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Original Research Paper

Periodontology

CONTEMPLATING EYES THROUGH GUMS

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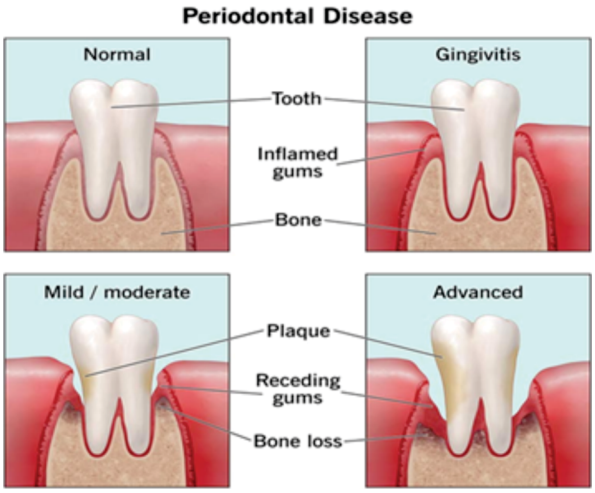
ABSTRACT Periodontal disease (or gum disease) is a bacterial infection and inflammation of the gums and supporting bone structures around your teeth. It progresses from mild, reversible gum inflammation (gingivitis) to severe tissue decay (periodontitis), which can destroy bone, cause teeth to loosen, and lead to tooth loss. The oral microbiome, when altered due to poor dental hygiene, can lead to the growth of harmful bacteria. These bacteria can enter the bloodstream and lymphatic system, traveling throughout the body, including to the eye.

KEYWORDS : Periodontal Diseases, Glaucoma, Macular Degeneration, Oral Health

INTRODUCTION

Periodontal disease (or gum disease) is a bacterial infection and inflammation of the gums and supporting bone structures around your teeth. It progresses from mild, reversible gum inflammation (gingivitis) to severe tissue decay (periodontitis), which can destroy bone, cause teeth to loosen, and lead to tooth loss.[1]



Periodontal diseases consist of a wide range of inflammatory conditions which causes degeneration of Periodontium and affects all supporting structures of teeth such as gingiva, periodontal ligament, cementum and alveolar bone etc. followed by teeth loss. WHO had reported about 10-15% of the world population is suffering from severe periodontal condition. It is complex infectious disease caused by aggressive microbial growth on teeth. The main aim of this study is to provide systemic update on periodontal disease regarding its stages, occurrence, pathophysiology, diagnosis, treatment and management. The pathophysiology of periodontal disease is associated with dental plaque, microbial biofilm formation and immunogenicity of the host cell. The severity of this disease depends upon risk factors and chronological stages.[2]

Periodontal disease and systemic conditions share a bidirectional relationship. Chronic inflammation and bacteria from the mouth can enter the bloodstream and impact distant organs, while systemic diseases can lower the body's resistance to oral infections, making gum disease more severe.[3]

Oral conditions such as gingivitis and chronic periodontitis are found worldwide and are among the most prevalent microbial diseases of mankind. The cause of these common inflammatory conditions is the complex microbiota found as dental plaque, a complex microbial biofilm. Despite 3000 years of history demonstrating the influence of oral status on general health, it is only in recent decades that the association between periodontal diseases and systemic conditions such as coronary heart disease and stroke, and a higher risk of preterm low birth-weight babies, has been realised. Similarly, recognition of the threats posed by periodontal diseases to individuals with chronic diseases such as diabetes, respiratory diseases and osteoporosis is relatively recent. Despite these epidemiological associations, the mechanisms for the various relationships remain unknown. Nevertheless, a number of hypotheses have been postulated, including common susceptibility, systemic inflammation with increased circulating cytokines and mediators, direct infection and cross-reactivity or molecular mimicry between bacterial antigens and self-antigens. With respect to the latter, cross-reactive antibodies and T-cells between self heat-shock proteins (HSPs) and Porphyromonas gingivalis GroEL have been demonstrated in the peripheral blood of patients with atherosclerosis as well as in the atherosclerotic plaques themselves. In addition, P. gingivalis infection has been shown to enhance the development and progression of atherosclerosis in apoE-deficient mice. From these data, it is clear that oral infection may represent a significant risk-factor for systemic diseases, and hence the control of oral disease is essential in the prevention and management of these systemic conditions.[4]

Oral Health in Relation with Optic Health:

Oral health and eye health are deeply connected, primarily through systemic inflammation and shared bacterial pathways. Harmful bacteria from gum disease can enter the bloodstream and spread to the eye, while untreated dental infections may also trigger eye conditions like glaucoma, uveitis, and macular degeneration.[5]

1. Indicators of Oral Issues and Related Eye Problems:

- Problems chewing, swallowing, or speaking
- Discoloration, like dark or white spots inside your mouth
- Spontaneous pain in your mouth, especially when you're trying to eat or brush your teeth
- Sores in your mouth
- Bleeding gums
- Tooth sensitivity
- Bad breath
- Jaw pain or clicking/popping of your jaw

- Discolored or misshapen pupils
- Persistent eye itching
- Pain, redness, or tenderness around your eye
- Green or yellow-colored discharge
- Swollen or droopy eyelids.[6]

2. Periodontitis and Glaucoma:

According to the American Academy of Ophthalmology, oral infections, including periodontal disease, cause an inflammatory response that can damage the optic nerve and cause vision loss. Additionally, people who have old mercury fillings may be at risk for vision problems that include iritis, color-vision issues, retinitis pigmentosa, and the formation of cataracts.

