

## Burden of Oral Precancerous Lesions and Associated Factors among Truck Drivers in Kolkata, West Bengal

Mohammed Adil Hussain M<sup>1</sup>, Aditi Ajit Jaiswal<sup>1</sup>, Meganathan E<sup>1</sup>, Arun G<sup>1</sup>, Lamabam Harit Singh<sup>2</sup>, Bobby Paul<sup>3</sup>

<sup>1</sup>Junior Resident, <sup>3</sup>Professor and Head, Department of Preventive and Social Medicine, All India Institute of Hygiene and Public Health, Kolkata, India

<sup>2</sup>Junior Resident, Department of Epidemiology, All India Institute of Hygiene and Public Health, Kolkata, India

**Correspondence:** Dr. Mohammed Adil Hussain M, Email: dradelhusyn@gmail.com

### Abstract:

**Introduction:** India accounts for a significant share of global smokeless tobacco users. Tobacco consumption, both smoking and chewing, is associated with oral mucosal lesions that may progress to cancer. Truck drivers are a vulnerable group due to occupational stress and high-risk habits. **Objectives:** To estimate the prevalence of oral precancerous lesions among truck drivers in Kolkata and identify associated factors. **Methods:** A cross-sectional study was conducted among 171 truck drivers selected by systematic random sampling from December 2022 to February 2023. Data were collected using a pretested interview schedule followed by oral examination. Data were analysed using SPSS version 24. **Results:** The median age was 37 (IQR 30, 55) years. All participants were male; 157 (91.8%) belonged to lower and middle socioeconomic classes. Tobacco use was reported in 68.4%, alcohol use in 69 (40.4%), and 24 (14.0%) had oral precancerous lesions, with leucoplakia being most common. Multivariable logistic regression identified poor oral hygiene (aOR = 6.29;  $p = 0.001$ ), younger age (aOR = 0.012;  $p = 0.001$ ), tobacco use (aOR = 24.12;  $p = 0.003$ ), and years of truck driving (aOR = 1.41;  $p < 0.0001$ ) as significant predictors. **Conclusion:** The study found a 14.6% prevalence of oral precancerous lesions, significantly associated with tobacco use, poor oral hygiene, younger age, and longer driving duration. Targeted workplace screening, oral health education, and cessation support are recommended for early detection and prevention among high-risk occupational groups.

**Keywords:** Oral Potentially Malignant Disorders; Truck drivers; Tobacco Use; Oral Hygiene

### Introduction:

Oral precancerous lesions represent a significant public health concern globally, as they serve as potential indicators of malignant transformation and an increased risk of oral cancer.<sup>[1]</sup> The burden of these lesions varies among different populations, with certain occupational groups being particularly susceptible due to their unique occupational hazards and lifestyle factors.<sup>[2]</sup> Truck drivers form a significant occupational group in Kolkata,

West Bengal, facing numerous challenges and exposed to multiple risk factors that can influence the development of oral precancerous lesions.<sup>[3]</sup>

Kolkata, as a bustling metropolis and a major transportation hub in West Bengal, witnesses a high volume of goods transported daily by truck drivers. These drivers encounter traffic congestion, endure unpredictable long working hours, and frequently face stressful conditions while driving. Additionally, they

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often engage in habits such as tobacco and alcohol use, which are well-established risk factors for oral precancerous lesions.<sup>[4,5]</sup> The study is critical, particularly concerning the mobile population of truck drivers who are constantly on the move, making it challenging for them to access community screenings and health checkups in their home areas. Limited research investigates the specific burden of oral precancerous lesions among truck drivers in Kolkata and the factors associated with their occurrence.

Epidemiological investigations show that smoking, periodontal disease, and oral cancer are closely related.<sup>[5]</sup> According to The Global Adult Tobacco Survey 2 (2016-2017), the three largest states of Uttar Pradesh, West Bengal, and Maharashtra have the highest number of tobacco users and together account for more than one-third (38%) of the tobacco users in India. 32.7 million in West Bengal are current tobacco users, that accounts for 33.7% of the entire population.<sup>[6]</sup>

Understanding the burden and associated factors of oral precancerous lesions among truck drivers in Kolkata is crucial for several reasons. Firstly, it provides valuable insights into the oral health status of this specific occupational group, thereby aiding in the development of targeted preventive measures and intervention strategies.<sup>[7]</sup> Secondly, elucidating the factors associated with the development of oral precancerous lesions in this population can help identify high-risk groups and inform the implementation of appropriate health promotion initiatives.<sup>[8]</sup> Moreover, investigating the burden and associated factors of oral precancerous lesions in Kolkata's truck drivers can contribute to the existing body of knowledge on occupational health and highlight the need for tailored interventions to mitigate the impact of occupational hazards on oral health.

