diabetes mellitus ;

(d) Increased risk of electrocardiographic abnormalities, hypertension, heart failure, ischemic heart disease, stroke, and aortic valve sclerosis. A study also demonstrated a possible association between complete edentulism and an increased risk of coronary heart disease. Furthermore, a more recent large prospective study concluded that the number of teeth was a dose-dependent predictor to cardiovascular mortality;

(e) Decreased daily function, physical activity, and physical domains of health-related quality of life;

(f) Increased risk of chronic kidney disease;

(g) Association between edentulism and sleep-disordered breathing, including obstructive sleep apnea.[8]

Discussion

The mouth can function as an "early warning" system for some diseases. The early identification of oral disease may contribute to the early diagnosis and treatment of diabetes. It is known that diabetic patients have higher rates of tooth loss, periodontal disease and soft tissue disease than non-diabetic patients.[3] Furthermore, the prevalence of bone resorption among patients with diabetes tends to be greater than among the general population; this difference may be related to hyperglycemia in the former group.[4]

Periodontitis is the characteristic complication of diabetes mellitus and significantly varies with the glycemic control.[5] The effect of diabetes on implants has revealed an alteration in bone remodeling processes and deficient mineralization, leading to less osseointegration.[7]

The effects of tooth loss range from itsdirect physical consequences, including loss of masticatory function and compromised nutrition intake, to an altered perception of self and diminished overall quality of life. Furthermore, tooth loss has been considered a predictor of longevity as a measure of the summative stresses a person has endured in his or her lifetime.[13] The correlation between diabetes, edentulism and nutrition seems to be like an vicious cycle in which the disease leads to loss of teeth effect the nutritional status due to edentulous condition which in turn worsen the glycemic state.

Conclusion

Diabetes Mellitus affects people of all age. Its prevalence has been increasing all over the world.[7] There is significant statistical relationship between edentulism prevalence and variables such as age, level of education, cigarette smoking, poororal health, caries, periodontal disease, economic status, and history of systemic disease including diabetes and heart disease.[10] There is also a direct influence of education and family income on the prosthetic status of the population.[11] We can conclude that as diabetes, edentulism and nutrition are all interrelated so the

treatment of edentulous state can improve nutritional status of the patients and in turn the glycemic state.

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