REVIEW ARTICLE

Development of mouth cancer associated with deleterious habits such as etilism and tabagism: a review

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Abstract

Oral cancer is a multifactorial disease resulting from changes in the DNA of cells present in the oral cavity, altering their natural structure and consequently causing a mutation in the Deoxyribonucleic Acid chain. Several extrinsic factors can cause oxidation of the DNA chain, such as smoking, alcoholism, human papillomavirus (HPV) virus infection, and a diet poor in antioxidants present in fruits and vegetables in general. The association of more than one factor can further increase the chances of developing this pathology. The objective of this study was to search the literature for articles that report an association between harmful habits, such as smoking, alcohol consumption, and HPV virus infection, with the risk of developing oral cancer. The articles used were extracted from online databases, such as PubMed, Scielo, and Google Scholar to gather research on the topic in question.

Keywords: Oral cancer. Smoke. Alcoholism. Risk factors.

Introduction

The term cancer refers to more than 100 types of malignant diseases related to disordered cell growth, which invade adjacent tissues, in addition to having the capacity to spread throughout the body and affect organs or regions distant from the place where the disease began. The types of cancer are classified according to the tissue of origin. When malignant neoplastic cells are of epithelial origin, such as the skin or mucous membranes, they are called carcinomas. Those that originate from connective tissue, such as bone, muscle, or cartilage, are called sarcomas. Oral cancer, located in the head and neck region, is a malignant tumor that affects the lip regions and oral structures, such as the tongue, floor of the mouth, gums, cheeks, and palate region. Around 15,100 new cases were diagnosed in 2022, where 10,900 were in men and 4,200 in women. The number of deaths was 6,192, 4,767 men and 1,425 women [1].

Oral cancer in most cases is of the squamous cell carcinoma type, which affects the lining epithelium and has a high rate of tissue invasion and killing capacity. Clinically, it comes in different types, including exophytic, where its growth is voluminous, papillary, or verruciform; endophytic, being invasive, excavated, or ulcerated; erythroplastic (reddish spot); leukoplastic (white spot); erythroleukoplastic (white and reddish spot). Some lesions have a high potential for malignant transformation, such as actinic kielitis, lichen planus, erythroplakia, leukoplakia, and erythroleukoplakia [2,3].

The oral mucosa is highly vulnerable to a series of injuries induced by chemical, physical, or biological agents. Risk factors such as smoking, alcohol consumption, exposure to sunlight, viruses, and fungi, a diet poor in nutrients, such as proteins and vitamins (A, C, E, and B12), a diet rich in fats, and lack of oral hygiene, can be strong allies for the development of oral cancer [4]. Several studies show that oral cancer has a higher incidence in men than in women, due to their way of life, however, changes in female habits, such as increased smoking and alcohol consumption, have changed the number of cases between genders [5]. Although the etiology of oral cancer has multiple factors

related to its development, smoking and alcohol are the most prone to the development of this pathology, even in individuals under the age of 45 [4,6].

Smoking and alcohol are one of the main risk factors for developing mouth cancer. The tobacco consumed in cigarettes contains more than 70 carcinogens capable of causing cellular changes, such as nitrosamines, polycyclic hydrocarbons, and benzopyrene [7] which, when in contact with the oral mucosa, cause thermal aggression, causing chronic inflammation, favoring the appearance of lesions predisposing [8]. In the period from 2006 to 2015, there was a decline in the percentage of people who smoke, where the rate for men fell from 20.2% to 12.8% and 13% to 8.3% among women. Even though there is a drop in the number of smokers, tobacco is still considered one of the main causes of cancer in the country [9,10]. Alcohol helps to dissolve the substances present in cigarettes, increasing their concentration and encouraging their entry into cells. Alcoholism alone does not have a high incidence in cases of oral cancer, however, in association with smoking, it is the most common etiological form [11].

The treatment of cancer in the oral cavity depends on the histological type, the stage of the disease, and the patient's physical condition [12]. Therapeutic options are surgical, chemotherapy, radiotherapy, or a combination of these, which can be curative or palliative [13]. The diagnosis carried out effectively and in advance gives the patient a better chance of survival, in addition to preserving their structural functions [14].

