fortune Journals

Research Article

FORTUNE JOURNAL OF HEALTH SCIENCES

ISSN: 2644-2906

# The Role of Tobacco as A Risk Factor in Head and Neck Cancers: A Comparative Study

**Dr. Masroor Rahman[1*], Dr. Mohammad Anwar Hossain[1], Dr. Tawfiqur Rahman[1], Dr. Arif Mahmud Jewel[1]**

## Abstract

**Introduction:** Head and neck cancer (HNC) refers to a wide range of cancer types that develop in various tissues and organs located in the head and neck area. The main risk factor for HNC is tobacco use.

**Objective**: This study aims to find the role of tobacco consumption in developing head and neck cancer gender-wise with previous studies.

**Methods:** This retrospective comparative study was conducted at the Department of Otolaryngology-Head & Neck Surgery at Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh from June 2023 to May 2024. 110 patients with head and neck cancer who completed the inclusion criteria were selected for this study. Demographic profile, sites involved, histopathological pattern and stage of presentation of head and neck carcinoma were studied.

**Results:** The highest incidence of cancer was observed in the 51-60 age group, mostly in urban areas due to tobacco chewing. The most common type of cancer observed was buccal mucosa cancer, particularly at the gingiva-buccal sulcus, and squamous cell carcinoma was the most frequently identified type on histopathology. Most cancers were diagnosed in locally advanced stages.

**Conclusions:** According to the findings of this study, males show a higher incidence of head and neck carcinoma, particularly in the buccal mucosa. This is correlated with tobacco chewing and keeping tobacco quid at the gingiva-buccal sulcus, leading to prolonged exposure

**Keywords:** Head and neck cancer, Buccal mucosa carcinoma, orally advanced stage, Gingiva-buccal sulcus, Tobacco chewing, Smoking

## Introduction

Several recent studies have suggested a connection between periodontitis and the risk of various types of cancer. A systematic review and meta-analysis of individuals in the United States found that non-smokers and those with periodontal disease have a higher risk of developing hematopoietic and lymphatic cancer [1]. In a case-control study, results indicated that dental caries were associated with the risk of gastric adenocarcinoma [2], while a prospective cohort investigation of postmenopausal women revealed an increased risk of breast cancer associated with periodontal disease [3]. Additionally, a systematic review and meta-analysis detailed a significant relationship between periodontitis and the incidence of lung cancer [4]. Head and neck cancer (HNC) is the seventh most common cancer worldwide, and its cases are increasing in aging populations [5, 6]. HNC encompasses

**Affiliation:**

[1]Assistant Professor, Department of Otolaryngology-Head & Neck Surgery, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh.

***Corresponding author:**
Dr. Masroor Rahman, Assistant Professor, Department of Otolaryngology-Head & Neck Surgery, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh.

**Citation:** Masroor Rahman, Mohammad Anwar Hossain, Tawfiqur Rahman, Arif Mahmud Jewel. The Role of Tobacco as A Risk Factor in Head and Neck Cancers: A Comparative Study. Fortune Journal of Health Sciences. 7 (2024): 509-513

