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A clinical and demographic study of oral cavity carcinoma

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Abstract: *Background:* Oropharyngeal carcinomas are the 6th most common carcinomas globally. Functional loss resulting from their treatment possess a serious threat to quality of life, In order to create better strategies, it is critical to have a deeper grasp of epidemiological characteristics, management, and prognosis of oral malignancies. *Aim and Objectives:* The study aimed to analyse clinical-demographic presentation of oral cavity carcinoma in Southern part of India. *Results:* Of 31 patients evaluated 12.9% were females and 87.1% males, the mean age overall, for tobacco chewing, onset of smoking was 53.23years, 27.61years and 21.83years respectively. 14(45.2%) were from rural area and 17(54.8%) urban areas. 31(100%) lesions were present on tongue. Commonest risk factor was spicy food19(61.3%).25(80.6%) had beetle consumption.28(90.3%) consumed tobacco. 12(38.7%) gutka, 2(6.5%) khara, 7(22.6%) pan parag ,7 (22.6%) zarda and 3(9.7%) did not consumed anything,18(58.1%) sleep with quid in mouth,23(74.2%) did smoking. *Conclusion:* This study offers valuable insights into epidemiology and management of oral malignancies, highlighting critical patterns and disparities within our cohort. The predominance of oral malignancies in males and the high rate of tongue lesions reflect established trends, while the significant prevalence of pan and betel consumption highlights their crucial role as risk factors. The study reveals regional and cultural variations that impact oral malignancy patterns, reinforcing the need for tailored prevention and intervention strategies. By integrating these findings, to develop more effective strategies to combat oral cavity carcinoma and reduce its global burden, ultimately improving patient care and outcomes.

Keywords: Burns, Morbidity, Mortality, Economic Burden.

Introduction

Cancer is one of the leading cause of demise in every society and one of the top cause of illness and mortality globally, with its proportional importance fluctuating according to age and sex .Oral and oropharyngeal carcinomas are one of the most common carcinomas in the world standing sixth in number [1]. Oral cavity malignancy is comparatively common [2].

There were 0.17 million new fatalities and 0.37 million new cases of lip and oral cavity cancer reported. The functional loss resulting from treatment methods, even with the best care available today, makes oral malignancies a serious threat to a patient's quality of life. Oral cancer is one of the most widespread cancers in India and a significant public health issue. Aside from lesions of the salivary glands, gingivae, nasopharynx, nasal cavity, and sinuses, more than 95% of all oropharyngeal malignancies reported to the SEER (Surveillance, Epidemiology, and End Results programme of the National Cancer Institute of the United States Public Health Service) registries in the USA between 1973 and 1987 were squamous cell carcinomas [3].

Oral cancer risk factors include a wide range of environmental and lifestyle variables. On the other hand, it is generally accepted that smoking, chewing tobacco, and alcohol use are significant avoidable risk factors. Furthermore, the combined effects of alcohol and smoke exacerbate the issues. When alcohol is used as a mouthwash ingredient or as a stimulant, it can accelerate the development of cancer. Oral cancer incidence is also linked to betel chewing, human papillomavirus infection, vitamin A, riboflavin, and iron deficiencies, poor oral hygiene, and immunosuppressive medication.

More recently, a link has been discovered between some gene polymorphisms, particularly those encoding cytokines and enzymes involved in alcohol metabolism, and an increased vulnerability to oral cancer in a person. Furthermore, the low-income population is more likely to engage in these behaviours. Diagnosis of a patient at an premature stage is simple, whereas advanced presentation of the disease is not common. Up to 99% of oral cancers and premalignancies can be found by the clinical identification and assessment of mucosal lesions in the mouth. The gold standard for diagnosing mouth cancer is still surgical biopsy [4].

Adjunctive diagnostic technologies, such autofluorescence imaging and toluidine blue staining, have been created and evaluated to assist doctors in the diagnostic route. Treatment options for OSCC vary greatly, minor oral cancers are often treated with surgery alone, whereas advanced oral cancers are typically treated with extensive surgery followed by radiation therapy or chemotherapy. Patients with neck involvement at presentation or with a probability of lymph node metastases higher than 20% are provided neck therapy.

Patients ignorance of symptoms and indifference to the disease may be the cause of late presentation. Because of the site's simple surgical accessibility, known risk factors, and precancerous lesions predominance, which offer a great chance for premature discovery and management, oral malignancies can be prevented from causing agony, deformity, and death. It goes without saying that in order to create better strategies, it is critical to have a deeper grasp of the state of the art in the areas of epidemiological characteristics, diagnosis, prognosis, and treatments for oral cavity cancers. This study was an attempt to prospectively evaluate the clinical and epidemiologic characteristics of individuals with cancer of the oral cavity.

