

---

Original Research Article

## An Epidemiological Study of Oral Cancer Patients Attending Tertiary Health Care Centre

Manoj Kumar Yadav<sup>1\*</sup>, Dheeraj Kumar Yadav<sup>2</sup>

<sup>1</sup>Assistant Professor, Shree Narayan Medical College & Hospital, Saharsa, Bihar, India

<sup>2</sup>MBBS, Senior Registrar, Tata Main Hospital, Jamshedpur, Jharkhand, India

Received: 30-01-2023 / Revised: 07-02-2023 / Accepted: 30-03-2023

---

### Abstract

**Background:** oral cancer is the most common cancer in India; amongst men (16.1%) while in women it is the fourth most common cancer (4.6%). Oral squamous cell carcinoma (OSCC) has been defined by WHO as a carcinoma with a squamous differentiation arising from the mucosal epithelium. Tobacco is addictive and is harmful to health in many ways. Smokeless tobacco includes betel quid with tobacco, pan masala, mainpuri tobacco, mawa, gul, tobacco with slaked lime(khaini) etc. Gutka chewing is the most and popular form of smokeless tobacco used in India. **Material and methods:** This prospective analytical study conducted at Department of Community medicine, Shree Narayan Medical College & Hospital, Saharsa, Bihar after approval from Thesis & Ethical Committee from Dec 2021 to Nov 2022 on 63 oral cancer patients. These 63 patients were collected from our medical college and hospital and multiple clinics of Surgery and ENT from Saharsa district and Purnea district. Permission from Surgery and ENT clinics was taken for the present study of diagnosed cases of oral cancer. **Results:** Most number of patients belongs to > 60 years' group i.e., 24 (38.09%). Based on gender most common were male i.e., 46 (73.02%), According to distribution of patients with respect to occupation, most of them belong to Clerical and skilled category i.e., 15 (23.81%). Most number of studied patients were having cancer site- Tongue i.e., 16 (25.40%). Most common presenting symptom in studied patients was painful oral ulcer i.e., 50 (79.37%). Out of 63 cases, 10 (15.87%) cases were diagnosed as well differentiated SCC, 48 (76.19%) cases were diagnosed as moderately differentiated SCC and 05 (07.94%) cases were diagnosed as poorly differentiated SCC. **Conclusion:** Early Oral SCC discovery not only improves survival rates but also lessens the necessity for deforming procedures. Unfortunately, because up to 50% of patients already have local or distant metastases at the time of diagnosis, early detection of oral malignant lesions has proven challenging. Only a small number of cells or discrete regions of tissue are affected by the malignant change at the start of carcinogenesis.

**Keywords:** Oral cancers, SCC, Tobacco, Gutka, Oral Ulcer.

---

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

---

### Introduction

World is heading towards various types of non-communicable diseases, which are also known as modern epidemics. Among these modern epidemics, cancer is the second commonest cause of mortality in developed countries. In the developing countries, cancer is among the ten commonest causes of mortality. Cancers are the commonest cause of death in adults<sup>1-2</sup>. Oral cancers are some of the leading causes of cancer related deaths in the world. According to GLOBOCAN 2020, oral cancer is the most common cancer in India; amongst men (16.1%) while in women it is the fourth most common cancer (4.6%). Oral squamous cell carcinoma (OSCC) has been defined by WHO as a carcinoma with a squamous differentiation arising from the mucosal epithelium<sup>2</sup>. Oral and oropharyngeal cancer is a disease of antiquity. Sushruta Samhita, a Sanskrit treatise of surgery, written in the Indian context, gives a description of oral cancer. Its aggressiveness to spread locally involving surrounding structures causes disfigurement and disfunction, thus leading to physical and psychosocial discomfort ultimately affecting quality of life<sup>3</sup>. Oral and oropharyngeal cancer is among the top three types of cancers in India. Severe alcoholism, use of tobacco like cigarettes, smokeless tobacco, betel nut chewing and human papilloma virus (HPV) are the most common risk factors for oral cancer. India has largest number of smokeless tobacco users in the world. In India, 90 - 95% of the oral cancers is squamous cell carcinoma<sup>4-5</sup>. In India, 20 per 100000 populations are affected by oral cancer which accounts for about 30% of all types of cancer<sup>6</sup>. Early detection of oral cancer offers

the best chance for long term survival and has the potential to improve treatment outcomes and make healthcare affordable<sup>7</sup>. According to the statistics, oral cancer is considered to be a disease which occurs mainly among the elderly people. Though most of the oral cancer cases occur between the ages of 50 to 70 years, but it could also affect children as early as 10 years. Incidence of oral cancer increases by age. The commonest age is the fifth decade of life. In India, men are two to four times more prone to be affected than women due to the changes in the behavioural and lifestyle patterns<sup>7-11</sup>. Tobacco consumption, either smokeless tobacco chewing or smoking and alcohol consumption are such common factors which cause oral cancer. Smokeless tobacco products contain nicotine and are highly addictive. Often, they also contain carcinogens, such as tobacco specific nitrosamines (TSNA), arsenic, beryllium, cadmium, nickel, chromium, nitrite and nitrate, in varying number of levels depending upon the quality of the product<sup>5-6</sup>. More than 28 chemicals have been extracted from smokeless tobacco which are carcinogens<sup>7</sup>. The pH of the products also varies widely, with some (e.g., khaini, zarda) listing slaked lime among their ingredients<sup>7</sup>. Raising the pH in this way, increases the absorption of nicotine which enhances the habit of using the smokeless product, increasing the likelihood of dependence. The elevated pH also increases the absorption of carcinogens, leading to higher toxicity and greater risk of harm<sup>12-15</sup>.