**Received:** August 20, 2024
**Accepted:** August 23, 2024
**Published:** August 28, 2024

Dr. Rahman M, et al., Fortune J Health Sci 2024
DOI:10.26502/fjhs.215

malignancies of the upper aerodigestive tract, including those originating from the paranasal sinuses, nasal cavity, oral cavity, and pharynx, and may be influenced by oral inflammatory disease [7, 8]. Therefore, periodontitis may be associated with a greater risk for HNC compared to other types of cancer. Studies and analyses have shown a connection between periodontitis and head and neck cancer (HNC) [9–12]. These studies looked at various factors such as number of lost teeth, periodontal pocket depth, tooth mobility, oral hygiene, dentist visits, daily tooth brushing, and evidence of alveolar bone loss on X-rays to assess periodontitis. However, these factors mainly represent past and current periodontal inflammation and are used to predict the outlook for individual teeth, rather than to assess current inflammatory activity in periodontal tissues. The Periodontal Inflamed Surface Area (PISA) is a new index developed by Nesse et al. It is used to quantify the inflammatory burden caused by periodontal disease by measuring the sum of probing pocket depth in bleeding on probing (BOP)-positive sites across all teeth [13]. Recent reports have shown that PISA values in patients with ankylosing spondylitis are positively correlated with periodontal indexes such as BOP, severity of periodontitis, frequency of Porphyromonas gingival is detection, and presence of that bacterium in the serum. Additionally, PISA has been associated with serum C-reactive protein (CRP) levels, indicating systemic inflammation in septuagenarian patients. Therefore, PISA is considered to be capable of indicating present inflammatory activity in periodontal tissues [14-16]. The current study's objective is to study the population based on their gender-wise demographic and histopathological data to compare the role of tobacco consumption in the development of head and neck cancer compared to previous studies. Ethical clearance was ensured before the study.

## Objectives

- *General objective*: The present study aims to draw attention to the reasons behind head and neck cancer, specifically tobacco.
- *Specific objective*: The target of this study is to compare the effects of tobacco consumption gender-wise in terms of head and neck cancer.

## Methodology

This retrospective comparative study was conducted at the Department of Otolaryngology-Head & Neck Surgery at Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh involving 110 patients, aged from 18 to 70 years, reported with head and neck cancer. The study was carried out for 12 months, from June 2023 to May 2024. In all the age groups, there was a significant male preponderance.

- *Inclusion criteria:* All histologically verified cases of adult patients of head and neck from the single one were included.
- *Exclusion Criteria*: Recurrent cases of head and neck cancer within the specified timeframe were excluded from the statistical analysis. Additionally, all instances of metastatic disease in the head and neck region were also excluded from the statistical analysis.

In this study, the demographic profile, sites affected, histopathological patterns, and stage of presentation of head and neck carcinoma were observed. Additionally, the study will examine any changes in the risk factor profile and gender-based prevalence. Data regarding the demographic profile and clinical information were collected from hospital and clinical records. Staging was determined using the American Joint Committee on Cancer criteria, which includes primary tumour size (T), regional neck status (N), and group stage. The site of cancer was categorized using the International Classification of Diseases for Oncology (ICD-O-2). Ethical clearance was taken from the hospital authority. Well-informed written consent was ensured before the study.

## Results

A total of 110 patients were selected for this study among which age group of 51 to 60 years people were found to be more affected. Most of the patients (72.73%) belong from urban areas [Table-1]. According to Table-2, most of the study patients had zero comorbidities, 21.81% were diagnosed with hypertension and 19.09% were suffering from both diabetes and hypertension. Buccal Mucosa Lesion was commonly found (60.91%) symptom. Neck swelling was the second most common syndrome [Table-3]. Table-4 shows Gingivobuccal Sulcus (46.36%) and CA Buccal Mucosa (25.45%) dominated the histopatholical reports of the patients. Study patients included in the research are mostly addicted to tobacco smoking (63.64%) and tobacco chewing (21.83%) [Table-5]. Histopathological subtype of squamous cell carcinoma was dominated by male patients [Figure-1]. Majority of the patients were diagnosed in locally advanced stage of cancer in which female patients were the majority [Figure-2].

**Table-1:** Demographic characteristics of patients (N=110)

| Variables | Groups | N= 110 | Percentage |
|---|---|---|---|
| Age group | 18-30 | 6 | 5.54% |
| | 31-40 | 25 | 22.73% |
| | 41-50 | 29 | 26.36% |
| | 51-60 | 34 | 30.91% |
| | 61-70 | 16 | 14.55% |
| Residence | Rural area | 30 | 27.27% |
| | Urban area | 80 | 72.73% |

**Citation:** Masroor Rahman, Mohammad Anwar Hossain, Tawfiqur Rahman, Arif Mahmud Jewel. The Role of Tobacco as A Risk Factor in Head and Neck Cancers: A Comparative Study. Fortune Journal of Health Sciences. 7 (2024): 509-513.