Material and Methods

An Observational descriptive longitudinal study was conducted on 31 patients with clinically diagnosed oral cavity carcinoma satisfying inclusion and exclusion criteria admitted in Hospital of south Karnataka during 18 months from July 2022 to December 2023**.** Age >18yrs were included in the study, Age <18 years excluded from study. Patient with proven malignancy undergoing chemotherapy were excluded from study

Descriptive and inferential statistical analysis was been carried out in the present study. Categorical data was analysed by using Paired, Unpaired T test and Chi Square test for comparison of variables. Descriptive Variables like the Demographic Data was analyzed by Mean, Median, SD Proportions, Frequency, Percentage for Demographic Data and depicted with Bar Diagrams and Pie Charts. The sample size was selected by convenience sampling technique,

- Z_α - 1.96 @ 95% confidence interval
- p - Prevalence (20/100000)
- e - Allowable error (0.5%)

Thus, sample size was calculated to be 31 at a confidence interval of 95% obtaining approval from the institutional scientific committee and ethics committee. Participants were given a patient information sheet explaining the study. Written informed consent was taken from each patient willing to be enrolled in the study following which a detailed evaluation and examination was done

Results

An Observational descriptive longitudinal study was conducted on 31 patients with clinically diagnosed oral cavity carcinoma. Mentioned below are the results of our study.

The Graph-1 shows the gender distribution in the study. The result shows that there are 4 females (12.9%) and 27 (87.1%) males.

Graph-1: Gender

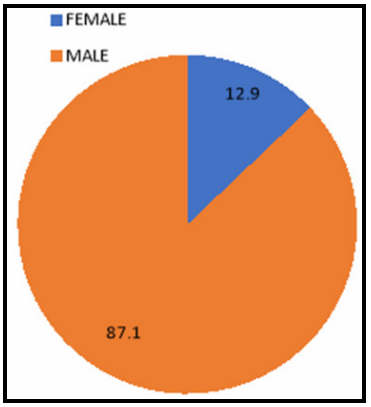


Table-1: Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Age	31	33	80	53.23	9.972
Age of tobacco chewing	28	21	37	27.61	5.109
Age of onset of smoking	24	16	32	21.83	4.469
Valid N (listwise)	21				

The table-1 shows the mean, standard deviation and range of age, age of tobacco chewing and age of onset of smoking. The result shows that the mean age is 53.23, mean age of tobacco chewing is 27.61 and mean age of onset of smoking is 21.83.

The table-2 shows the distribution based on the occupation. The result shows that 5(16.1%) were bus conductor, 4(12.9%) were carpenter, 11(35.5%) were farmer, 2(6.5%) were house wife, 2(6.5%) NA and 7 (22.6%) were shopkeeper.

Table-2: Occupation				
Valid	Frequency	Percent	Valid Percent	Cumulative Percent
Bus conductor	5	16.1	16.1	16.1
Carpenter	4	12.9	12.9	29.0
Farmer	11	35.5	35.5	64.5
House wife	2	6.5	6.5	71.0
NA	2	6.5	6.5	77.4
Shop keeper	7	22.6	22.6	100.0
Total	31	100.0	100.0	

Table-3: Dietary Habits				
Valid	Frequency	Percent	Valid Percent	Cumulative Percent
Non Vegetarian	20	64.5	64.5	64.5
Vegetarian	11	35.5	35.5	100.0
Total	31	100.0	100.0	

The table-3 shows the distribution based on the dietary habits. The result shows that 20(64.5%) were non vegetarian while 11 (35.5%) were vegetarian.

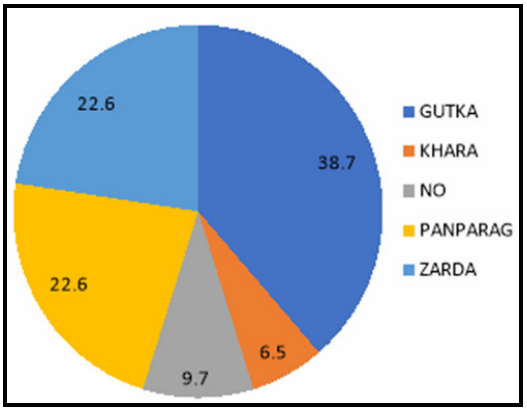
The table-4 shows the distribution based on the seasoning. The result shows that 3 (9.7%) used ginger, 9 (29%) used green chillies, 13(41.9%) used red chillies and 6(19.4%) used tarmarind.