Therefore, this study aims to assess the burden of oral precancerous lesions and investigate the associated factors among truck drivers in Kolkata, West Bengal. By examining the prevalence, types, and clinical characteristics of oral precancerous lesions, as well as analysing the potential influence of occupational and lifestyle factors, we seek to enhance our understanding

of the oral health challenges faced by this specific occupational group and contribute to the formulation of targeted preventive strategies.

## Methods:

### Study Setting and Design

This was a descriptive cross-sectional study conducted from November 2022 to March 2023 in a single large logistics company that operates multiple warehouses across Kolkata, including locations in Dankuni, Dunlop, and Howrah. The company was selected through convenience sampling based on prior institutional collaboration and feasibility of access, as it permitted onsite health research activities and had a sizeable population of full-time truck drivers.

### Study Population and Sampling Technique

Truck drivers above the age of 18 years and working in the field of driving for more than a period of one year and were working full-time were included in the study. Those who were acutely ill and were unwilling to participate were excluded.

Taking the prevalence of 42.24% by Bhattacharjee T et al.<sup>[9]</sup> with a 95% confidence interval and absolute error (L) = 7.5%, the minimum sample size achieved was 171 participants.

The study utilized a systematic random sampling method to select participants from the pool of currently employed truck drivers within the logistics company. Among the 250 eligible truck drivers available on-site, a sampling interval (k) was determined by dividing the total number of eligible drivers (N = 250) at the warehouse by the desired sample size (n = 171).

$$k = n/N = 171/250 \approx 1.46$$

Since selecting every first driver would over sample, and every second driver would under sample, every alternate driver (k = 2) was approached initially to meet the sample requirement. During actual recruitment, non-respondents and refusals were replaced by the next eligible driver on the list, ensuring the final sample size of 171 was achieved. The sampling interval was adjusted to accommodate non-response while maintaining the systematic nature of selection.

### **Study Tools and Technique**

Screening for oral precancerous lesions was conducted following a systematic approach. Written informed consent was obtained from each participant prior to data collection. A comprehensive medical history was recorded, assessing risk factors such as tobacco and alcohol use. A detailed oral examination was carried out using a fluorescent lamp, which included inspection of the lips, buccal mucosa, tongue, floor of the mouth, and palate. Diagnostic aids were utilised when necessary. Any suspicious lesions identified during the examination were documented and photographed for reference. Participants with clinically suspicious findings were referred for specialist evaluation, and follow-up appointments were arranged to ensure appropriate management. Strict data management protocols were implemented to maintain accuracy and confidentiality.

Oral hygiene status and related practices were also assessed. Clinical examination included evaluation of plaque, calculus, gingival health, dental caries, oral mucosa, and halitosis. The Simplified Oral Hygiene Index (OHI-S) was applied to provide a standardised measurement of oral cleanliness.<sup>[10]</sup> Additionally, participants completed a structured questionnaire covering oral hygiene habits, types of dental products used, and dietary practices. The combined data from clinical and questionnaire assessments were analysed to explore associations between oral hygiene practices and oral health outcomes.

For the purpose of this study, oral precancerous lesions were defined as per the World Health Organization (WHO) classification, including leukoplakia, erythroplakia, and oral submucous fibrosis.<sup>[1]</sup> Burden of oral precancerous lesions was assessed by determining both prevalence and severity, based on clinical characteristics such as lesion size, colour, and features suggestive of dysplasia.<sup>[11,12]</sup>

Oral health was defined in accordance with the WHO as a state of the mouth, teeth, and orofacial

structures that enables individuals to eat, speak, and socialise without discomfort or disease, supporting overall well-being and self-confidence.<sup>[13]</sup>

### **Data Analysis**

Quantitative data was analysed using Microsoft Excel 2019 and Statistical Package for Social Sciences software (Version 24). Descriptive statistics for the predictor variables and the outcome variables were shown by frequency table, median, and interquartile range. Data were represented by tables, charts, and figures. Factors were tested for significance ( $p$ -value  $< 0.05$ ) at 95% confidence interval in a univariate regression model after excluding multicollinearity. The final multivariable logistic regression model was performed, including all the biologically plausible and significant predictor variables in the respective univariate analysis.