Dr. Rahman M, et al., Fortune J Health Sci 2024
DOI:10.26502/fjhs.215

**Table-2:** Comorbidities of the study patients (N=110)

| Comorbidities | N= 110 | Percentage |
|---|---|---|
| Diabetes | 19 | 17.27% |
| Hypertension | 24 | 21.81% |
| HIV | 0 | 0% |
| Hepatitis | 3 | 2.73% |
| Both diabetes & hypertension | 21 | 19.09% |
| None | 43 | 39.10% |

**Table 3:** Symptoms and affected areas of the patients

| Symptoms | N | Percentage |
|---|---|---|
| Buccal Mucosa Lesion | 67 | 60.91% |
| Cheek Swelling | 2 | 1.82% |
| Neck Swelling | 36 | 32.73% |
| Trismus | 1 | 0.91% |
| Tongue Lesion | 6 | 5.45% |
| Change In Voice | 12 | 10.91% |
| Palatal Lesion | 4 | 3.64% |

**Table 4:** Various diagnosis among study patients

| Comorbidities | N= 110 | Percentage |
|---|---|---|
| CA Buccal Mucosa | 28 | 25.45% |
| CA Tongue | 20 | 18.18% |
| CA Hard Palate | 4 | 3.64% |
| Gingivobuccal Sulcus | 51 | 46.36% |
| CA Nasopharynx | 4 | 3.64% |
| CA Lip | 3 | 2.73% |

**Table 5:** Prevalence of tobacco consumption

| Consumption type | N (%) |
|---|---|
| Tobacco chewing | 24 (21.82%) |
| Tobacco smoking | 70 (63.64%) |
| Both chewing and smoking | 16 (14.55%) |
| Tobacco chewing and alcohol | 3 (2.73%) |
| Tobacco smoking and alcohol | 7 (6.36%) |
| Tobacco chewing, smoking and alcohol | 4 (3.64%) |
| None | 0 (0%) |

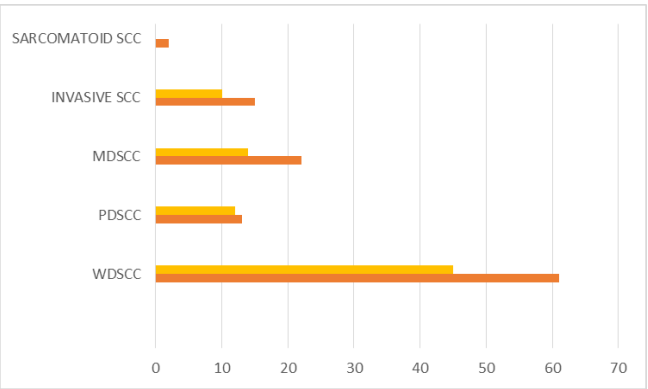


**Figure 1:** Histopathological subtype of squamous cell carcinoma

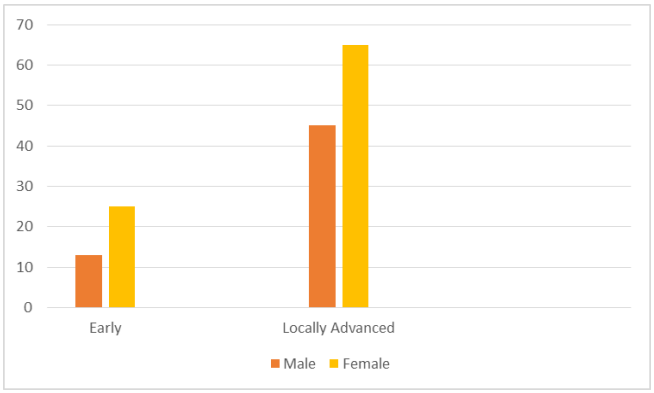


**Figure 2:** Stage presentation of the patients

## Discussion

The current research indicates that men are more likely than women to engage in behaviors that increase the risk of head and neck cancer. Previous studies conducted in similar geographical areas have also shown a male plurality of cancer cases. In a previous study, the combination of alcohol, tobacco, and smoking was the most prevalent behavior among both genders [13,14]. However, in this study, tobacco smoking was the most common addiction among females, while males indulged in both tobacco chewing and smoking. Additionally, a previous study also found that the combination of chewing and smoking along with alcohol drinking showed a very high relative risk [9].