Oral and oropharyngeal cancer will remain a major health problem. It is expected that the incidence will increase by 2020 and 2030 in both sexes. However, early detection and prevention will reduce this burden. Oral cavity is accessible for visual examination, and oral cancers and premalignant lesions have well defined clinical diagnostic features but oral cancers are typically detected in their advanced stages. If it is detected early, possibly at the precancerous stage, the patient can be treated or cured. The precancerous lesion can be

---

\*Correspondence

**Dr. Manoj Kumar Yadav**

Assistant Professor, Shree Narayan Medical College & Hospital,  
Saharsa, Bihar, India.

E-mail: [asramlibrary@gmail.com](mailto:asramlibrary@gmail.com)

detected up to 15 years prior to their change to invasive carcinoma. Thus, oral cancer is amenable to primary prevention. The secondary prevention of oral cancer by early detection and prompt treatment could result in longer survival rate and reduction in the morbidity and mortality from these diseases<sup>4</sup>.

Oral cavity is lined by both keratinized and nonkeratinized mucosa, which act as physical barrier and have many functions such as protective, secretory and sensory<sup>16</sup>. Health of the oral cavity and its ability are compromised among the people with oral habits such as tobacco chewing and smoking. When oral mucosa gets affected, it will show increased epithelial thickness and increased keratinisation<sup>17</sup>. When the epithelium becomes the seat of malignant disease or of some benign conditions, the cells may lose their cohesiveness so that the deeper cells may be exfoliated along with the superficial cells. The smear obtained by exfoliative cytology can be analyzed qualitatively as well as quantitatively. Oral mucosa exhibits a rapid turnover of cells and these exfoliated cells have a valuable role in diagnosis of certain local and systemic diseases<sup>16</sup>. Among all the malignancies, oral malignancies account for 4% in males and 2% among females. Lifestyle changes, poverty, lack of education and deleterious habits along with limited access to health care result in an increased rate of cancer development and morbidity<sup>17-18</sup>. Tobacco is a product prepared from the leaves of the tobacco plant by curing them. The plant is part of the genus *Nicotiana* and is of the solanaceae family. More than 70 species of tobacco are known in literature; the chief commercial crop is *N. tabacum*<sup>19-21</sup>. Tobacco is addictive and is harmful to health in many ways. Smokeless tobacco includes betel quid with tobacco, pan masala, mainpuri tobacco, mawa, gul, tobacco with slaked lime(khaini) etc. Gutka chewing is the most and popular form of smokeless tobacco used in India<sup>22</sup>. Smokeless tobacco use has many oral effects including oral cancer, leukoplakia and erythroplakia, verrucous carcinoma, oral submucous fibrosis (if mixed with areca nut), loss of periodontal support (recession) and staining of teeth and composite restorations<sup>23</sup>. The main categories of chewing tobacco-induced oral mucosal soft-tissue lesions so far reported are: oral squamous cell carcinoma (SCC) and verrucous carcinoma, oral potentially malignant disorders (OPMDs) (leukoplakia, erythroplakia and erythroleukoplakia) and tobacco pouch lesion [tobacco and lime users' lesion, oral submucous fibrosis (OSF) when mixed with areca nut]<sup>24</sup>.

Oral cavity lesions are a disease of unknown etiology, endemic in India and Indian sub- continent affecting mainly persons of age group of 20-40 yrs. The prevalence rate of oral cavity lesions varies from 0.2% to 0.5 % in India with higher percentage being found in southern parts of the country. Sex ratio demonstrates male predominance. The incidence of potentially malignant diseases of the oral cavity is increasing and also showing predilection in younger age group due to increase in intake of smokeless form of tobacco<sup>25</sup>. Tobacco has been identified as initiation and progression of oral cancer.

Squamous cell cancer appears as red granular areas which tends to be exophytic- ulcerative- infiltrative. Ulcerative lesions have a distinct rolled border (margins). Induration at the margins and base of the tumour is a pathognomonic sign of oral SCC<sup>26</sup>. Oral submucous fibrosis is a chronic, insidious disease that affects the submucosa of the oral cavity resulting in progressive limitation of mouth opening which is a hallmark feature of the disease. The most common premalignant lesions and condition found was oral submucous fibrosis followed by tobacco pouch lesion, which is seen mostly in association with submucous fibrosis as a result of placement and chewing of smokeless form of tobacco; there is high reported use of smokeless form of tobacco in Indian subcontinent<sup>27-28</sup>. Verrucous carcinoma comprised up to 16 per cent of oral cancers in an Indian study with a predilection for commissural, buccal or gingival Sites<sup>28</sup>. Leukoplakias are usually diagnosed after the fourth decade of life. There are two main clinical types of leukoplakia encountered in clinical practice; homogeneous and non- homogeneous leukoplakia<sup>29</sup>. Erythroplakia clinically appears as a red patch with a velvety or a granular surface and present with well circumscribed clinical

margins<sup>29</sup>.

According to mouth cancer foundation, approximately 90% of people with mouth cancer are tobacco users<sup>30</sup>. The clinical manifestation of many diseases of the oral cavity can be similar to oral manifestation of certain systemic disorders, often making it difficult to establish a correct clinical diagnosis<sup>31</sup>. In some cases, early-stage malignant lesion can be mistaken for benign lesions<sup>32</sup>. This leads to incorrect treatment and potentially dangerous to the patients. The prognosis for patients with oral squamous cell carcinoma that is treated early, is much better, with a 5-year survival rates as high as 80%. The quality of life improves after early treatment because cure can be achieved with less complex and less aggressive treatment<sup>33-40</sup>.

Taking all these adverse effects of tobacco into considerations, this study was conducted to evaluate the oral mucosal changes which may occur in the patients due to the usage of tobacco in various forms and also to record the detailed history about the type of tobacco used, duration, frequency and site of oral and oropharyngeal cancers in the patients.

