

Oral cancer micro environment in paediatric population

Dimple Mahinder Vaswani¹, Karthik Shunmugavelu², Shyam Sundar Behura³, Shashirekha Govind⁴, Shalu Verma⁵, Amit Bhardwaj⁶

¹Reader Yashwantrao Dental College, Ahmednagar, India

²Department of Dentistry/Oral and Maxillofacial Pathology, PSP Medical College Hospital and Research Institute Tambaram Kanchipuram, Tamil Nadu, India

³Department of Oral & Maxillofacial Pathology, Kalinga Institute of Industrial Technology (KIIT) Deemed to be University, Bhubaneswar, Odisha, India

⁴Department of Conservative Dentistry and Endodontics, Institute of Dental Sciences, Siksha O Anusandhan deemed to be University, Bhubaneswar, India

⁵Department of Pediatric and Preventive Dentistry, Faculty of Dental Sciences, SGT University, Gurugram, Haryana, India

⁶Department of Periodontology, Faculty of Dental Sciences, SGT University, Gurugram, Haryana, India

ABSTRACT

The various oral diseases can be diagnosed, screened, prevented and treated by paediatric dentists in children. Among many oral diseases, oral cancer is very rare and benign in the paediatric population. The abnormalities seen in the oral cavity can be diagnosed by the dentists and the oral cancer can be screened by oral and maxillofacial pathologists along with paediatric oncologists. If any changes are seen in the oral cavity of the child, the changes should be diagnosed as fast as possible and treated soon. The most common oral cancer is lymphoma and sarcoma, seen in children. The other type of cancer that may occur in children is melanoma. The anaerobic bacteria, a few viruses, and rare species of fungi are also responsible for oral cancer in children.

Key words: squamous cell carcinoma, oral cancer, paediatric population

INTRODUCTION

The condition in which cells grow in larger amounts and damages the tissues related to the oral cavity is called oral cancer. In the oral cavity, tongue, lips, buccal mucosa, palate, the floor of the mouth, gingiva, and back of the throat are the main parts that are affected by oral cancer [1,2]. Also, oral cancer may sometimes be fatal if untreated at the correct time [3,4]. The cancerous cells may form and proliferate on the tongue, or under the tongue or at the base of the tongue or in the tissue lining the mouth and gums or in the throat or at the back of the mouth. The oral cancer that develops in the lips is called labial carcinoma. The oral cancer that forms in the lips and cheeks is called buccal carcinoma. When the cancer is caused in the gums, it is known as gingival carcinoma. The cancer that forms on the roof and floor of the mouth is known as hard palate carcinoma or floor of mouth carcinoma. When the cancer is caused on the tongue, it is called tongue carcinoma. The cancer which causes in the middle part of the throat, tonsils, and base of the tongue is a throat cancer called oropharyngeal cancer [5,6]. The symptoms of oral cancer are jaw swelling, white or red patches on the tongue, gums or mouth, a sore on the lips or mouth which does not heal, change in voice, ear pain, coughing, difficulty in swallowing as well as chewing, lump in the mouth or throat, sometimes bleeding resulting in inflammation and pain. Mostly, cancer caused in the oral cavity is benign or malignant [7-10]. And also, the oral cancer is very rarely seen in the paediatric population as well as adolescents [11,12]. Squamous cell carcinoma is the most common type of oral cancer that forms in the inside of the mouth with very thin and flat cells and mucosal epithelium and it can also occur in the larynx and pharynx but, it is seen rarely in children [13]. The bacteria which is responsible for the formation of oral cancer in the oral cavity is *Porphyromonas gingivalis*. Staging is the process in which we can find about the cancer that has spread out in oral cavity to other nearby areas of the body, but the staging system is not operated in the childhood oral cancer. The tests and procedures are done to diagnose oral cavity cancer which further help with the treatment procedures and unfortunately, sometimes after treatment also, the childhood oral cavity may come back again [13]. Children who have oral cancer receive chemotherapy that decreases quality of life [14]. Children who have oral cancer, their oral microbiota are used in providing information about the illness and chemotherapy [15]. While treating oral cancer in children, there are certain side effects such as oral mucositis, which may be painful, there may

Address for correspondence:

Karthik Shunmugavelu
Department of Dentistry/Oral and Maxillofacial Pathology,
PSP Medical College Hospital and Research Institute Tambaram
Kanchipuram, Tamilnadu, India,
Email: drkarthiks1981@gmail.com