A majority of the participants in the study have used tobacco, either by chewing or smoking, like previous studies in both South and North India. This highlights the importance of prevention through a shared risk factor approach. Tobacco use has been linked to various multi-system illnesses, making it imperative to implement proper preventive techniques through a common risk factor approach alongside a comprehensive educational campaign [13, 14]. In this study, the majority of the population presenting to the hospital belonged to urban locations, possibly due to the geographical location of the hospital and lack of awareness of disease presentation and severity in rural populations. The tongue was the second most prevalent location of malignancy after the buccal mucosa, which differs from a previous study where the tongue was the most common site of malignancy. However, an analysis based on published data from other cancer registries in 2023 indicates that the buccal mucosa is the most common site of cancer in both males and females [15]. Repeated contact with the quid during tobacco chewing could be a possible cause of the increased incidence of cancer in the tongue and buccal mucosa. Around 40% of cases were of cancer in the gingivo-buccal sulcus, possibly due to the habit of keeping tobacco there for a long time. Limited visibility and inaccessibility of the gingivo-buccal sulcus during regular oral hygiene maintenance may cause early cancerous changes like leuoplakia/erythroplakia to

go unnoticed. In the northeastern states, the incidence of hypopharynx cancer was the highest for both males and females, possibly due to the high prevalence of smoking and smokeless forms of tobacco use in the region. The majority of the patients had histopathological type squamous cell carcinoma (WDSCC), which is the most common type in head and neck cancers. Most patients were diagnosed at a locally advanced stage, similar to a previous study, resulting in a higher need for composite resection and complex plastic surgery for reconstruction, leading to higher morbidity [7, 13, 15]. After undergoing treatment for head and neck cancer, it's crucial to consider physical therapy as an essential part of preventing complications and helping patients recover shoulder, neck, and facial function. Monitoring for early symptoms like leukoplakia, voice changes, and swelling is also important to ensure early intervention [5, 7].

## Limitations

This single-centre study may not represent the overall scenario of the country.

## Conclusion

According to the current study, the higher occurrence of carcinoma in males suggests that they are more likely to engage in behaviors that increase the risk of head and neck carcinoma. Buccal mucosa carcinoma, particularly at the gingivo-buccal sulcus, is noted to be the most common site, and is closely correlated with tobacco smoking and chewing habits. Keeping tobacco quid at the gingivo-buccal sulcus leads to prolonged exposure. Prevention and early diagnosis are the two main pillars that will determine the control of head and neck cancer.