Table-4: Seasoning				
Valid	Frequency	Percent	Valid Percent	Cumulative Percent
Ginger	3	9.7	9.7	9.7
Green Chillies	9	29.0	29.0	38.7
Red Chillies	13	41.9	41.9	80.6
Tarmarind	6	19.4	19.4	100.0
Total	31	100.0	100.0	

Table-5: Hot Beverages				
Valid	Frequency	Percent	Valid Percent	Cumulative Percent
Coffee	18	58.1	58.1	58.1
Tea	13	41.9	41.9	100.0
Total	31	100.0	100.0	

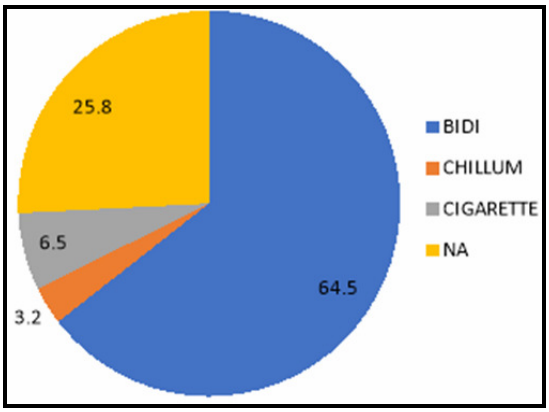
The table-5 shows the distribution based on the hot beverages. The result shows that 18(58.1%) consumed coffee and 13 (41.9%) consumed tea.

Graph-2: Type of tobacco



The Graph-2 shows the distribution based on the type of tobacco consumption. The result shows that 12(38.7%) consumed gutka, 2(6.5%) consumed khara, 3(9.7%) did not consumed anything, 7(22.6%) consumed pan parag and 7 (22.6%) consumed zarda.

Graph-3: Type of smoking

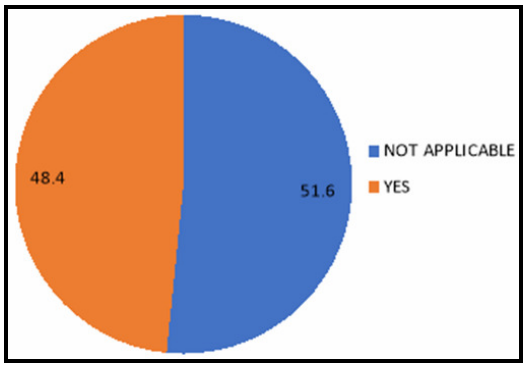


The Graph-3 shows the distribution based on type of smoking. The result shows that 20(64.5%) smoked bidi, 1(3.2%) smoked chillum, 2(6.5%) smoked cigarette.

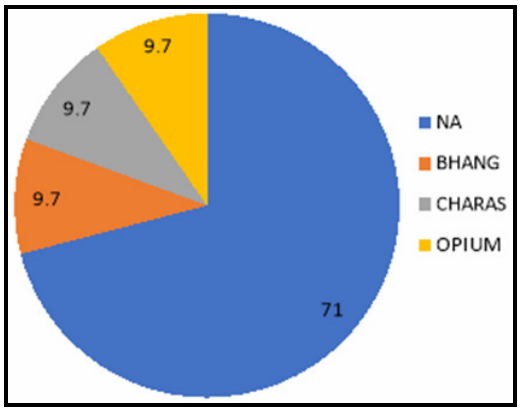
The Graph-4 shows the distribution based on alcohol use. The result shows that 15(48.4%) did alcohol consumption.

The Graph-5 shows the distribution based on addictive drug used. The result shows that 3(9.7%) used bhang, 3(9.7%) used charas and 3(9.7%) used opium.

Graph-4: Alcohol Use



Graph-5: Addictive drug use



Discussion

Oral cavity carcinoma remains a critical health challenge globally, characterized by its aggressive nature and significant potential for premature metastasis. Affecting the mucosal surfaces of the oral cavity including the lips, tongue, and buccal mucosa. Oral cavity carcinoma presents a considerable burden due to its complex management and high morbidity and mortality rates [5]. Historically, the disease has shown a higher prevalence in older males, particularly in regions with prevalent risk factors such as tobacco use, alcohol consumption, and betel quid chewing [6] .

