Review Article

JRAD Journal of Research and Advancement in Dentistry

J Res Adv Dent 2016;5:3:286-288.

The Hook Up Between Periodontal Disease and Cancer: A Review

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ABSTRACT

Background: Periodontal diseases are major chronic infections combining destruction of the tooth-supporting apparatus i.e. the gingiva, the periodontal ligament, alveolar bone. Data shows chronic infections and inflammation are indicates high cancer risk. Studies show bridge between bacterial and viral infections and carcinogenesis. Therefore, the present review is an attempt to establish a link between cancer and periodontal disease.

Keywords: Periodontal disease, cancer, carcinogenesis.

INTRODUCTION

Inflammation is a physiological process necessary for the innate immune system which reacts to acute tissue destruction. Studies revealed connection between inflammation related with cancer to that seen with the chronic inflammation.[1] The German Pathologist Virchow acknowledged the connection between inflammation and cancer in the 19th century. The interlink between inflammation and cancer can be considered of two pathways:

- An extrinsic mechanism, where a constant inflammatory state contributes to increased cancer risk;
- an intrinsic mechanism, where acquired genetic alterations trigger tumor development.

Critical state of periodontal diseases leads to significant inflammatory loading, furthermore to the succession of systemic conditions including carcinogenesis.

"Cancer" is a broad term used to describe a group of illnesses defined by uncontrolled growth of abnormal cells that can occur anywhere in the body. Various factors such as:

- Environmental factors include chemicals, radiation, and infection etc.
- Intrinsic factors include gene mutations, hormones etc. [2]

Link between various cancers and periodontal disease:

PANCREATIC CANCER RISK

Periodontal disease is believed to endorse pancreatic carcinogenesis through inflammation or through the generation of carcinogens, such as nitrosamines. Nitrosamines and gastric acidity have been thought to play a rolein pancreatic cancer. When the statistical data was considered from the National Health and Nutrition Examination Survey (NHANES I) population it was concluded that people with gingivitis, periodontitis had an elevated risk of death from cancer, with a suggestion of an association for pancreatic cancer. [3]

Received: Aug. 1, 2016: **Accepted:** Oct. 7, 2016
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pISSN 2278-0076
eISSN 2321-9270

UPPER GASTROINTESTINAL CANCER RISK

Possible reasons connecting tooth loss and upper gastrointestinal cancers:

Tooth loss might be a result of unhygienic oral conditions. It markens the risk of upper gastrointestitial cancers as the oral bacterial habitation is disturbed. Eventually there is a potential exposure as well as in vivo generation of nitrosamines.[3]

POST MENOPAUSAL BREAST CANCER

Aromatase inhibitor (AI) is known to influence bone mineral density(BMD).

Low BMD causes:

- Periodontitis
- alveolar bone loss
- tooth loss

Systemic BMD ⇨ bone density of the oral cavity ⇨ osteoporosis.

AIs plays a key role among PM women in maintaining a good oral habitat.[4]

COLORECTAL CANCER RISK

Colorectal cancer (CRC) is the second major cause of cancer death. Recent publications have unveiled Fusobacterium nucleatum, to be the primary subgingival microbial species in chronic periodontitis.Specific subgingival microorganism are found similar in periodontitis as well as cancerous changes leading to CRC. Clarification of F. nucleatum in CRC is an eye opener in many oral-systemic connections. Both periodontal disease and CRC are considered aged people's diseases.[5]

HODGKIN'S LYMPHOMA RISK

Indications of a para neoplastic manifestation of HL are:

- inflammatory gingival overgrowth
- premature root resorption of deciduous teeth
- alveolar bone loss in conjunction with the regression of gingival overgrowth

The gingival inflammatory reaction was accumulated by the bacterial induced cytokine secretion released by monocytes. Inflammatory gingival overgrowth, deciduous premature root resorption, and bone loss are noticed in HL. [6]

NASOPHARYNGEAL CANCER RISK

Nasopharyngeal carcinoma (NPC) is a tumour of epidermoid origin prominently found in ethnic groups. It is abundantly found in Hong Kong . Nasopharyngeal carcinoma is both radiosensitive and chemosensitive. Radiotherapy is the primary treatment for early disease. On the other hand cocurrent chemotherapy is standardized for advanced disease. Xerostomia is eventually faced by NPC patients following radiotherapy. Hence patients oral hygiene is not maintained which leads to various periodontal diseases.[7]

LEUKAEMIA RISK

Different forms of leukaemia are:

- acute lymphocytic leukaemia in children
- acute myeloid leukaemia (AML) in teenagers and young adults
- chronic myeloid leukaemia in adults
- chronic lymphocytic leukaemia in patients aged above 40 years and in the elderly.

