Impact Of Alcohol Consumption, Tobacco, & Smoking Upon Risk Of Oesophageal, Pharyngeal, And Oral Cancers In Indian Men

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Abstract
Introduction- There are over one billion smokers in the world and among them, four million will die as a result of their habit. **Methodology-** This study was conducted at Geetanjali Dental and Research Institute, Udaipur during 2022-2025. The cases were 1,563 oral, 636 pharyngeal and 566 esophageal male cancer patients. Odds ratios (ORs) and 95% confidence intervals (CIs) for the sites under study were estimated according to smoking, chewing and alcohol habits using unconditional multiple logistic regression models. Interactions between the effects of the 3 habits were also assessed. **Results-** Tobacco chewing emerged as the stron- gest risk factor for oral cancer, with the highest odds ratio (OR) for chewing products containing tobacco of 5.05 [95% confidence internal (CI) 4.26 –5.97]. The strongest risk factor for pharyngeal and esophageal cancers was tobacco smoking, with ORs of 4.00 (95% CI 3.07–5.22) and 2.83 (95% CI 2.18 –3.66) in current smokers, respectively. An independent in- crease in risk was observed for each habit in the absence of the other 2. For example, the OR of oral cancers for alcohol drinking in never smokers and never chewers was 2.56 (95% CI 1.42– 4.64) and that of esophageal cancers was 3.41 (95% CI 1.46 –7.99).**Conclusion-** Furthermore, significant decreases in risks for all 3 cancer sites were observed in subjects who quit smoking even among those who had quit smoking 2– 4 years before the interview.

Introduction

Four million of the globally one billion smokers will pass away as a result of their habit. Over 10% of all fatalities in European Union are thought to be caused by consumption of alcohol, while oral and esophageal cancer have been linked to betel quid (area nut), an additional dangerous stimulant chewed by almost 600 million people in Asia. As a result, the negative health consequences brought on by such addictive substances have grown to be a significant global public health issue.[1]

Numerous diseases, such as cancer, lung disorders, and heart disease, are brought on by cigarette smoking. Also, it appears to be linked to conditions of the gastrointestinal system, such as peptic ulcers, and discovered that it impacts how quickly gastric ulcer patients heal.[2, 3] Drinking too much alcohol is also linked to high-mortality conditions such as pancreatitis, liver cirrhosis, and certain types of cancer. It has been discovered that ethanol causes ulcers in the stomach epithelium. The combined use of cigarette smoking and alcohol consumption is a known risk factor for erosive esophagitis and Barrett's esophagus.[4]

The aim of research was to examine the connection among emergence of oral, pharyngeal, and esophageal malignancies in the northern region of India and patterns of tobacco smoking, chewing, and alcohol consumption, as well as to evaluate the relationship between these three behaviours.

Methodology

From Jan 2022 to jan 2025, this investigation was carried out at the Geetanjali Dental and Research Institute in Udaipur. Male patients with cancer with 1,563 oral, 636 pharyngeal, and 566 esophageal cases were included. The Ninth Revision of the International Classification of Diseases (ICD-9) was used to code the locations. The mouth, tongue, and lip were among the oral cancer locations. The oropharynx, hypopharynx, and pharynx undefined were the pharyngeal cancer sites. The esophagus's ICD code was 150. Male patients from the same centres who had non-tobacco-related malignancies reported over the same research period were chosen as disease controls. Histological confirmation was obtained for all cases and cancer controls. 1,927 male regular hospital visitors from Udaipur were chosen as controls in addition to the 1,711 cancer controls from the two centres. Certified investigators conducted interviews with each subject. Epidemiological and socioeconomic characteristics, history of illness, alcohol and tobacco use, nutrition, and working conditions were all asked of the participants.
Those who smoked, chewed, or drank alcohol at least once a day for at least six months were classified as ever-smokers, chewers, and drinkers. Those who had quit smoking two or more years prior to the interview were classified as former smokers. The amount of tobacco in grammes was assumed to be 1 per cigarette, 0.5 per bidi, and 2 per cigar, cheroot, and chutta in order to calculate pack-years. The proportion of ethanol was assumed to be 0.40 for spirits (whisky, gin, rum, brandy, arrack and country liquor), 0.03 for beer and 0.05 for toddy in order to calculate the total lifetime consumption of ethanol. Employing unbiased multiple logistic regression models, odds ratios (ORs) and 95% CIs for research locations were calculated based on alcohol, chewing, and smoking habits. Additionally, connections among the three behaviours' impacts were evaluated. Age, centre, and educational attainment were taken into account while adjusting all ORs. After compensating for the other two habits, ORs pertaining to one habit were determined; after adjustment for third habit, the joint effects of two habits were calculated.

Results

1,563 instances of oral cancer, 636 cases of pharyngeal cancer, 566 cases of esophageal cancer, and 3,638 controls were contributed by the two centres. The distribution of age and educational attainment was somewhat different between the case and control populations.