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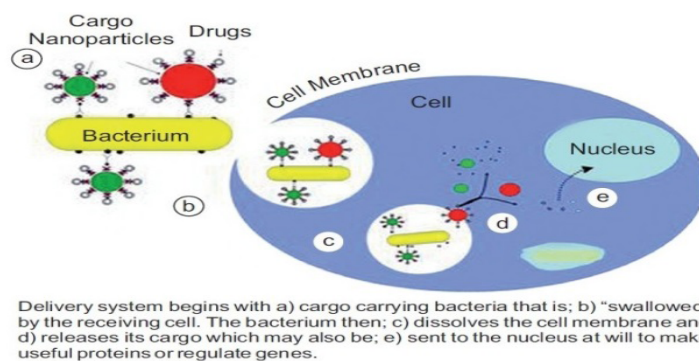


Fig. 1. Bacteria laden with "Smart polystyrene nanoparticles" which can carry genes, drugs, Nano sensors or other cargo into the interior of host cells for early diagnosis and treatment of oral cancers

be difficulty in feeding resulting in malnutrition, and thus there is no soon recovery resulting in prolonged hospitalization and, also it may cause bloodstream infection, resulting in decrease in the quality of life and treatment adherence [16,17]. Many species of bacteria may cause infections that are not mild or may also produce toxins which disturb the cell cycle and lead to anonymous and abnormal cell growth and this may lead to the cancer [18-20]. As the toxins get produced by the bacteria, there also will be inflammation in the tissues and thus damaging DNA and leading to genetic disorders which in turn cause cancer [21-25]. The pathogenic bacteria that causes infection, gives rise to abnormal cell growth by suppressing apoptosis and with this, the immunity of the host will get decreased thus provoking to cancer [26-28]. Chronic infections induce proliferation of the cells and DNA replication by activating mitogen activated kinase pathways and increasing the volume of cell growth and thus the tumour increases in size and due to this, there are a lot of changes seen in genes leading to genetic mutations [29,30]. The nitrosamine, which is available by the process of nitrosation, is also the cause of carcinoma including both mucosa of the oral cavity and the oesophagus [31]. Some bacteria like *E.coli*, yeasts and fungi may have the property to catalyse the nitroso compounds which may lead to oral cavity [32] (Figure 1).

On taking salivary counts of the species of the bacteria, and the abnormalities seen in the mouth, the screening test for oral cancer is to be done as saliva can be easy to be used for the diagnosis of oral cancer from adult patients who use tobacco and alcohol [33-36]. As well, to know the action of the bacteria on oral cancer formation, the tumour specimens have to be collected and tested [37]. The dietary factor is also a risk factor of oral cancer as it gives the lower immunity provoking for the formation of the cancer. The other risk factors that cause oral cancer in the paediatric population are, if the child gets infected with human papillomavirus, if the

child has genetic disorders such as epidermolysis bullosa, fanconi anaemia, xeroderma pigmentosum or any gene mutations, and if the child is suffering with graft-versus-host disease or if the child has poor oral hygiene or the child may chew tobacco or may smoke or may have alcohol [38-45]. Apart from the various bacteria, very few species of viruses are involved in the formation of cancer by altering the genomic functions involving the cellular proteins. Chronic hyperplastic candidosis, which is an oral fungal infection, is very rarely caused when candidal hyphae invade into the oral epithelium and causes so many changes that are abnormal and lead to oral cancer [45]. However, many clinical trials in gene therapy are taken into practice for the eradication of oral cancer.

CONCLUSION

The above review explains the association between the various germs like bacteria, viruses, and fungi and the oral cavity. But still there is no clear demonstration of the bacterial actions on the oral cavity as it is not easy to predict how the bacteria colonizes and causes oral cancer. The proposal of "Oral Cancer Among Young" is to bring together a group of international researchers from various countries from the U.S., Europe, and Asia to conduct and do research on the cancer of the tongue and mouth in youngsters from different parts of the world so as to eradicate oral cancer as early as possible. Children should undergo diagnosis as soon as any abnormality is seen in the oral cavity as well and should follow all the protocols of good hygiene and a healthy life. Still, there should be studies associated with bacteria and the oral cavity. Preventive measures have to be taken for the control of oral cancer in the oral cavity, like proper hygiene, avoiding smoke, alcohol and tobacco. As well if any abnormalities are seen in the oral cavity, consult the dentists as early as possible for the screening and diagnosis of the disease.

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