The oral cavity is the prime source of infection in such patients as the blistered gingival tissues plays an important mode of entrance for bacteria and its products inducing the serum levels of inflammatory cytokines. In AML patients, gingival overgrowth with a soft boggy appearance, along with gingival bleeding and erythema is witnessed eventually leading to periodontitis .[8]

CERVICAL CANCER (HUMAN PAPPILOMA VIRUS) RISK

Human papilloma viruses (HPVs) has gained significant importance because of their definite role in the pathogenesis of numerous human malignancies. It attacks the basal cells of the epithelium, where the virus remains dormant. Furthermore ,the only site in the oral mucosa where basal cells is apparent to the environment is the periodontal pocket.

Studies clearly revealed role of herpes virus in the pathogenesis of periodontal disease. The chronic inflammation and continuous epithelial proliferation in the junctional and gingival sulcus epithelium creates a favourable environment for periodontitis cloning of HPV. It is a definite reservoir of HPV in the oral mucosa.[9]

ORAL SQUAMOUS CELL CARCINOMA RISK

The oral cavity assures a communication between the external and internal environment in the body. Oral hygiene plays an important role in the development of chronic disease.Oral squamous cell carcinoma (OSCC) is the most common of all oral malignancies leading to a number of mutilations and cancer related deaths each year.[10]

A positive link between OSCC and chronic bacterial inflammation due to involvement of inflammatory mediators, cytokines and bacterial toxins which results in malignant transformation vitro. Hence, studies conclude a clinical relevance of a strong connection between chronic periodontitis and malignant transformation.[10]

CONCLUSION

Based on the "focal infection" theory that emerged at the beginning of the 20th century, many studies over the past two decades have investigated the possibility of PD being a risk factor of systemic conditions, such as cardiovascular diseases, diabetes, chronic obstructive pulmonary diseases, adverse pregnancy outcomes, etc. In 1863, Virchow hypothesized that cancer originates from chronic inflammation sites, and subsequent evidence has indicated that inflammation is a critical component of cancer progression.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

REFERENCES

1. Pendyala G,Joshi S, ChaudhariS,Gandhage D, Links Demystified: Periodontitis And Cancer Dental Research Journal 2013 November;10(6)
2. Michaud DS, Liu Y, Meyer M, Giovannucci E, Joshipura K. Periodontal disease, tooth loss, and cancer risk in male health professionals: a prospective cohort study. Lancet Oncol 2008;9:550–558.
3. Yao Sg, Fine Jb, Periodontitis And Cancer...A Link? A Review Of The Recent Literature compendium 2010 august;31(6)
4. Taichman LS, Inglehart MR, Giannobile WV, Braun T, Kolenic G, Poznaki CV Periodontal Health in Women With Early-Stage Postmenopausal Breast Cancer Newly on Aromatase Inhibitor:A Pilot Study jop 2015:86(7)
5. Han YW Oral Bacteria as Drivers for Colorectal Cancer J Periodontol 2014 September
6. Galitis ON,Papadaki T,Moshovi M,KammaJj,ConstantinidouCvv,Tsoumakas C et al Gingival Overgrowth As The Initial Paraneoplastic Manifestation Of Hodgkin's Lymphoma In A Child J Periodontol 2001 January
7. Paw Ehn,Mcmillan As,Leung Wk,K Wong Dlw,WongMcm, Oral Health Condition In Southern Chinese After Radiotherapy For Nasopharyngeal Carcinoma:Extent And Nature Of Problem Clinical Oral Disease 2003;9:196-202
8. Shankarapillai R, Nair MA, George R, Walsh LJ. Periodontal andgingival parameters in young adults with acute myeloid leukemiain Kerala, South India. Oral Health Prev Dent 2010;8:395-400.
9. Hormia M, Willberg J, Ruokonen H, Syrjanen S. MarginalPeriodontium as a potential reservoir of human papillomavirusin oral mucosa. J Periodontol 2005;76:358-63.
10. Kruger M, Hansen T, Kasaj A, Moergel M; The Correlation Between Chronic Periodontitis And Oral Cancer; Hindawi Publication Corporation, Vol. 2013.