The global impact of Oral cavity carcinoma is further compounded by disparities in healthcare access and outcomes. In many regions, particularly low- and mid-income countries, limited resources and lack of public awareness contribute to late-stage diagnoses and poorer outcomes [7]. Addressing these disparities requires a multifaceted approach,

including improving access to premature detection and treatment, enhancing public education, and developing targeted interventions tailored to specific risk profiles. Understanding these factors is crucial for developing more effective strategies to combat Oral cavity carcinoma and reduce its global burden.

In light of these challenges and evolving trends, we conducted a comprehensive study to better understand the clinical and demographic characteristics of oral cavity carcinoma within our specific population. The present research aimed to elucidate patterns of incidence, identify prevalent risk factors in our cohort. By performing a detailed analysis of patient data including demographics, clinical presentations our study sought to provide valuable insights that could inform more effective management strategies. The present study shows a gender distribution where 27 (87.1%) of the oral carcinoma patients are male and 4 (12.9%) are female (Graph 1). This gender disparity is consistent with the broader epidemiological trends for oral cavity carcinoma . For example, a study by Alves et al [8], also reported a higher prevalence of OSCC among males, with 76.6% of their cohort being male.

The predominance of oral cavity carcinoma in males is often linked to the higher prevalence of key risk factors such as tobacco and alcohol consumption, which are more common among men [9]. These substances are well-established contributors to the development of intraoral oral cavity carcinoma. Additionally, sunlight exposure has been noted as a risk factor for lip squamous cell carcinoma (LSCC) [10], further emphasizing the role of environmental and lifestyle factors in this gender disparity. However, recent studies have indicated a potential shift in the male-to-female ratio for OSCC. Research by Weijers M et al [11] suggests a decrease in this ratio, which could be attributed to changing patterns in tobacco and alcohol use, as well as cultural and geographic factors.

In the present study, the mean age of patients diagnosed with oral cancer is 53.23 years as shown in Table 1. This is slightly higher than findings from previous research. For instance, Shenoi et al [9] reported a mean age of 49.73 years, with the largest number of patients falling within the 51 to 60-year age range, and the smallest proportion in those younger than 70 years.

In the present study, the distribution of occupations among patients reveals a diverse range of professions as shown in Table 2. The majority of patients are farmers, comprising 35.5% of the sample, followed by shopkeepers at 22.6%, bus conductors at 16.1%, carpenters at 12.9%, and housewives and unspecified roles each at 6.5%. This occupational distribution highlights farming as the most prevalent occupation among the patients. This finding is consistent with previous research. For example, Shenoi et al. [9] identified farming as the most frequent occupation among patients with squamous cell carcinoma, with 33.9% of their cohort engaged in farming. Similarly, Shenoi et al [9] noted that a significant portion of their study population was involved in labor-intensive and self-employed roles, which might be associated with increased exposure to risk factors related to oral cancer. This reinforces the notion that occupational exposure is a significant factor in the epidemiology of oral cancer.

The present study reveals that 100% of the oral cavity carcinoma lesions were located on the tongue, highlighting a distinct pattern within our sample. This finding contrasts sharply with the observations made by Souza RL [12] who identified the lower lip vermilion as the most frequent site for OSCC, accounting for 23.3% of cases. Similarly, studies by Zini A[13] and Sharma P et al[14] underscore the prevalence of OSCC lesions on the lower lip vermilion, particularly in tropical countries.

In addition, the study by Sharma R et al [15] reported that the buccal mucosa and retromolar pad were the most commonly involved sites (63.75% and 15%, respectively), while the palate was the least frequently affected (2.5%). This pattern aligns with the high incidence of buccal mucosa lesions observed in regions where the practice of chewing "pan" is prevalent, such as Central and Southeast Asia [16]. In contrast, the Western literature [17]. highlights the lateral

tongue and floor of the mouth as more commonly involved sites, with the anterior two-thirds of the tongue being prevalent in India, and the posterior lateral borders and ventral surfaces being more frequently affected in the United States [18].

The predominance of tongue lesions in our study, as corroborated by Alshami et al.,[19] could be attributed to specific socio-demographic and cultural factors unique to our population. In contrast, the high frequency of lower lip vermilion lesions observed in other studies may reflect the impact of regional and environmental factors, such as increased sun exposure and differing socio-cultural practices [20]. These differences underscore the importance of considering geographical and cultural variations when analyzing oral cavity carcinoma patterns and highlight the need for tailored preventive and diagnostic approaches based on local epidemiological data.