#### Objectives:

1. To study the socio-demographic profile of oral cancer patient attending a Tertiary Health Care Centre.
2. To study the Distribution of oral cancer patients according to severity of Disease.
3. To assess the impact of alcohol and tobacco in the causation of oral cancer.
4. To study the correlation between the causative factors and distribution of oral and oropharyngeal cancers.

#### Material and Methods

This prospective analytical study conducted at Department of Community medicine, Shree Narayan Medical College & Hospital, Saharsa, Bihar after approval from Thesis & Ethical Committee from Dec 2021 to Nov 2022 on 63 oral cancer patients. These 63 patients were collected from our medical college hospital and multiple clinics of Surgery and ENT from Saharsa district and Purnea district on 63 oral cancer patients attended to above mentioned clinics in one year. Permission from surgery and ENT clinics was taken for the present study of diagnosed cases of oral cancer.

#### Sampling method

The individuals were informed about the procedure involved in the study and assured that they were free to refuse to participate in the study. Informed written consent was taken in local language from the patients before participation in the study. Separate proforma for each individual was filled. Identity of patients was not revealed. History was obtained from the patient and his/her relatives. The predesigned pretested proforma was used to collect information about epidemiological factors like Age, Sex, Occupation, Residence, Marital status, Personal Habits like Tobacco consumption (like chewing, betel quid, pan, smoking, gutkha, khaini or any other). Detailed clinical data like symptoms, signs and associated illnesses, general and systemic examination were collected and included in the study. The age of individuals was entered on study proforma in completed years after confirmation by history sheet.

#### Data analysis

The data, after collection, was edited to detect and correct errors or omission. For reducing data and for making it feasible to further processing more systematically and quickly coding was done by assigning numerical value. All the data recorded was transcribed into a master table. Data is then analyzed using statistical software and is presented in the form of tables, figures, graphs, wherever Introduction necessary. Descriptive & inferential analysis of data was carried out by the use of appropriate methods using hypothesis testing by applying suitable tests of significance. The whole process of data analysis was carried out using SPSS software 24 version.

**Inclusion criteria**

All diagnosed cases of oral cancer attending Tertiary Health Care Centre during the period of one year was included in the study.

**Exclusion criteria**

People not giving consent, People not willing for examination. Histopathology confirmed pre-malignant lesion/condition & Metastatic lesion in the oral cavity from other sites.

**Terminologies Used**

**Age:** It was recorded to the nearest completed year<sup>41</sup>.

**Habit:** Tobacco chewing and Smoking were defined as those chewing smokeless tobacco and its product such as betel quid (pan) with tobacco mixing, gutkha, pan masala, zarda, khaini etc. with or without combination of tobacco smoking like cigarette, bidi at least one time per day for a period of one-year continuously<sup>41</sup>.

A **cigarette** is a narrow cylinder containing psychoactive material, usually tobacco that is rolled into thin paper for smoking. Most cigarettes contain a "reconstituted tobacco" product known as "sheet", which consists of "recycled [tobacco] stems, stalks, scraps, collected dust, and floor sweepings", to which are added glue, chemicals and fillers; the product is then sprayed with nicotine that is extracted from the tobacco scraps, and shaped into curls. The cigarette is ignited at one end, causing it to smolder and allowing smoke to be inhaled from the other end, which is held in or to the mouth. Most modern cigarettes are filtered, although this does not make them safer<sup>41</sup>.

**Bidi** is a local cigarette made by wrapping less than 0.5 g of coarse tobacco dust in a dry temburni leaf (*Diospyros melanoxylon*)<sup>41</sup>.

**Khaini** means tobacco sometimes chewed in the presence of lime. This is referred to as khaini. A pinch of raw powdered tobacco is taken in the palm and a small amount of slaked lime paste is added; the mixture is then rubbed thoroughly with the thumb and placed in the mouth- generally in one or both cheeks, or in the mandibular groove. The mixture is retained for 10-15 min, after which it becomes

bland; occasionally it is left in the groove during sleep. Pieces of areca nut are sometimes chewed with khaini<sup>41</sup>.

**Mishri** is a form of tobacco used in India as a substitute for chewing tobacco. It is a 'roasted or half-burnt tobacco, prepared by baking tobacco' on a hot metal plate until it becomes uniformly black. It is then powdered and used primarily for cleaning teeth<sup>41</sup>.

**Zarda**, which is produced and used in India, is also exported to a number of Arab countries. During the manufacture of zarda, tobacco leaf is first broken into small pieces and boiled in water with lime and spices until evaporation. The residual particles of tobacco are then dried and coloured with vegetable dyes. Zarda is usually chewed mixed with finely-cut areca nut and spices<sup>41</sup>.

**Gutka or gutkha** is a chewing tobacco preparation made of crushed areca nut, tobacco, catechu, paraffin wax, slaked lime and sweet or savory flavorings<sup>41</sup>.

**Pan chewing** is defined as chewing of a quid containing fresh betel leaves (Piper betle), arecanut (*Areca catechu*) and aqueous lime (calcium hydroxide). Locally cursed tobacco leaves and/or stem are added to the quid in pan-tobacco<sup>41</sup>.

