AETIOLOGY AND RISK FACTORS FOR ORAL CANCER – A BRIEF OVERVIEW


ABSTRACT

Oral cancer is the sixth most common malignancy in the world. Despite recent advances in cancer diagnoses and therapies, the five-year survival rate of oral cancer patients has remained at a dismal 50% in the last few decades. Oral cancer is of major concern in Southeast Asia primarily because of the prevalent oral habits namely betel quid chewing, smoking and alcohol consumption. This paper provides a brief overview on the various aetiological agents and risk factors implicated in the development of oral cancer.

Key words: etiology, risk factors, oral cancer, oral precancer, carcinogenicity, tobacco, alcohol, nutrition, viruses, genetic predisposition.

INTRODUCTION

The three main factors which influence most diseases are lifestyle, environmental factors and genetic susceptibility (1). Oral or head and neck squamous cell carcinoma (SCCHN) development is influenced by all these factors namely tobacco (smoking & smokeless), alcohol, diet and nutrition, viruses, radiation, ethnicity, familial and genetic predisposition, Candida infection, immuno-suppression, the use of mouthwash, syphilis, dental factors, occupational risks and maté (2).

LIFESTYLE FACTORS

Tobacco:

Tobacco consumption continues to prevail as the most important cancer risk and tobacco accounts for millions of cancer deaths annually (3). The neoplastic diseases caused by smoking include cancers of the lung, oral cavity, pharynx, larynx, esophagus, urinary bladder, renal pelvis and pancreas (4). The oral consumption of smokeless tobacco in various forms also causes cancer, particularly in the oral cavity (5). The relationship between smoking and oral cancer has been established firmly by epidemiological studies (6). The most important carcinogens in tobacco smoke are the aromatic hydrocarbon benz-pyrene and the tobacco specific nitrosamines (TSNs) namely 4-(nitrosomethylamino)-1-(3-pyridyl)-1-butanone (NNK) and N'-nitrosornicotine (NNN). Animal studies have shown that NNK and NNN in the tobacco products causes tumours of the oral cavity, lung, esophagus and pancreas (7). NNK, NNN and their metabolites covalently bind with DNA of keratinocyte stem cells forming DNA adducts. These adducts are responsible for critical mutations involved in DNA replication (8). The metabolism of these carcinogens involves oxygenation by P450 enzymes in cytochromes and conjugation by glutathione-S-transferase (GST). Genetic polymorphisms in the genes coding for these enzymes are suspected to play a key role in the genetic predisposition to tobacco induced head and neck cancers (9). Certain other classes of enzymes are involved in the activation or degradation of carcinogens and procarcinogens and they are termed xenobiotic metabolizing enzymes (XMEs). These enzymes are found mainly in the liver and also in the upper aero-digestive tract mucosa. Many of the XMEs are polymorphic and they strongly influence the individual's biological responses to carcinogens by formation of DNA adducts. Hence, certain XME genotype may increase individual susceptibility to cancer through erroneous carcinogen metabolism leading to increased carcinogen exposure. The ability to repair damaged DNA by carcinogens, has also been found to be reduced in head and neck cancer patients (1).

Marijuana is a popular name for dried flowering leaves of the plant Cannabis Sativa and is also called bhang or ganja. It is smoked as cigarettes and the cannabinoids release potent carcinogens like benz(o)pyrene, phenols, phytosterols, acids and terpenes when burnt. Studies have shown that marijuana smoking is not an independent risk factor for oral cancer development. However, a theoretical risk exists because of composition of marijuana. Moreover, tobacco usually forms a part of marijuana smoking mix (10).