### **Ethical Approval**

The study was approved by the Institutional Ethics Committee (IEC/AIHH&PH/2022/29) and was conducted in accordance with the ethical standards of the Declaration of Helsinki. Written informed consent was obtained from all participants prior to data collection. Confidentiality and anonymity were maintained throughout the study.

### **Results:**

A total of 171 male truck drivers participated in the study. The median age was 37 years (interquartile range: 30–55 years), and the median duration of truck driving experience was 17 years. Most participants were Hindu ( $n = 96$ , 56.1%), followed by Muslims ( $n = 42$ , 24.6%), and others ( $n = 33$ , 19.3%). Regarding educational status, 32 (18.7%) were illiterate, and 119 (69.5%) had completed formal education up to the primary level. Socioeconomic status was assessed using the Modified BG Prasad Scale (2022), with 157 (91.7%) participants classified under lower and middle classes, suggesting limited economic resources and healthcare access. The detailed sociodemographic profile is presented in Table 1.

**Table 1: Sociodemographic characteristics of the study participants (Nn= 171)**

Category	Frequency (n)	Percentage (%)
Gender		
Male	171	100.0
Age (in years)		
Median (IQR)	37 (3055)	-
Religion		
Hindu	96	56.1
Muslim	42	24.6
Others	33	19.3
Education		
Illiterate	32	18.7
Up to Primary Level	119	69.5
Above Primary	20	11.7
Truck Driving Experience (years)		
Median (IQR)	17 (11-18)	-
Socioeconomic Class (Modified BG Prasad)		
Lower	102	59.6
Middle	55	32.1
Upper	14	8.3

\* Others included Jain, Christian etc.

**Oral Precancerous Lesions**

Out of the 171 participants, 24 individuals (14.0%) were diagnosed with one or more oral precancerous lesions. Among these, the most common lesion was leucoplakia, observed in 12 participants (7.0%). Other types of oral precancerous lesions included actinic cheilosis in 6 participants (3.5%), submucous fibrosis in

**Table 2: Type and Site of Oral Precancerous Lesions among study participants (n = 171)**

	Frequency (n)	Percentage (%)
Lesion Type (n=24)*		
Leukoplakia	12	7.0%
Actinic cheilosis	6	3.5%
Oral submucous fibrosis	3	1.8%
Erythroplakia	2	1.2%
Lichen planus	1	0.6%
Site Affected (n=26)*		
Buccal mucosa	14	8.2%
Tongue	5	2.9%
Lower lip	4	2.3%
Palate	2	1.2%
Gingiva	1	0.6%

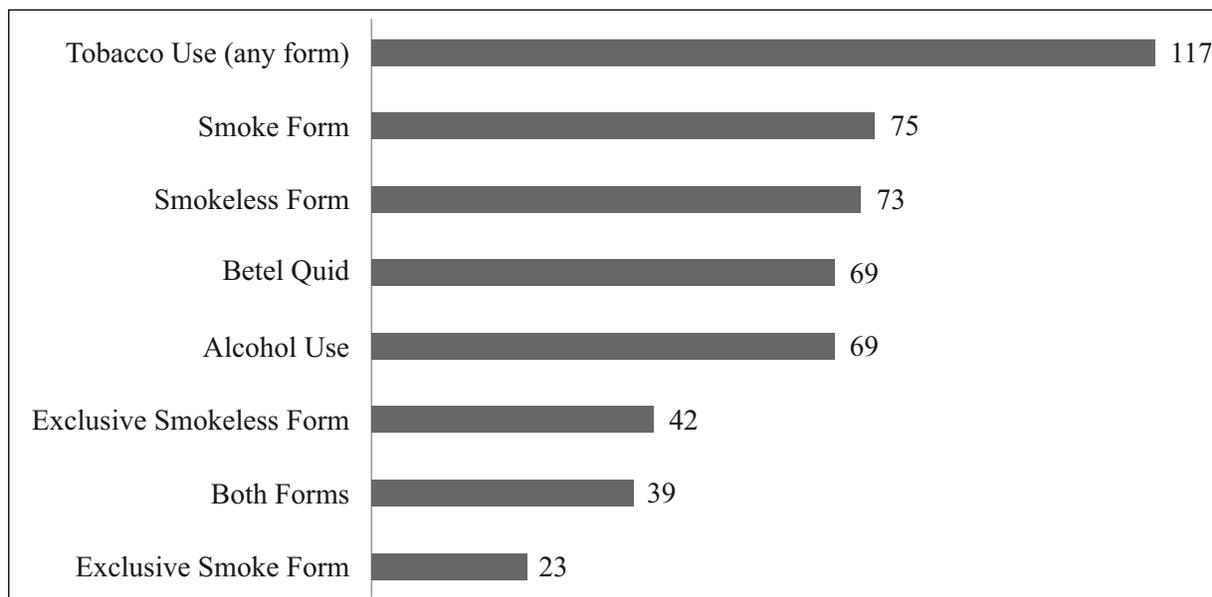
Note: Some participants had more than one lesion or site involved. Hence, totals may exceed 100%.