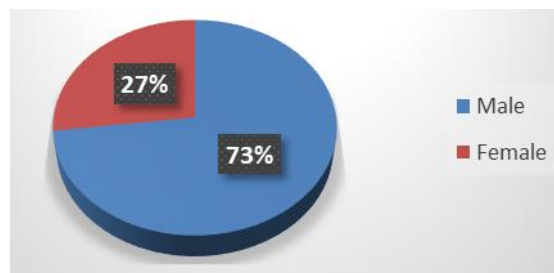
**Results**

The present Hospital based prospective analytical study was carried out among 63 patients over a period of 12 months, from December 2021 to November 2022 in Tertiary Care Centre & Government medical College of eastern India. Observations which were found in study are as follows:

Most number of patients belongs to > 60 years' group followed by 51-60 years group i.e., 24 (38.09%) and 15 (23.81%) respectively (Table 1). Based on gender, most of the patients according to gender were male i.e., 46 (73.02%) (Figure 1). According to distribution of patients with respect to occupation, most of them belong to Clerical and skilled category i.e., 15 (23.81%) followed by managerial, semi-skilled and unskilled workers i.e., 12 (19.05%) & 11 (17.46%) each respectively (Table 2).

**Table 1: Distribution of patients according to age**

Age in years	Number of patients	Percentage
< 30 years	04	06.35%
31-40 years	08	12.70%
41-50 years	12	19.05%
51-60 years	15	23.81%
> 60 years	24	38.09%
Total	63	100.00%
Mean age ± SD	55.86 ± 12.68 years	



**Figure 1: Distribution of patients according to gender**

**Table 2: Distribution of patients according to occupation**

Occupation	Number of patients	Percentage
Professional	6	9.52
Managerial	12	19.05
Clerical and skilled	15	23.81
Semi-skilled	11	17.46
Unskilled	11	17.46
Unemployed	8	12.70

Most number of studied patients were having cancer site- Tongue i.e., 16 (25.40%) followed by tonsil & buccal mucosa i.e., 12 (19.05%)

respective (Table 3).

**Table 3: Distribution of patients according to cancer site**

Cancer Site	Number of patients	Percentage
Lips	0	00.00
Alveolus	2	03.17
Buccal Mucosa	12	19.05
Floor of mouth	4	06.35
Tongue	16	25.40
Retromolar Area	4	06.35
Hard palate	1	01.59
Soft palate/Anterior pillar	3	04.76
Tonsil	12	19.05
Base of tongue	9	14.28
Posterior pharyngeal wall	0	00.00

Most of the studied patients were having tobacco chewing habit i.e., in the last 1-20 years duration i.e., 44 (93.62%) (Table 4). 47 (74.60%) with frequency of 1-5 packet per day i.e., 40 (85.11%) &

**Table 4: Distribution of patients according to tobacco chewing habit**

Tobacco	Number of patients	Percentage
Non-Chewers	16	25.40
Chewers	47	74.60
<b>Number of times per day</b>		
1-5	40	85.11
6-10	7	14.89
> 10	0	0.00
<b>Duration in years</b>		
1-20	44	93.62
21-40	2	4.25
> 40	1	2.13

Most of the patients were having habit of smoking i.e., 40 (63.49%) past 1-20 years duration i.e., 26 (65.00%) (Table 5). with frequency of 6-10 cigarettes per day i.e., 18 (45.00%) & in the

**Table 5: Distribution of patients according to smoking habit**

Cigarette	No. of patients	Percentage
Non-Smokers	23	36.51
Smokers	40	63.49
<b>Number of times per day</b>		
1-5	21	52.50
6-10	18	45.00
> 10	1	2.50
<b>Duration in years</b>		
1-20	26	65.00
21-40	10	25.00
> 40	4	10.00

Most of the studied patients were not having pan/betel nut chewing habit i.e., 39 (61.90%) (83.33%) & in the past 1-20 years duration i.e., 18 (75.00%) was seen habit i.e., 24 (Table 6). Among the pan/betel nut chewers i.e., 24 (38.10%) with frequency of 1-5 packet or pan per day i.e., 20

**Table 6: Distribution of patients according to pan/betel nut with tobacco chewing habit**

Pan/betel nut	Number of patients	Percentage
Non-Chewers	39	61.90
Chewers	24	38.10
<b>Number of times per day</b>		
1-5	20	83.33
6-10	3	12.50
> 10	1	4.17
<b>Duration in years</b>		
1-20	18	75.00
21-40	4	16.67

Majority of the patients in our study were not having alcohol drinking habit i.e., 42 (66.67%) (52.38%) & in the past 1-20 years duration i.e., 19 (90.48%) was seen habit i.e., 21 (Table 7). Among patients having drinking habit i.e., 21 (33.33) with frequency of 1-5 pegs (\*each peg 30 ml) per day i.e., 11

**Table 7: Distribution of patients according to alcohol drinking habit**

Alcoholism	Number of patients	Percentage
Non-drinkers	42	66.67
Drinkers	21	33.33
<b>Number of *pegs per day</b>		
1-5	11	52.38
6-10	8	38.10
> 10	2	9.52

Duration in years		
1-20	19	90.48
21-40	2	9.52
> 40	0	0.00

1 peg = 60 ml

Most common presenting symptom in studied patients was painful oral ulcer i.e., 50 (79.37%) followed by painless oral swelling i.e., 8 (12.70%) respectively (Table 8).

**Table 8: Distribution of patients according to symptoms**

Symptoms	Number of patients	Percentage
Painful oral ulcer	50	79.37
Painless oral swelling	8	12.70
Difficulty in opening mouth	2	3.17
Burning sensation in the mouth	3	4.76
Total	63	100

The paraffin embedded sections were stained with hematoxylin & eosin, taken for histopathological analysis. Out of 63 cases, 10 (15.87%) cases were diagnosed as well differentiated SCC, 48 (76.19%) cases were diagnosed as moderately differentiated SCC and

05 (07.94%) cases were diagnosed as poorly differentiated SCC. In the present study most, common histopathological diagnosis was obtained as moderately differentiated SCC (Table 9).