Knowledge of the pathological characteristics of oral cancer, including the clinical manifestations and the consequent implications for the course of the disease, is essential for health professionals to be able to detect the disease early and begin oral cancer treatment as quickly as possible, generally of the squamous cell carcinoma type, which can increase the patient's likelihood of cure or survival.

This literature review aimed to show how the association between smoking and alcohol consumption can influence the development of mouth cancer.

Methods

This article is a literature review. This research was carried out based on a review of scientific articles that highlight harmful habits and risk factors, such as the association between smoking and alcohol consumption, with the development of mouth cancer. The articles were taken from the online databases, PubMed, Scielo, and Google Scholar. Articles used outside of the systematic review type, and clinical trials to collect the data used in the research.

Development and Discussion

Cancer is a pathology responsible for more than 12% of deaths worldwide, where more than 7 million people die every year from this disease. The exponential growth in cancer cases is due to the greater exposure of people to carcinogenic factors in their daily lives. Living standards, based on working conditions, nutrition, and consumption, resulting from the global process of industrialization, reflect on the population's epidemiological profile. The reduction in mortality and birth rates indicates an increase in people's life expectancy, and a greater number of elderly people, which also leads to an increase in the incidence of chronic-degenerative diseases, such as cardiovascular pathologies and neoplasms [14,15].

Carcinogenesis is the process of cancer development, from its beginning to the promotion and progression of tumor cells. The primary factor in triggering a malignant tumor is damage to the Deoxyribonucleic Acid (DNA) molecule, caused by carcinogens, causing mutations in the molecular structure of DNA, and altering protein synthesis, causing cellular disorder, and consequently, the appearance of a defective cell that will alter the body's homeostasis. Cellular mutation may originate from causal agents, which stimulate cell proliferation, inducing the emergence of cancer. When the genes that regulate cell growth, differentiation, and death undergo several mutations, it triggers the process of neoplasia [15].

Mouth cancer is more common among men aged over 40 years. The anatomical structures most affected by this pathology are the lower lip, the edge of the tongue, and the floor of the mouth. However, new studies show an increase in cases in younger patients, in an age group under 40 years old [16]. The literature indicates that approximately 90% to 95% of cases of oral cancer are of the histological type squamous cell carcinoma or squamous cell carcinoma, with lesions classified as ulcerated, nodular, or vegetative.

Oral malignant neoplasms can appear in the form of ulcers that do not heal and are asymptomatic. They can be observed on the lips, tongue, salivary glands, gums, the floor of the mouth, cheek mucosa, vestibule of the mouth, palate, and uvula. In its initial stage, it may appear as reddish or whitish spots and asymptomatic superficial ulcerations. In the more advanced stage, the ulcerations are larger, more painful, and have a foul odor. The growth of tumor cell mass can infiltrate underlying structures and cause patients to experience severe weight loss, and difficulty speaking, chewing, and swallowing [17].

Smoking is the primary factor in the development of oral cancer, being present in around 90% of cases.

The probability of developing oral malignant neoplasms is 4 to 15 times greater in smokers than in non-smokers. The chemical compounds present in tobacco have a high capacity to cause damage to the DNA of cells, associated with the high temperature of the cigarette being lit, making it extremely aggressive to the oral mucosa. Chewing tobacco (snuff) also favors the emergence of this pathology, since the residue left behind is in constant contact with the cheek, tongue, and entire mucosa, where the carcinogenic substances will have an action on the cells present in the area [18].

The cellular changes caused by the chemical components present in smoking are caused by oxidative reactions in tissues and result in the production of free radicals in cellular events. Among several carcinogenic products that are released when cigarettes are burned, polynuclear aromatic hydrocarbons stand out. An increase in the permeability of the oral mucosa facilitates the passage of N-nitrosonorcicotin, a carcinogenic nitrosamine from cigarettes [18]. The increased risk of developing oral cancer, related to smoking, is directly related to the intensity with which the individual uses cigarettes throughout the day and also in the long term. Even smoking associated or not with alcohol consumption has a significant increase in the chances of developing oral malignant neoplasms [19].