3 participants (1.8%), erythroplakia in 2 participants (1.2%), and lichen planus in 1 participant (0.6%). The remaining 147 participants (86.0%) did not present with any detectable oral precancerous lesions.

**Determinants of Oral Precancerous Lesions**

Substance use was highly prevalent among the truck drivers. A total of 117 participants (68.4%) reported using tobacco in any form. Among them, 75 (43.9%) consumed smoke forms such as bidi or cigarettes, while 73 (42.7%) used smokeless forms like gutkha or khaini.

**Figure 1: Substance Use Patters among study Participants (n = 171)**



**Table 3: Distribution of Oral Hygiene Indicators and Practices among study participants (n = 171)**

Oral Hygiene Variable	Frequency (n)	Percentage (%)
Oral Hygiene Index (OHI-S)		
Good	45	26.3
Fair	72	42.1
Poor	54	31.6
Brushing Frequency		
Once daily	112	65.5
Twice daily	42	24.6
Irregular	17	9.9
Brushing Instrument		
Toothbrush	137	80.1
Finger	26	15.2
Neem stick	8	4.7
Toothpaste Type Used		
Fluoridated	109	63.7
Non-fluoridated	41	24.0
Unknown	21	12.3
Use of Traditional Substances		
Yes	36	21.1
No	135	78.9

Dual use of both forms was reported by 39 participants (22.8%). Exclusive use of smoked tobacco was observed in 23 (13.5%), and exclusive use of smokeless tobacco in 42 (24.6%). Additionally, alcohol and betel quid consumption were each reported by 69 participants (40.4%).

**Oral Hygiene Indicators and Practices**

Oral hygiene status and related practices were evaluated among all 171 truck drivers. As shown in Table 3, 45 participants (26.3%) had good oral hygiene, 72 participants (42.1%) had fair hygiene, and 54 participants (31.6%) were assessed with poor oral hygiene based on the Simplified Oral Hygiene Index (OHI-S).

Brushing frequency was reported as once daily by 112 participants (65.5%), twice daily by 42 participants (24.6%), and irregular by 17 participants (9.9%). Regarding brushing instruments, 137 participants (80.1%) used a toothbrush, 26 participants (15.2%) used

**Table 4: Multivariable logistic regression showing association of different factors with Prevalence of Oral Precancerous lesions among study participants (n = 171)**

Variable	Adjusted OR (95% CI)	p-value
Age of Truck Driver	0.012 (0.01 0.149)	0.001
Socioeconomic Status		
Upper class	ref	-
Middle class	1.512 (0.258 8.858)	0.647
Lower class	0.740 (0.150 3.662)	0.712
Truck Driving Years	1.419 (1.181 1.706)	<0.0001
Tobacco Consumption		
Absent (Ref)	ref	-
Present	24.123 (2.885 201.734)	0.003
Betel Quid Consumption		
Absent (Ref)	ref	-
Present	3.609 (1.029 12.654)	0.055
Alcohol Consumption		
Absent	ref	-
Present	0.030 (0.003 0.281)	0.200
Oral Hygiene		
Present	ref	-
Absent	6.289 (2.079 19.022)	0.001
Oral Hygiene Practice		
Good practice	ref	-
Poor practice	6.240 (1.370 13.090)	0.129

their fingers, and 8 participants (4.7%) used neem sticks or similar traditional materials.

Fluoridated toothpaste was used by 109 participants (63.7%), non-fluoridated toothpaste by 41 participants (24.0%), and 21 participants (12.3%) were unaware of the type of toothpaste they used. Additionally, 36 participants (21.1%) reported using traditional substances such as charcoal or ash for oral cleaning, while 135 participants (78.9%) denied such practices.

These findings indicate that a significant proportion of truck drivers engage in suboptimal oral hygiene practices, which may contribute to the development of oral precancerous lesions.

#### **Factors associated with Oral Precancerous Lesions**

Binary univariate logistic regression was done for all the factors. The predictor variables which came significant in univariate analysis at  $p$ -value  $< 0.25$ , were put in the final multivariable logistic model. Results are shown in Table 4.

