



## Head and neck cancer and factors predisposing to it

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### ABSTRACT

This article presents current data on the incidence, risk factors, and pathogenetic mechanisms of head and neck cancer (HNC). An analysis of the main predisposing factors is provided, including tobacco smoking, alcohol consumption, viral infection (in particular, human papillomavirus), and occupational and environmental exposures. Genetic and epigenetic features that contribute to epithelial malignancy are considered. Particular attention is paid to the role of lifestyle factors and early diagnosis of the disease. The results of a retrospective analysis of patients with squamous cell carcinoma of the head and neck are presented.

### Keywords:

Head and neck cancer, risk factors, HPV, smoking, alcohol, epidemiology, prevention.

**Relevance of the topic.** Malignant neoplasms of the head and neck (HN) represent a significant medical and social problem, ranking sixth among all oncological diseases worldwide. According to the World Health Organization (WHO), more than 650,000 new cases of cancer in this area and over 330,000 deaths are registered annually. Despite advances in diagnosis and treatment, mortality and disability rates remain high, due to late presentation and the aggressive nature of the disease [1].

The head and neck comprise a number of anatomically complex structures—the oral cavity, pharynx, larynx, nasopharynx, paranasal sinuses, and salivary glands. In 90–95% of cases, tumors in these organs are squamous cell in origin, developing from the epithelium of the mucous membranes. A distinctive feature of cancers in this group is a high tendency to recurrence and regional metastasis, which significantly complicates the prognosis [3].

The etiology of head and neck cancer is multifactorial. Among the key risk factors, the most significant are tobacco smoking and

alcohol abuse, which together increase the risk of the disease tenfold. Tobacco smoke contains more than 60 carcinogens, including polycyclic aromatic hydrocarbons and nitrosamines, which cause mutations in the DNA of epithelial cells. Alcohol, in turn, increases the permeability of the mucous membrane to carcinogens, and the product of its metabolism, acetaldehyde, has a direct mutagenic effect.[4]

In recent years, there has been an increase in cases of oropharyngeal cancer associated with human papillomavirus (HPV), primarily types 16 and 18. HPV infection leads to the expression of oncoproteins E6 and E7, which inactivate tumor suppressors p53 and pRb, which initiates uncontrolled cell proliferation [5,7].

Predisposing factors also include occupational exposures (contact with asbestos, nickel, formaldehyde, wood dust and dyes), poor oral hygiene, chronic inflammatory diseases of the mucous membranes, deficiency of vitamins A and E, immunodeficiency states, and genetic predisposition.

Epigenetic mechanisms such as hypermethylation also play an important role.

promoter regions of tumor suppressor genes, disruption of microRNA regulation and changes in the expression of proteins involved in DNA repair.

It should be noted that head and neck cancer has significant social significance, as it primarily affects people of working age (40 to 65 years), often leading to loss of voice, difficulty swallowing, facial deformities and psychological disorders[8].

Despite advances in imaging techniques, PET-CT, and immuno- and targeted therapy, survival rates for GERD remain low: 5-year survival rates do not exceed 50%. This is because approximately 60–70% of patients present to a doctor at stages III–IV, when radical treatment becomes difficult.

Therefore, studying the factors that contribute to the development of head and neck cancer and modifying them is of great importance for primary and secondary prevention. Reducing smoking rates, limiting alcohol consumption, introducing HPV vaccination, and improving dental care can significantly reduce the incidence of this pathology[9].

Thus, the problem of head and neck cancer requires a comprehensive approach, including early detection of precancerous conditions,

active public awareness of risk factors and the use of modern screening and diagnostic methods[10].

**The aim of the study was** to identify the main predisposing factors and their relationship with the development of head and neck cancer, as well as to assess the frequency of occurrence of key risk factors among patients in this category.

**Materials and methods.** A retrospective study of medical data of 120 patients with morphologically confirmed squamous cell carcinoma of the head and neck organs who were treated at the oncology center in the period

2020–2024

was conducted. The average age of patients was  $58 \pm 9$  years; there were 86 men (71.7%) and 34 women (28.3%).

The control group consisted of 40 conditionally healthy individuals, matched for gender and age.

The research methods included :a) screening patients for risk factors (smoking, alcohol, occupation, family history);collection of clinical and demographic data;laboratory and histological studies of biopsy material; statistical processing of data using the SPSS 25.0 program ( $p < 0.05$ ).

**Table 1. Distribution of patients by main risk factors**

Risk factor	Number of patients (n=120)	% of total
Smoking for >10 years	86	71.7%
Regular alcohol consumption	73	60.8%
HPV infection (PCR positive)	34	28.3%
Occupational hazards (dust, dyes, chemicals)	29	24.2%
Chronic inflammatory diseases of the mucous membrane	41	34.2%
Poor oral hygiene	52	43.3%
Family history of cancer	11	9.2%

**Results and discussion.** The analysis confirmed the leading role of tobacco smoking and alcohol abuse as the main etiological factors for laryngeal and oral cancer. In smokers, laryngeal and oral cancer occurred 2.3 times more frequently than in nonsmokers. The combined effects of alcohol and tobacco increased the risk of the disease by 10-12 times.

HPV infection was detected in almost a third of patients, primarily those with oropharyngeal cancer, consistent with international literature data. These cases were characterized by younger patients and a better response to therapy. A correlation was also noted between poor oral hygiene and the frequency of buccal and oral floor lesions. Laryngeal or nasal cancer was diagnosed in 24% of patients working in

hazardous industries (paint and varnish factories, woodworking plants, and metallurgical plants).

A family history was identified in 9% of patients, but the role of genetic factors was secondary compared to modifiable risk factors.

### Conclusions.

1. The main predisposing factors for head and neck cancer are smoking, alcohol abuse, HPV infection, occupational hazards and poor oral hygiene.
2. The combination of smoking and alcohol has a synergistic carcinogenic effect, significantly increasing the risk of disease.
3. Human papillomavirus is a significant factor, especially in oropharyngeal cancer in young people.
4. Identification and elimination of modifiable risk factors is key to preventing head and neck cancer.
5. Extensive educational work and the implementation of early diagnosis programs in high-risk groups are needed.

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