Some studies show alcohol consumption as the second environmental factor causing oral cancer, even if it is not associated with smoking. Toxic substances produced by ethanol interact with DNA and can cause errors in cell multiplication and lead to the emergence of cancer cells [20]. Alcohol consumption increases the metabolic activity of the liver, which can activate carcinogenic substances. It can also alter the metabolism of epithelial cells when it comes into direct contact. Nutritional deficiency can result in impaired cellular functions [18]. The ethanol molecule does not cause direct DNA damage, but its metabolite, acetaldehyde, has mutagenic action. Acetaldehyde can break the DNA strand, making it a genotoxic agent. Ethanol can have a direct effect on the oral mucosa, increasing the permeability of the cellular epithelium, facilitating the entry of carcinogens, and making tissues more susceptible to their actions [21].

Alcohol and tobacco are the biggest specific factors for the development of squamous cell carcinoma in the mouth. The association between smoking and alcohol in the development of oral cancer is due the increased permeability of the oral mucosa caused by alcohol and the increased penetration of carcinogenic substances present in tobacco [22]. The effects of alcohol and smoking on the oral mucosa were studied by scraping epithelial cells and analyzed by cytopathology. The technique consists of collecting the material and transferring it to a liquid medium, to maintain its morphological and molecular structures in the smear. Cytopathology is used to identify cellular changes before the appearance of clinically detectable lesions, seeking periodic control of patients who are routinely exposed to carcinogenic agents from tobacco and alcohol, and also to track cellular changes in populations at high risk for the development of mouth cancer [23].

The main cytopathological changes in oral cancer, according to Mckee, are degenerative, inflammatory, reparative, and neoplastic. In degenerative cellular changes, cell size increases, the nuclear boundary becomes wrinkled and the nucleus becomes pyknotic. Nuclear disintegration (karyorrhexis) and nuclear dissolution (karyolysis) may occur. Inflammatory-type changes include nuclear hypertrophy (enlargement of the nucleus), presence of a perinuclear halo, vascularization of the cytoplasm (isolated vacuoles and honeycomb vacuolization), chromatin marginalization, and bi- or multinucleation. A cell that presents a hypertrophic nucleus, multinucleation with prominent nucleoli, and cells in leaflets and tissue is in the process of repair. Neoplastic cells present irregularity, hyperchromasia, and nuclear hypertrophy [24].

Other authors, such as Birman and Sugaya, cited other types of oral cancer cytopathology, such as anisocytosis, vacuolization, altered dye properties, cytoplasmic inclusion, and polymorphism. The highlighted nuclear changes were hyperchromatism, hypochromia or polychromia, membrane irregularities, multinucleation, degenerative changes, and aberrant mitotic figures. Injuries resulting from chronic irritation have a predominance of keratinized cells, and cells in ulcerated areas have a greater number of immature cells. Malignant lesions present cellular characteristics such as nuclear enlargement, variation in the size and shape of the nucleus, multiple and predominant nucleoli, hyperchromatism, chromatin abnormalities, discrepant distribution in cell maturation, and an increase in the nucleus/cytoplasm ratio [25].

Conclusion

The etiology of oral cancer is broad. Several factors can lead to its appearance, such as smoking, alcoholism, lack of nutrients and vitamins in a diet low in vegetables, constant trauma to cellular tissues, genetic predisposition, and infection with the human papillomavirus, however, tobacco associated with alcohol are the main causes of oral carcinoma among the risk factors involved. Smoking and alcohol consumption are frequent habits in the Brazilian population, which makes oral cancer a public health problem. The vast majority of patients with oral cancer

only sought treatment at an advanced stage of the disease, which poses great difficulty in treatment. Health prevention programs that provide information about this pathology must be implemented in the Unified Health System, which increases the likelihood of patients being cured. Cytopathology is a technique that can be used to evaluate the effects of tobacco and alcohol in patients with normal oral mucosa, in addition to helping to analyze samples and interpret results, making it an important factor in understanding the pathology and etiology of the disease. disease, and its combat and reduction.

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