#### **Discussion:**

The findings of this study shed light on several crucial factors potentially influencing a specific outcome among truck drivers. The investigation encompassed a range of variables, including age, socioeconomic status, truck driving experience, tobacco consumption, betel quid consumption, alcohol consumption, oral hygiene, and oral hygiene practice. The analysis yielded significant insights into the associations between these factors and the outcome of interest.

In West Bengal, the proportion of men aged 15 years and above who use any kind of tobacco is 48.1% according to the National Family Health Survey - 5 2019-20.<sup>[14]</sup> Tobacco consumption displayed a significant relationship with the outcome. Truck drivers who reported tobacco consumption exhibited significantly higher odds of experiencing the outcome. This finding underscores the well-established health risks associated with tobacco use and emphasises the importance of smoking cessation programmes and tobacco control measures targeted specifically at this occupational group.

The results of this study also suggest that oral hygiene is a significant determinant of oral precancerous lesions among truck drivers. People with poor oral hygiene were more likely to develop oral precancerous lesions than people with good oral hygiene. This finding is consistent with previous studies by Gupta et al.<sup>[15]</sup>, 2017, and Balaram et al.<sup>[16]</sup>, 2002, that have shown a link between poor oral hygiene and oral precancerous lesions.

The finding that oral hygiene practices suggested that the association between oral hygiene practices and oral precancerous lesions is not strong enough to be considered significant. This could be due to a number of factors, such as the way that oral hygiene practices were measured in this study. It is also possible that other factors, such as smoking or diet, play a more important role in the development of oral precancerous lesions.

Age emerged as a determinant for oral precancerous lesions. The data showed that older truck drivers were significantly less likely to suffer from oral precancerous lesions compared to their younger counterparts. Similar findings were found in a study conducted by Shetty et al.<sup>[3]</sup> among cab drivers in Bengaluru City, Karnataka. This finding underscores the importance of considering age as a relevant factor in understanding and addressing the issue at hand. It also raises questions about potential age-related factors, such as experience, health behaviours, or physiological differences, that might contribute to this observed association.

The borderline significance observed for betel quid consumption warrants attention, as it suggests a potential role in influencing the outcome. Likewise, the protective trend associated with alcohol consumption, although not statistically significant, raises questions about the moderation of alcohol's effects on health outcomes among this population. Further research with larger sample sizes may provide more clarity on these relationships.

#### **Conclusion:**

The study found that 14.0% (24 out of 171) of truck drivers in Kolkata had oral precancerous lesions, with

leukoplakia being the most common type. Tobacco consumption was reported by 68.4% of participants and emerged as a strong predictor for oral lesions (aOR = 24.12). Poor oral hygiene (aOR = 6.29) and longer duration of truck driving (aOR = 1.41 per year) were also independently associated with lesion occurrence. Conversely, increasing age was associated with a lower likelihood of having lesions (aOR = 0.012).

Although betel quid and alcohol consumption did not reach statistical significance in the multivariable model, they showed potential trends worth further investigation. These findings underscore the importance of integrating tobacco cessation, oral hygiene promotion, and routine oral screening into occupational health programs for truck drivers in urban logistics sectors.

#### **Limitations:**

It is essential to acknowledge the study's limitations, such as its cross-sectional design and the specific geographic location of the study. Further research is needed to establish causal relationships and generalise the findings to other truck driver populations.

#### **Recommendations:**

Based on the study findings showing a 14% prevalence of oral precancerous lesions and strong associations with tobacco use, poor oral hygiene, and longer occupational duration, targeted interventions are recommended. Workplace-based oral screening should be introduced at transport hubs to enable early identification and referral. Tobacco cessation programmes tailored for truck drivers are essential, given the high usage rate and strong link with lesion presence. Oral hygiene education and the distribution of low-cost, travel-friendly hygiene kits should be incorporated into outreach activities, as poor oral hygiene was an independent risk factor. Additionally, focused interventions should target younger drivers and those with longer driving experience, who were found to be at higher risk.

Establish workplace-based oral screening programmes within transport hubs and logistics

companies where truck drivers are stationed. Early identification of precancerous lesions at the workplace can facilitate timely referral and management, especially considering that drivers may have limited access to routine healthcare services.

Incorporate oral hygiene education and low-cost preventive tools (e.g., travel-friendly oral hygiene kits) into routine health outreach for drivers.

Target younger drivers and those with longer driving experience, both of whom were found to be at greater risk in the study. Peer-led sessions and behaviour change interventions may be particularly effective for these groups.

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