**Table 9: Distribution in relation to HPE Diagnosis**

Category	No. of cases	Percentage
Well diff SCC	10	15.87
Moderately diff SCC	48	76.19
Poorly diff SCC	05	07.94

HPE: Histo-pathological Evaluation, SCC: Squamous cell Carcinoma Most common site for smoking, pan/beetle nut, tobacco chewers and alcoholics were tongue, buccal mucosa, buccal mucosa and tongue

and tongue respectively (Table 10).

**Table 10: Distribution of patients according to habit pattern and cancer site**

Habit Pattern	Alveol us	Buccal Mucosa	Floor of mouth	Tong ue	Retromolar Area	Hard palate	Soft palate/ Anterior pillar	Ton sil	Base of tongue
Smoking	1	6	3	12	3	1	3	7	4
Pan/Betel Nut Chewing	1	7	2	5	1	1	1	4	2
Tobacco Chewing	2	11	0	12	3	1	3	8	7
Alcoholism	1	2	1	6	1	0	1	5	4
p-value	The chi-square statistic is 2.5348. The p-value is 0.004581. The result is significant at p < 0.05.								

**Discussion**

Prospective analytical study was carried out among 63 patients over a period of 12 months, from December 2021 to November 2022 in Tertiary Care Centre & Government medical College of eastern India. In present study, the greatest number of patients belongs to > 60 years' group followed by 51-60 years group i.e., 24 (38.09%) and 15 (23.81%) respectively & most of the patients according to gender were male i.e., 46 (73.02%). Similar to present study Addala L et al<sup>42</sup> (2012) observed maximum no. of patient were in the age group of above 60 years (34.76%) whereas minimum affected age group was below 30 years (9.65%). Gender wise distribution shows 66.93% were males and 33.07% were females with male: female ratio being 2.02:1. The most affected age group both in males and females was above 60 years (35.17% and 33.90% respectively) and least affected age group both in males and females was below 30 years (9.9% and 9.1% respectively). Also, Ganesh R et al<sup>43</sup> (2013) observed maximum no. of patient were in the age group of 51-60 years (30.8%) and minimum affected age group was below 30 years (1.2%). Gender wise distribution shows 68% were males and 32% were females with male: female ratio being 2.1:1. The most affected age group both in males and females was 51-60 years (30.9% and 30.51% respectively) and least affected age group both in males and females was below 30 years (1.1% and 1.2% respectively).

According to distribution of patients with respect to occupation in present study, most patients belong to Clerical and skilled category i.e., 15 (23.81%). In contrast to present study, Singh MP et al<sup>44</sup> (2015) observed 73.2% were semiskilled, 14% were unemployed. Similarly in contrast to present study Ganesh R et al<sup>43</sup> (2013) observed that unemployed constituted 25.7%, unskilled workers constituted 26.56%, semiskilled workers constituted 5.46%, skilled workers constituted 10.15%, clerical workers, shopkeepers or farmers

constituted 18.8%, semi-professionals constituted 6.25% and professionals constituted 9.7%.

Most number of studied patients in present study were having cancer site- tongue i.e., 16 (25.40%) followed by tonsil & buccal mucosa i.e., 12 (19.05%) respectively. Similar to present study, Gupta Y et al<sup>45</sup> (2018) observed that 23.3% patients had cancer of buccal mucosa followed by 18.3% of patients having cancer of tongue. Also, Singh MP et al<sup>44</sup> (2015) observed that Buccal mucosa and gingivo buccal sulcus were the most common subsites (43.8%) affected followed by alveolus (32.1%). Tongue cancer was the third major site (18.4%) of carcinoma patients were affected. Few cases of the floor of the mouth and retromolar trigone were also reported.

Most of the patients in present study were having tobacco chewing habits i.e., 47 (74.60%) with frequency of 1-5 times per day i.e., 40 (85.11%) & in the last 1-20 years duration i.e., 44 (93.62%). Singh MP et al<sup>44</sup> (2015) study observed that majority of patients were tobacco users who comprised of 93.7% of our patients in this study. The majority of cases (53.0%) were tobacco chewers only, followed by the group of those who were both smokers and tobacco chewers who represented 32.6% cases. 8.2% cases were only smokers and 6.2% patients never consumed tobacco in any form. Furthermore, Singh MP et al<sup>44</sup> (2015) study observed 25.5% patients had a history of tobacco consumption for 15-24 years while 22.7% patients had the habit of tobacco consumption for 5-14 years. 2.1% patients had a habit of tobacco consumption for more than 45 years. Jasotharan V et al<sup>46</sup> (2014) observed that, 81.82% patients had the habit of tobacco consumption and of which 77.78% were consuming by the method of chewing, 11.11% were smoking and the remaining 11.11% were both chewing and smoking. 18.18% of the people with oral cancer investigated never had the habit of tobacco consumption. Similarly, Rahman SS et al<sup>47</sup> (2014) observed that that most of the patients were

tobacco chewers (36.11%) followed by 18.98% were both habit of tobacco chewing and smoking. 13.43% had habit of smoking, tobacco chewing and alcohol consumption. 4.63% did not have any of these three habits.

Most of the patients in present study were not having pan/betel nut chewing habits i.e. 39 (61.90%) with frequency of 1-5 packet or pan per day i.e. 20 (83.33%) & since 1-20 years duration i.e. 18 (75.00%). Khandekar SP et al<sup>48</sup> (2006) observed that 71.3% patients consumed tobacco in the form of betel quid or khaini and 63.3% males were tobacco smokers in the form of cigarettes and bidis. There were 22.5% patients who were using tobacco in both chewing as well as smoking form. None of the female smoked tobacco. Majority of the patients in our study were not having alcohol drinking habit i.e., 42 (66.67%). Among patients having drinking habit i.e., 21 (33.33) with frequency of 1-5 pegs (\*each peg 30 ml) per day i.e., 11 (52.38%) & in the last 1-20 years duration i.e. 19 (90.48%) was seen.