Poor dental hygiene is also known to contribute to the development of open-angle glaucoma. A degenerative eye disease, open-angle glaucoma results from increased fluid build-up in the eye that places damaging pressure on the optic nerve. Left untreated, this condition can cause vision loss and even blindness. One recent study found that the number of natural teeth a person has, an indication of the person's dental care, is related to the risk of developing glaucoma.[7]

3. Periodontitis and Macular Degeneration:

Researchers have found that the microorganisms that causes periodontal disease enter into the systemic circulation and causes inflammation in other organs in the body. In the last few decades, macular degeneration which is a common cause of blindness in older population is found to be associated with periodontitis. The cause of this disease, age-related macular degeneration (AMD) is unknown, however, several risk factors such as old age, hypertension, high cholesterol, have been identified as risk factors. Some suggests genetic and environmental factors together have a role in the development of AMD.[8]

In the cross-sectional study by Shin et al, a total of 13,072 participants were enrolled with age 40 years or above. Photographs of retinal fundus were taken and community periodontal index (CPI) was extracted from the Korean National Health and Nutrition Examination Survey (KNHANES). Participants were divided into a middle age group that included adults with age ≤62 years and an old age group consisted of adults with age >62 years. In the results, it was concluded that participants with severe PD in the middle age group had 1.61 times more chances to have AMD (Odds Ratio 1.61, 95% Confidence interval 1.02-2.54). Thus concluding severe PD was independently associated with AMD in adults of age 62 years or younger.[9]

Wagley et al carried out secondary analysis of data obtained in the National Health and Nutrition Examination Survey III (NHANES III). Using the photographs of eye fundus collected during the survey, they evaluated patients with AMD above 60 years of age and patients with AMD at age 60 years or below. After adjusting confounding factors using logistic regre ssion model, the results were interpreted. They suggested that periodontitis increased the risk of AMD in patients 60 years or below with odds ratio = 1.96, 95% confidence interval = 1.22-3.14 and p value = 0.006. Nevertheless, this association was not seen in patients above 60 years of age.[10]

Several studies have shown that periodontitis in the oral cavity can be linked with the macular degeneration in patients below the age of 60 years. However, more number of studies will provide insight into the pathogenesis of this relationship. Therefore, studies in this area are scarce and more scientific evidences are certainly needed to establish a relationship. Overall, periodontal diseases may contribute to the development of age-related macular degeneration.[11]

Taking Care of Oral Health and thus Protecting Eyes:

Thankfully, you can prevent eye-straining oral problems with the right habits. If you haven't already, then, try adopting the following tips:

Practice Good Oral Hygiene – Twice daily, brush your teeth with a soft-bristled toothbrush and fluoridated toothpaste. Furthermore, remove any excess plaque and food debris by flossing once daily.

Eat a "Mouth-healthy" Diet – Sugary foods and drinks erode enamel, whereas nutrient-dense meals keep your teeth and gums healthy from the inside out. So, add some lean proteins, fresh fruits, and raw veggies to your diet plan.

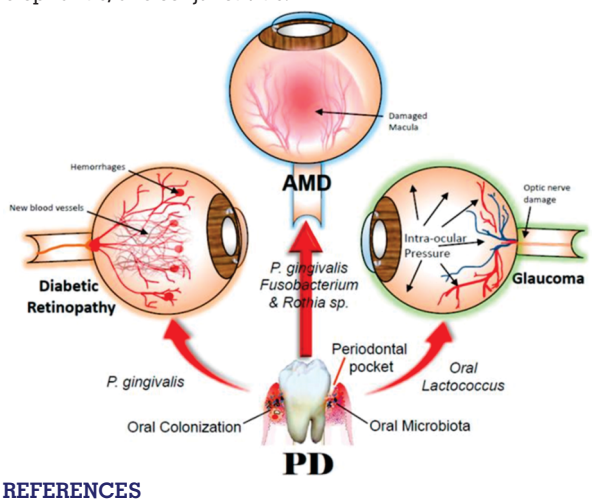
Avoid Bad Oral Habits – Tobacco drastically increases your risk of gum disease when ingested. Therefore, try your best to quit smoking or chewing products that contain it.

See Your Dentist Often – We dentists recommend checkups and cleanings every six months. These routine visits can catch gum disease early and prevent severe dental problems. Furthermore, they give practices a chance to screen for oral cancer.[12]

"It's not uncommon for optometrists or dentists to notice issues with the eyes or inside the mouth that are actually symptoms for larger health conditions," says Dr. Raj Hazarika, MD, SM and vice president and chief medical officer for commercial products at Point32Health – the parent company of Harvard Pilgrim Health Care and Tufts Health Plan. "For example, blurred vision can be a symptom of diabetes, as can swollen or inflamed gums."[13]

CONCLUSION

The oral microbiome, when altered due to poor dental hygiene, can lead to the growth of harmful bacteria. These bacteria can enter the bloodstream and lymphatic system, traveling throughout the body, including to the eye. This can disrupt the normal eye microbiome, potentially leading to various eye diseases like dry eye syndrome, keratitis, blepharitis, and conjunctivitis.[14]



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