Table 1- Odds ratios of oral, pharyngeal and esophageal cancer for smoking, chewing and alcohol drinking

Site	Control	Cases	OR[1]	95% CI	OR[2]	95% CI
Oral cavity						
Smoking						
Never[3]	1,799	424	1.00	—	1.00	—
Former	444	185	1.76	1.45–2.16	0.83	0.65–1.06
Current	1,395	954	2.90	2.54–3.32	1.91	1.61–2.26
Chewing Never[3]	3,079	711	1.00	—	1.00	—
Without tobacco	181	88	2.11	1.61–2.75	2.19	1.63–2.95
With tobacco	374	757	8.77	7.56–10.17	5.05	4.26–5.97
Alcohol drinking Never[3]	2,919	780	1.00	—	1.00	—
Ever	719	783	4.08	3.58–4.63	1.98	1.68–2.33
Pharynx						
Smoking						

Never[3]	1,799	87	1.00	—	1.00	—
Former	444	57	2.65	1.87–3.77	1.23	0.84–1.79
Current	1,395	492	7.29	5.75–9.26	4.00	3.07–5.22
Chewing Never[3]	3,079	424	1.00	—	1.00	—
Without tobacco	181	34	1.36	0.93–1.99	1.37	0.89–2.10
With tobacco	374	178	3.46	2.81–4.24	1.83	1.43–2.33
Alcohol drinking Never[3]	2,919	297	1.00	—		
Ever	719	339	4.63	3.89–5.52	2.07	1.67–2.56
Esophagus						
Smoking						
Never[3]	1,799	107	1.00	—	1.00	—
Former	444	86	3.26	2.41–4.41	1.58	1.14–2.20
Current	1,395	373	4.50	3.59–5.64	2.83	2.18–3.66
Chewing Never[3]	3,079	371	1.00	—	1.00	—
Without tobacco	181	33	1.51	1.03–2.23	1.60	1.05–2.45
With tobacco	374	160	3.55	2.87–4.40	2.06	1.62–2.63
Alcohol drinking Never[3]	2,919	304	1.00	—	1.00	—
Ever	719	262	3.50	2.91–4.21	1.70	1.36–2.13

Table 2 – Odds ratios of specific oral and pharyngeal cancer sites for smoking, chewing and alcohol drinking

	OR	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**
Smoking Never[3]	1.00	—	1.00	—	1.00	—	1.00	—
Former	0.95	0.69–1.32	0.73	0.54–0.99	1.14	0.60–2.17	1.48	0.93–2.35
Current	1.92	1.52–2.43	1.79	1.45–2.22	5.46	3.46–8.61	3.73	2.66–5.24
Chewing								
Never[3]	1.00	—	1.00	—	1.00	—	1.00	—
Without tobacco	1.71	1.13–2.59	2.60	1.82–3.73	1.45	0.77–2.74	1.34	0.78–2.30
With tobacco	2.74	2.18–3.43	6.95	5.72–8.46	1.74	1.25–2.43	1.98	1.46–2.68
Alcohol drinking								
Never[3]	1.00	—	1.00	—	1.00	—	1.00	—
Ever	1.92	1.54–2.39	2.06	1.69–2.50	2.51	1.85–3.40	1.78	1.35–2.34

Up to 40 years of smoking, there was a substantial dose-related relationship among smoking history and oral, pharyngeal, and esophageal cancers; beyond that, there was no noticeable rise in risk. Up to 20 g of tobacco per day, there was a strong dose-response relationship between the average daily amount of tobacco and all three cancer foci; beyond that, no additional rise was seen. There was a statistically significant elevated risk of esophageal and pharyngeal malignancies among all tobacco smokers. All forms of smoking, with the exception of cigarette smoking, demonstrated a statistically significant elevated risk for oral malignancies. Bidi smokers had the highest risk for esophageal and pharyngeal cancers, while cigar or cheroot smokers had the most greater danger for mouth cancers. When compared to present smokers, past smokers showed a lower risk for all three sites.

Table 3 – Odds ratios of oral, pharyngeal and esophageal cancer for duration, level and cumulative chewing

	Oral Cavity			**Pharynx**			**Oesophagus**		
Controls	**Cases**	**OR**	**95% CI**	**Cases**	**OR**	**95% CI**	**Cases**	**OR**	**95% CI**
Never chewing 3,079	711	1.00	—	424	1.00	—	371	1.00	—
Duration of chewing (yr)[2]									
0–19 286	250	3.11	2.51–3.86	67	1.23	0.89–1.71	71	1.78	1.30–2.45
20–39 209	432	5.31	4.32–6.52	101	1.97	1.46–2.67	84	2.05	1.50–2.80
≥40 64	170	5.19	3.70–7.29	44	2.60	1.60–4.20	40	2.26	1.42–3.62
p for linear trend									
Average daily amount (no. of quids)[2]									
1–3 343	279	2.06	1.68–2.53	101	1.21	0.91–1.61	81	1.19	0.88–1.60
4–5 135	273	6.02	4.70–7.72	55	1.89	1.29–2.76	51	2.18	1.48–3.19
>5 800	300	11.94	8.93–15.96	56	4.22	2.71–6.56	63	6.07	4.03–9.14
p for linear trend									
Cumulative exposure to chewing									
<1000 158	354	3.78	2.95–4.84	101	1.36	0.97–1.90	69	0.94	0.66–1.34
>1000 26	211	13.32	8.49–20.89	31	1.97	1.05–3.68	23	1.72	0.90–3.27
p for linear trend									
Time since quitting chewing (yr)[3]									