The present study indicates that 80.6% of the participants reported consuming paan, highlighting its significant prevalence within the cohort. This finding underscores the prominent role of paan consumption as a risk factor in this population. In contrast, Imam et al [21] found that paan was used by 2.0% of Pakistani medical students, with Niswar being the most commonly used form of smokeless tobacco at 3.2%. This lower prevalence in Imam et al.'s[21] study could be attributed to the specific demographic of medical students, who may have different tobacco consumption patterns compared to the general population observed in our study.

Moreover, research by Merchant et al [22] provides insights into the impact of paan consumption on oral cancer risk. The study reported an odds ratio (OR) of 7.39 (95% CI, 1.01–38.11) for oral cancer associated with paan use without tobacco. This significant association indicates that even without tobacco, paan consumption carries a considerable risk. Additionally, the study found that the natural indirect effect of paan on oral cancer, mediated through oral submucous fibrosis (OSMF), had an OR of 2.48 (95% CI, 0.99–10.44), while the direct effect of paan with absent OSMF had an OR of 3.32 (95% CI, 0.68–10.07). These findings collectively emphasize the need for targeted public health interventions and preventive strategies addressing paan consumption and its potential role in increasing oral cancer risk.

The present study reveals that 25 (80.6%) of the participants used betel. This is somewhat lower compared to the findings of *Chourasia et al.,*[23] who reported that 96.6% of patients with oral submucous fibrosis (OSMF) had a habit of chewing betel nut in various forms. This discrepancy could be attributed to regional or cultural differences in betel consumption practices. Despite this variation, both studies underscore the significant association between betel use and oral health issues. The areca alkaloids found in betel nut impact energy release mechanisms in the central nervous system, acting as gamma-aminobutyric acid (GABA) inhibitors, which may contribute to the health risks associated with its consumption.

The present study reveals distinct patterns of tobacco consumption compared to the study conducted by Kaur et al [24]. In the present study, a significant portion of participants engage in the consumption of specific tobacco products, as shown in Graph 2 with 38.7% using gutka, 22.6% using both pan parag and zarda, and 6.5% using khara. Notably, 80.6% of participants consume either pan or betel, highlighting a strong preference for these forms of tobacco. This suggests that within this sample, there is a pronounced inclination towards certain smokeless tobacco products and a high prevalence of pan and betel usage. The study emphasizes that smokeless tobacco use is significantly higher in older age groups, with 24.8% in the 31-45 years category and 29.9% in those over 46 years. This indicates a notable demographic trend where older individuals are more likely to use smokeless tobacco.

The present study's high rates of specific smokeless products and pan and betel consumption suggest a regional or cultural preference that is not captured in Kaur et al.'s [24] broader categorization. Additionally, Kaur et al.'s findings on the age-related increase in smokeless tobacco use offer insight into demographic factors influencing tobacco habits, which are not addressed in the present study. These variations underscore the

importance of considering both specific product use and demographic factors when analyzing tobacco consumption patterns.

Table 3 shows, 20 (64.5%) participants were non-vegetarian, and 11 (35.5%) were vegetarian. This aligns closely with the findings of Gangane et al.,[25] who reported 65.4% non-vegetarians and 34.6% vegetarians, indicating a similar distribution of dietary preferences between the two studies. Both studies also observed that a substantial portion of non-vegetarians consumed non-vegetarian food regularly, with the present study finding 48.4% consuming it regularly and Gangane et al.[25] noting 46.8%.

Regarding seasoning use, the present study reported that 9.7% used ginger, 29% used green chilies, 41.9% used red chilies, and 19.4% used tamarind as shown in Table 4. Gangane et al.[25] observed similar patterns, with 11.2% using ginger, 27.5% using green chilies, 42.1% using red chilies, and 19.2% using tamarind. The close alignment in seasoning use between the studies reflects consistent culinary practices. For hot beverages, the present study found that 58.1% consumed coffee and 41.9% consumed tea as shown in Table 5. Gangane et al.[25] also reported that 60.2% preferred coffee and 39.8% preferred tea. The similarity in beverage preferences between the studies indicates consistent consumption trends. Overall, the present study's findings are consistent with those of Gangane et al.[25], showing similar dietary patterns and preferences across both populations.

In the present study, the distribution of tobacco consumption reveals that a substantial majority, 90.3%, consume tobacco. Among these, 38.7% use gutka, 22.6% consume both pan parag and zarda, and a small proportion use khara. Furthermore, tobacco packet consumption data indicates that 35.5% of participants consume one packet, while 51.6% consume two packets daily, reflecting moderate to high usage levels.