**Funding:** Self-funded research

**Conflicts of interest:** N/A

## References

1. Wu Y, Shi X, Li Y, et al. Hematopoietic and lymphatic cancers in patients with periodontitis: a systematic review and meta-analysis. Med Oral Patol Oral Cir Bucal 25 (2020): e21–8.
2. Shakeri R, Malekzadeh R, Etemadi A, et al. Association of tooth loss and oral hygiene with risk of gastric adenocarcinoma. Cancer Prev Res 6 (2013) :477–82.
3. Freudenheim JL, Genco RJ, LaMonte MJ, et al. Periodontal disease and breast cancer: prospective cohort study of postmenopausal women. Cancer Epidemiol Biomark Prev 25 (2016): 43–50.
4. Wang J, Yang X, Zou X, et al. Relationship between periodontal disease and lung cancer: a systematic review and meta-analysis. J Periodont Res 55 (2020): 581–93.
5. Dhull AK, Atri R, Dhankhar R, et al. Major risk factors in head and neck cancer a retrospective analysis of 12-year experiences. World J Oncol 9 (2018): 80–4.
6. Vahl JM, Wigand MC, Denkinger M, et al. Increasing mean age of head and neck cancer patients at a German tertiary referral center. Cancers 13 (2021): 1–10.
7. Cognetti DM, Weber RS, Lai SY. Head and neck Cancer an evolving treatment paradigm. Cancer 113 (2008): 1911–32.
8. Gopinath D, Menon RK, Veettil SK, et al. Periodontal diseases as putative risk factors for head and neck cancer: systematic review and meta-analysis. Cancers 12 (2020): 1–15.
9. Tezal M, Sullivan MA, Hyland A, et al. Chronic periodontitis and the incidence of head and neck squamous cell carcinoma. Cancer Epidemiol Biomark Prev 18 (2009): 2406–12.
10. Garrote LF, Herrero R, Reyes RMO, et al. Risk factors for cancer of the oral cavity and oro-pharynx in Cuba. Br J Cancer 85 (2001): 46–54.
11. Hashim D, Sartori S, Brennan P, et al. The role of oral hygiene in head and neck cancer: results from International Head and Neck Cancer Epidemiology (INHANCE) consortium. Ann Oncol 27 (2016): 1619–25.
12. Zeng XT, Deng AP, Li C, et al. Periodontal disease and risk of head and neck cancer: a meta-analysis of observational studies.
13. Nesse W, Abbas F, Van Der Ploeg I, et al. Periodontal inflamed surface area: quantifying inflammatory burden. J Clin Periodontol 35 (2008): 668–73.
14. Park SY, Ahn S, Lee JT, et al. Periodontal inflamed surface area as a novel numerical variable describing periodontal conditions. J Periodontol Implant Sci 47 (2017): 328–38.
15. Linden GJ, McClean K, Young I, et al. Persistently raised C-reactive protein levels are associated with advanced periodontal disease. J Clin Periodontol 35 (2008): 741–7.
16. Noack B, Genco RJ, Trevisan M, et al. Periodontal infections contribute to elevated systemic c-reactive protein level. J Periodontol 72 (2001): 1221–7.
17. Kulkarni MR. Head and Neck Cancer in India 4 (2013): 29-35
18. Kekatpure KM. Oral Cancer in India: Learning from different populations. National newsletter and website from New York Presbyterian Hospital 14 (2010).
19. Neville BW, Day TA. Oral cancer and precancerous lesions. CA Cancer J Clin 52 (2002): 195-215.
20. Sankaranarayanan R, Black RJ, Swaminathan R, Parkin

Dr. Rahman M, et al., Fortune J Health Sci 2024
DOI:10.26502/fjhs.215

DM. An overview of cancer survival in developing countries. IARC Sci Publ 145 (1998): 135-73.

21. Subapriya R, Thangavelu A, Mathavan B, Ramachandran CR, Nagini S. Assessment of risk factors for oral squamous cell carcinoma in Chidambaram, Southern India: a case-control study. Eur J Cancer Prev 16 (2007): 251-6.

22. Heck JE, Berthiller J, Vaccarella S, Winn DM, Smith EM, Shan'gina O, et al. Sexual behaviors and the risk of head and neck cancers: A pooled analysis in the international head and neck cancer epidemiology (INHANCE) consortium. Int J Epidemiol 39 (2010): 166-81.

23. Berrino F, Sant M, Verdecchia A, Capocaccia R, Hakulinen T, Esteve. Survival of cancer patients in Europe: The EUROCARE Study, IARC Scientific Publication 132 (1995).

24. Chaturvedi P. "Head and neck surgery.," J Can Res Ther 5 (2009).

25. Addala L, Pentapati CK, Reddy Thavanati PK, Anjaneyulu V, Sadhnan. Risk factor profiles of head and neck cancer patients of Andhra Pradesh, India. Indian J Cancer 49 (2012): 215-9.

26. Chauhan R, Trivedi V, Rani R, Singh U. A Study of Head and Neck Cancer Patients with Reference to Tobacco Use, Gender, and Subsite Distribution. South Asian J Cancer 11 (2022): 46-51.

27. Bagal S, Budukh A, Thakur JS, Dora T, Qayyumi B, Khanna D, et al. Head and neck cancer burden in India: an analysis from published data of 37 population-based cancer registries. Ecancer medical science 17 (2023): 1603.