Current chewers 460	640	1.00	—	171	1.00	—	160	1.00	—
2–4 41	93	1.15	0.75–1.77	15	0.81	0.40–1.66	12	0.51	0.24–1.09
5–9 20	59	1.60	0.92–2.81	10	1.23	0.51–3.01	8	0.90	0.36–2.26
10–14 19	30	0.71	0.37–1.35	6	0.45	0.15–1.33	8	0.61	0.24–1.58
≥15 19	30	0.67	0.36–1.26	10	0.57	0.24–1.39	7	0.43	0.17–1.12

Table 4- Odds ratios of oral, pharyngeal and esophageal cancer for combination of smoking, chewing and alcohol drinking

Smoke	Chewing	Alcohol	Controls	Case	OR	95% CI	Cases	OR	95 % CI	Cases	OR	95% CI
No	No	No	1,471	122	1.00	—	50	1.00	—	45	1.00	—
No	Yes-T—	No	83	24	3.39	2.04–5.66	5	1.60	0.61–4.17	9	3.30	1.53–7.13
No	Yes-T+	No	127	159	9.27	6.79–12.66	25	3.73	2.20–6.31	35	5.74	3.50–9.42
Yes	No	No	1,084	268	2.45	1.94–3.10	175	3.54	2.54–4.94	155	3.57	2.51–5.06
No	No	Yes	75	16	2.56	1.42–4.64	0	—	—	7	3.41	1.46–7.99
Yes	Yes-T—	No	49	25	4.80	2.79–8.27	10	4.89	2.29–10.43	10	4.82	2.23–10.44
Yes	Yes-T+	No	102	161	8.53	6.13–11.89	32	4.55	2.74–7.56	48	7.22	4.47–11.64
No	Yes-T—	Yes	15	6/	4.36	1.55–12.30	0	—	—	0	—	—
No	Yes-T+	Yes	26	95	24.28	14.87–39.65	7	4.28	1.72 10.62	10	6.71	2.94–15.32
Yes	No	Yes	449	287	4.81	3.74–6.19	199	8.41	5.94–11.9	164	7.33	5.06–10.62

									0			
Yes	Yes-T—	Yes	34	33	8.10	4.68–14.02	19	10.75	5.53–20.90	14	9.12	4.35–19.12
Yes	Yes-T+	Yes	119	342	16.34	12.13–22.00	114	13.44	8.90–20.29	67	8.65	5.50–13.62

Likelihood ratio test statistics for interactions among smoking, drinking and chewing habits were calculated by treating each of the habits as a dichotomous variable. Likelihood ratio tests were statistically significant ($p < 0.05$) for all combinations of the 3 habits except for the interaction between chewing and drinking for oral cavity and pharyngeal cancers, and between drinking and smoking for esophageal cancer. The tested models were adjusted for age, center, and education level and the third habit for 2-way interactions.

Discussion

In conclusion, all three of the examined habits were substantial risk factors for each of the three cancer locations. The results supported earlier research that found chewing to be the biggest risk factor for oral cancer, especially when chewing tobacco-containing items. While the scientific data for pharyngeal cancers was suggestive but not definitive, chewing tobacco-free items were also an independent risk factor for esophageal and oral cavity malignancies. Smoking was found to be the biggest risk factor for the latter type of cancer.

There is conflicting information from earlier research regarding interconnections between the three habits.5 This discrepancy may be explained by the fact that prior research did not account for alcohol use, which is a powerful confounding factor and an independent risk factor for the three cancer sites. In addition to not measuring alcohol intake, prior research was limited by a sample size that was too small to measure interactions. There were sufficient cases and controls in our research to evaluate every two-way and three-way interaction. The third habit was taken into account when evaluating the interaction between two habits. The combined consequences of drinking alcohol with other habits were only evaluated in two earlier research from this area.6Chewing and drinking, as well as chewing and poor oral hygiene, appeared to interact multiplicatively in one study that was limited to oral cancer.Six Although the analysis was limited to a single group of individuals, the second investigation revealed synergistic relationships between alcohol use and chewing and smoking in the development of all three cancer locations.[7]

Conclusion

In India, mothers and children frequently engage in this behaviour, which is not regarded as harmful. Lastly, because lifestyle factors have been shown to play a significant role in the onset of oral, pharyngeal, and esophageal cancers, they should be regarded as a significant source of preventable morbidity and mortality in India, and public health measures should focus heavily on preventing them.

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