According to a case control study by Maier et al<sup>49</sup> (1992), the average alcohol consumption in the patients was more than twice that of normal subjects. It could be demonstrated that alcohol increased the risk of head and neck cancer. Spitz MR et al<sup>50</sup> (1993) showed that heavy alcohol consumption was associated with significantly increased risk of development of cancer of upper aerodigestive tract.

Most common presenting symptom in studied patients was painful oral ulcer i.e., 50 (79.37%) followed by painless oral swelling i.e., 8 (12.70%) respectively. Similarly, Fischbein NJ et al<sup>51</sup> (2003) study observed that the most frequent chief complaint is soreness or irritation in the mouth. Early carcinoma may be painless. Pain usually occurs when the lesion becomes ulcerated. Rarely, a patient seeks

consultation because of a lump in the neck.

Based on histopathological examination (HPE) findings in our study most patients were having well differentiated SCC i.e., 40 (63.49%). Similar to present study, Gupta M et al<sup>52</sup> (2016) observed that 98.18% cases had squamous cell carcinoma. The adenoid cystic carcinoma was present in 0.6% a cases and muco-epidermoid carcinoma in 1.2% cases. Also, Khandekar SP et al<sup>48</sup> (2006) study observed that 92.31% cases were squamous cell carcinoma.

In a study conducted by Addala L et al<sup>42</sup> (2012) similar result were found with rest to present study. Subjects with smoking/alcohol/smoking + alcohol together had an influence of cancer more commonly in tongue (33.5%, 36.8%, and 28.5%, respectively) followed by rest of the oral cavity (16.6%, 12.4%, and 18.5% respectively) and buccal mucosa (10.7%, 11.8%, and 17.4% respectively). Buccal mucosa (21.4% and 30.2%) was the commonest site for subjects with chewing tobacco and alcohol + chewing habits, followed by tongue (19.4% and 23.4%) and rest of the oral cavity (12.9% and 7.8%). Subjects with a combined smoking and chewing habit had cancer more likely in tongue (24.4%), followed by buccal mucosa (18.9%) and palate (15.3%). Among the subjects with all the three habits, the common site of cancer was the tongue (29.5%), followed by buccal mucosa (18.2%) Subjects without any habits had cancer in nasopharynx (21.2%), tongue (15.7%), oropharynx (15%), and hypopharynx (14%) more commonly than rest of the sites. Overall, tongue was the commonest site of cancer occurrence with respect to all the habits (both single and in combined) except for chewing tobacco where buccal mucosa was the most common site.

Studies	Buccal Mucosa	Tongue	Alveolus	Floor Of Mouth	Retro Molar Trigone	Hard Palate	Lip
Bagate A et al <sup>53</sup>	-	34%	-	13%	-	-	-
Upadhyay A et al <sup>54</sup>	32%	52%	4%	2%	3%	-	3%
Mehrotra R et al <sup>55</sup>	36%	21%	14%	-	-	4%	18%
Babshet M et al <sup>56</sup>	67%	5%	21%	-	-	-	7%
Jha BM et al <sup>57</sup>	28%	38%	-	28%	-	-	-
Gupta S et al <sup>58</sup>	71%	7%	-	-	-	-	-
Bijwe SP et al <sup>59</sup>	56%	17%	1%	1%	-	3%	3%
Present Study	19%	25%	03%	06%	06%	01.50%	-

### Conclusion

Early Oral SCC discovery not only improves survival rates but also lessens the necessity for deforming procedures. Unfortunately, because up to 50% of patients already have local or distant metastases at the time of diagnosis, early detection of oral malignant lesions has proven challenging. Only a small number of cells or discrete regions of tissue are affected by the malignant change at the start of carcinogenesis. Therefore, before histology, cytological investigation should be an appropriate way to clarify the nature of suspicious oral lesions. Additionally, mass screening programmes can benefit it. Future research on oral cytology should demonstrate its use on tiny dubious lesions. To stop oral cancer in its earliest stages of development, it is necessary to introduce cutting-edge adjunctive techniques to cytological diagnosis for the monitoring of potentially malignant lesions.

### References

- National Cancer Institute and Centers for Disease Control and Prevention. Smokeless tobacco and public health: a global perspective. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Institutes of Health, National Cancer Institute; 2014. Bethesda, MD NIH Publication No 14-7983. <https://cancercontrol.cancer.gov/brp/tcrb/global-perspective/SmokelessTobaccoAndPublicHealth.pdf>.
- Moghbel N, Ryu B, Cabot PJ, Steadman KJ. In vitro cytotoxicity of Nicotiana glauca leaves, used in the Australian Aboriginal smokeless tobacco known as pituri or mingkulpa. Toxicology Letters. 2016;254:45-51.
- Maki J. The incentives created by a harm reduction approach to smoking cessation: Snus and smoking in Sweden and Finland. International Journal of Drug Policy. 2015;26(6):569-74.
- Palipudi K, Rizwan SA, Sinha DN, Andes LJ, Amarchand R, Krishnan A, Asma S. Prevalence and sociodemographic determinants of tobacco use in four countries of the World Health Organization: South-East Asia region: findings from the Global Adult Tobacco Survey. Indian journal of cancer. 2014;51(5):24.
- IARC Working Group on the Evaluation of Carcinogenic Risks to Humans, World Health Organization, International Agency for Research on Cancer. Smokeless Tobacco and Some Tobacco-specific N-nitrosamines. Lyon: World Health Organization; 2007. <https://monographs.iarc.fr/wp-content/uploads/2018/06/mono89.pdf>.
- Stanfill SB, Connolly GN, Zhang L, Jia LT, Henningfield JE, Richter P, Lawler TS et al. Global surveillance of oral tobacco products: total nicotine, unionised nicotine and tobacco-specific N-nitrosamines. Tobacco control. 2011;20(3):e2-.
- Sankhla B, Kachhwaha K, Hussain SY, Saxena S, Sireesha SK, Bhargava A. Genotoxic and carcinogenic effect of gutkha: a fast-growing smokeless tobacco. Addiction & health. 2018;10(1):52.
- Singh A, Ladusingh L. Prevalence and determinants of tobacco use in India: evidence from recent Global Adult Tobacco Survey data. PloS one. 2014;9(12):e114073.
- Grover S, Anand T, Kishore J, Tripathy JP, Sinha DN. Tobacco use among the youth in india: evidence from global adult tobacco survey-2 (2016-2017). Tobacco Use Insights. 2020;13:1179173X20927397.
- Siddiqi K, Husain S, Vidyasagaran A, Readshaw A, Mishu MP, Sheikh A. Global burden of disease due to smokeless tobacco