Comparatively, Pandey et al.[26] found that 44% of their sample consumed various forms of oral tobacco. Within this group, a notable majority, 78%, used dried tobacco leaves, while 10% and 11% exclusively used gutkha and pan (betel leaves), respectively. Additionally, 27% consumed both tobacco leaves and gutkha. This suggests a high prevalence of traditional forms of smokeless tobacco, similar to the present study's findings but with a broader variety of products.

The Global Adult Tobacco Survey-India, as reported by Bhawna et al.,[27] highlights a regional disparity in tobacco prevalence, with rural areas exhibiting a higher rate (38.4%) compared to urban areas (25.3%). The survey identifies khaini as the most common form of smokeless tobacco, consumed by 12% of the population, contrasting with the present study where gutka, pan parag, and zarda are more prevalent.

This study also reports a high average daily consumption of five tobacco packets, which is significantly higher than the 2 packets per day observed in the present study. Mawa's dominance, along with miraj and zarda, highlights different regional preferences and consumption patterns compared to the present study.

Overall, while the present study and the referenced research share some similarities in the high consumption of smokeless tobacco, there are notable differences in the types of tobacco products and consumption rates. The variation in tobacco types and the volume consumed reflect regional preferences and underscore the need for tailored public health strategies addressing these diverse consumption patterns.

The present study reveals that 64.5% of participants smoke bidis, while smaller proportions use chillum (3.2%) and cigarettes (6.5%) as shown in Graph 3. Additionally, 74.2% of the sample engages in smoking. When examining the number of packets smoked per day, the results indicate that 29% of participants smoke no packets, 41.9% smoke one packet daily, and another 29% smoke two packets daily. This distribution suggests a significant prevalence of bidi smoking among participants and a range of daily consumption levels.

In comparison, Anil Paney et al [28] study found that among 235 patients diagnosed with oral cancer, 44% were bidi smokers, with 34%

using adulterated tobacco such as khaini snuff, and 22% smoking cigarettes. This study highlights a strong preference for bidi smoking similar to the present study but also includes a notable use of khaini snuff.

Overall, the present study's findings on bidi smoking and smoking frequency are consistent with the broader trends observed in other studies. The high rate of bidi smoking across studies underscores its significant role in tobacco consumption patterns, while variations in packet consumption and the presence of other forms of tobacco use offer insights into the diversity of smoking behaviors. These patterns highlight the need for targeted public health interventions to address the prevalent use of bidis and manage smoking-related health risks effectively.

The present study reports that 48.4% of participants consume alcohol,as shown in Graph 4, which is notably higher than the 30.0% regular alcohol use rate reported by Gangane et al.[25] This discrepancy may reflect differences in study populations or definitions of regular versus occasional alcohol consumption. Additionally, the study provides information on the use of addictive drugs,as shown in Graph 5, with 9.7% of participants using bhang, charas, and opium. These findings highlight a substantial proportion of the sample engaging in alcohol consumption and a smaller percentage using specific addictive substances. Overall, while both studies emphasize the significance of alcohol consumption, the present study reveals a higher prevalence of alcohol use and a broader pattern of substance use. This has potential implications for health interventions and suggests the need for further research into substance use patterns.

Conclusion

This study offers valuable insights into the epidemiology and management of oral cavity carcinoma, highlighting critical patterns and disparities within our cohort. The predominance of oral cavity carcinoma in males and the high rate of tongue lesions reflect established trends, while the significant prevalence of pan and betel consumption underscores their crucial role as risk factors. The diverse patterns of tobacco use and the high prevalence of alcohol consumption suggest a need for targeted public health interventions to address these behaviors and their implications for oral cavity carcinoma risk. The clinical and pathological staging data further illustrate a broad spectrum of disease severity, emphasizing the importance of personalized treatment approaches to improve patient outcomes.

Despite advancements in diagnostic and therapeutic technologies, challenges remain, particularly concerning healthcare access and premature detection. The study reveals regional and cultural variations that impact oral cavity carcinoma patterns, reinforcing the need for tailored prevention and intervention strategies. Future research should focus on elucidating the genetic and molecular mechanisms of oral cavity carcinoma, enhancing premature detection methods, and addressing healthcare disparities. By integrating these findings, we can develop more effective strategies to combat oral cavity carcinoma and reduce its global burden, ultimately improving patient care and outcomes.

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Conflicts of interest: There are no conflicts of interest.

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