- consumption in adults: an updated analysis of data from 127 countries. *BMC medicine*. 2020;18(1):1-22.
11. Sinha DN, Suliankatchi RA, Gupta PC, Thamarangsi T, Agarwal N, Parascandola M, Mehrotra R. Global burden of all-cause and cause-specific mortality due to smokeless tobacco use: systematic review and meta-analysis. *Tobacco control*. 2018;27(1):35-42.
  12. Zhou J, Michaud DS, Langevin SM, McClean MD, Eliot M, Kelsey KT. Smokeless tobacco and risk of head and neck cancer: evidence from a case-control study in New England. *International journal of cancer*. 2013;132(8):1911-7.
  13. Vidyasagan AL, Siddiqi K, Kanaan M. Use of smokeless tobacco and risk of cardiovascular disease: a systematic review and meta-analysis. *European journal of preventive cardiology*. 2016;23(18):1970-81.
  14. Inamdar AS, Croucher RE, Chokhandre MK, Mashyakhy MH, Marinho VC. Maternal smokeless tobacco use in pregnancy and adverse health outcomes in newborns: a systematic review. *Nicotine & Tobacco Research*. 2014;17(9):1058-66.
  15. Gupta PC, Subramoney S. Smokeless tobacco use and risk of stillbirth: a cohort study in Mumbai, India. *Epidemiology*. 2006;47-51.
  16. Oral mucosa exhibits a rapid turnover of cells and these exfoliated cells have a valuable role in diagnosis of certain local and systemic diseases, *World Journal of Pharmaceutical Research*, 2020,9(9).
  17. Shafer WG. A text book of oral pathology. A text book of Oral Pathology. 6th ed. New Delhi: Elsevier, 2009. Cherubism. 1983,699-702.
  18. Sivapathasundharam B, Kalasagar M. Yet another article on exfoliative cytology. *Journal of Oral and Maxillofacial pathology*. 2004;8(2):54.
  19. Nanci A. Cytoskeleton, junctions and fibroblasts. *Ten Cate's Oral Histology. Development, Structure and Function*. 5th ed. St. Louis, Mo, USA: Mosby Elsevier. 1985,54-78.
  20. Mulki S, Shetty P, Pai P. Oral rinse-based cytology and conventional exfoliative cytology: A comparative study. *Journal of Cancer Research and Therapeutics*. 2015;11(1):129.
  21. Singh M, Sircar K, Tandon A, Chowdhry A, Popli DB. The role of tobacco as an etiological agent for oral cancer: Cytomorphometrical analysis of the buccal mucosa in tobacco users. *Dental research journal*. 2014;11(6):649.
  22. Gupta PC, Ray CS. Smokeless tobacco and health in India and South Asia. *Respirology*. 2003;8(4):419-31.
  23. Shaikh S, Aljanakh M, Al Ibrahim IK, Memon MS. Harmful consequences of specific substances on the oral health. *JPMA. The Journal of the Pakistan Medical Association*. 2018;68(3):437-43.
  24. Muthukrishnan A, Warnakulasuriya S. Oral health consequences of smokeless tobacco use. *The Indian journal of medical research*. 2018;148(1):35.
  25. Mehrotra R, Nigam SK. Incidence of oral cavity lesions and their clinico-histopathological correlation. *Journal of Evolution of Medical and Dental Sciences*. 2013;2(43):8223-9.
  26. Eveson JW, Pring M. Oral cavity. In *Pathology of the Head and Neck*. Springer, Berlin, Heidelberg, 2016,129-177p.
  27. Wahi PN, Luthra UK, Kapur VL. Submucous fibrosis of the oral cavity. *Histomorphological studies*. *British Journal of Cancer*. 1966;20(4):676.
  28. Fedele S. Diagnostic aids in the screening of oral cancer. *Head & neck oncology*. 2009;1(1):1-6.
  29. Rekha KP, Angadi PV. Verrucous carcinoma of the oral cavity: a clinico-pathologic appraisal of 133 cases in Indians. *Oral and maxillofacial surgery*. 2010;14(4):211-8.
  30. Perkins NJ, Joshi V. The Mouth Cancer Foundation—An important support organisation for head and neck cancer patients. *British Journal of Oral and Maxillofacial Surgery*. 2007;45(7):e5.
  31. Mays JW, Sarmadi M, Moutsopoulos NM. Oral manifestations of systemic autoimmune and inflammatory diseases: diagnosis and clinical management. *Journal of Evidence Based Dental Practice*. 2012;12(3):265-82.
  32. Kaugars GE, Silverman Jr S, Ray AK, Page DG, Abbey LM, Burns JC, Svirsky JA. The use of exfoliative cytology for the early diagnosis of oral cancers: is there a role for it in education and private practice? *Journal of Cancer Education*. 1998;13(2):85-9.
  33. Sandler HC. Cytological screening for early mouth cancer. Interim report of the veteran's administration co-operative study of oral exfoliative cytology. *Cancer*. 1962;15(6):1119-24.
  34. Rudgley R. *The encyclopedia of psychoactive substances*. Macmillan, 2014.
  35. Mehta FS. Report on investigations of oral cancer and precancerous conditions in Indian rural populations, 1966-1969. *Basic Dental Research Unit, Tata Institute of Fundamental Research*, 1971.
  36. Chaly PE. Tobacco control in India. *Indian Journal of Dental Research*. 2007;18(1):2.
  37. Sciubba JJ, US Collaborative Oral CDx Study Group. Improving detection of precancerous and cancerous oral lesions: computer-assisted analysis of the oral brush biopsy. *The Journal of the American Dental Association*. 1999;130(10):1445-57.
  38. Kramer IR. Definition of leukoplakia and related lesions: an aid to studies on oral precancer. *Oral Surg Oral Med Oral Pathol*. 1978;46:518-39.
  39. Modi D, Laishram RS, Sharma LD, Debnath K. Pattern of oral cavity lesions in a tertiary care hospital in Manipur, India. *Journal of Medical Society*. 2013;27(3):199.
  40. Mehrotra R, Gupta A, Singh M, Ibrahim R. Application of cytology and molecular biology in diagnosing premalignant or malignant oral lesions. *Molecular cancer*. 2006;5(1):1-9.
  41. Kaur J, Jain DC. Tobacco control policies in India: implementation and challenges. *Indian journal of public health*. 2011;55(3):220.
  42. Addala L, Pentapati CK, Thavanati PR, Anjaneyulu V, Sadhmani MD. Risk factor profiles of head and neck cancer patients of Andhra Pradesh, India. *Indian journal of cancer*. 2012;49(2):215.
  43. Ganesh R, John J, Saravanan S. Socio demographic profile of oral cancer patients residing in Tamil Nadu—a hospital-based study. *Indian journal of cancer*. 2013;50(1):9.
  44. Singh MP, Misra S, Rathanaswamy SP, Gupta S, Tewari BN, Bhatt ML, Kumar V. Clinical profile and epidemiological factors of oral cancer patients from North India. *National journal of maxillofacial surgery*. 2015;6(1):21.
  45. Gupta Y, Singh P, Bedi N, Garg P, Singh Banipal R. Clinical findings and risk factors associated with oral cancer: A prospective study. *Int J Otorhinolaryngol Head Neck Surg*. 2018;4:473-6.
  46. Jasotharan V, Beumy Saluja N, Fathima Nahthiya FH, Arulnandem K, Pirasath S. Descriptive study on socio-demographic and risk factors associated with the oral cancers, Batticaloa district. *J Blood Disorders Transf*. 2014;5(1000216):2.
  47. Rahman SS, Sarker MK, Khan MH, Biswas SS, Saha MM. Clinical profile of oral squamous cell carcinoma patients attending a tertiary care hospital. *Bangladesh Medical Journal Khulna*. 2014;47(1-2):3-6.
  48. Khandekar SP, Bagdey PS, Tiwari RR. Oral cancer and some epidemiological factors: a hospital-based study. *Indian J Community Med*. 2006;31(3):157-9.
  49. Maier H, Dietz A, Gewelke U, Heller WD, Weidauer H. Tobacco and alcohol and the risk of head and neck cancer. The clinical investigator. 1992;70(3):320-7.
  50. Spitz MR, Fueger JJ, Newell GR, Goepfert H, Hong WK. Squamous cell carcinoma of the upper aerodigestive tract. A case comparison analysis. *Cancer*. 1988;61(1):203-8.
  51. Fischbein NJ, Dillon WP. SOL Silverman JR., MA, DDS. Oral

- 
- Cancer. 2003;1:48.
52. Gupta M, Choudhary H, Gupta N, Gupta A. Histopathological study of neoplastic lesions of oral cavity and oropharynx. *Int J Res Med Sci.* 2016;4(5):1506-0.
53. Bagate A, Dukare S, Gawai K, D'costa G. Oral cytomorphological study of chronic tobacco chewers in rural area: A prospective study. *The Pharma Innovation.* 2015;4(6, Part B):78.
54. Upadhyay A, Mundra RK. A Prospective Clinico-Pathological Study of Oral Lesions and Diagnostic Correlation Between Brush Cytology and Histopathology. *Journal of Evolution of Medical and Dental Sciences.* 2018;7(14):1699-703.
55. Mehrotra R, Singh M, Kumar D, Pandey AN, Gupta RK, Sinha US. Age specific incidence rate and pathological spectrum of oral cancer in Allahabad. *Indian journal of medical sciences.* 2003;57(9):12.
56. Babshet M, Nandimath K, Pervatkar SK, Naikmasur VG. Efficacy of oral brush cytology in the evaluation of the oral premalignant and malignant lesions. *Journal of Cytology/Indian Academy of Cytologists.* 2011;28(4):165.
57. Jha BM, Roy A, Jana SH, Patel C, Vaghela P, Gupta S. Scrape cytology—can it replace punch biopsy in diagnosing oral lesions? *International Journal of Medical Science and Public Health.* 2014;3(2):224-9.
58. Gupta S, Shah JS, Parikh S, Limbdiwala P, Goel S. Clinical correlative study on early detection of oral cancer and precancerous lesions by modified oral brush biopsy and cytology followed by histopathology. *Journal of cancer research and therapeutics.* 2014;10(2):232.
59. Bijwe SP, Bakshi AP. Cytodiagnosis of oral lesions in chronic tobacco users. *IAIM.* 2018;5(1):17-27.

**Conflict of Interest: Nil Source of support: Nil**