

## Prevalence of oral potentially malignant disorders in workers of Udupi taluk

Yeturu Sravan Kumar, Shashidhar Acharya, Kalyana Chakravarthy Pentapati

## Abstract

**Objective:** The objective was to assess the prevalence and risk factors of oral potentially malignant disorders (PMD) among industrial workers of Udupi taluk, Karnataka. **Materials and Methods:** The sample consisted of industrial workers aged >18 years from randomly selected industries in Udupi Taluk. A self-administered questionnaire was given to the participants to assess sociodemographic factors and abusive habits (Tobacco, Alcohol, and Betel quid) followed by clinical oral examination by single trained and calibrated examiner. **Results:** A total of 396 completed all steps of the survey and were included for analysis. A total of 14, 11.4, and 14.4% were tobacco, alcohol, and betel quid users, respectively. A total of 8.6% ( $n = 34$ ) have at least one PMD. A significantly higher number of participants with single (11.4%) or combined habits (60.4%) had oral lesions while none of the participants without habits reported any oral lesions ( $P < 0.001$ ). **Conclusion:** Prevalence of abusive habits and oral premalignant lesions or conditions was substantial among the workers. The cause and effect relationship and dose-response were also shown to be significantly associated. Prevention and early diagnosis through workplace screening are the major cornerstones for the control of oral cancer.

**Key words:** Alcohol, betel quid, disorders, premalignant, tobacco

## Introduction

Oral cancer is an important component of the worldwide burden of cancer and is eighth most common cancer worldwide. It is generally accepted that oral cancer may arise from potentially malignant disorders (PMD). The use of PMD's conveys that not all lesions and conditions described under this term may transform to cancer, instead there is a family of morphological alterations among which some may have an increased potential for malignant transformation.<sup>[1]</sup>

The prevalence of oral PMD's and their malignant transformation rates varies globally. The prevalence of oral submucous fibrosis (OSMF) ranged from 0.4% to 1.2%<sup>[2]</sup> and the frequency of malignant transformation has been reported to vary from 7.6% to 40%.<sup>[3,4]</sup> The prevalence of leukoplakia varied from 0.2% to 4.9%<sup>[5]</sup> while Petti<sup>[6]</sup> summarized the global prevalence to be 2.6%. The malignant transformation of leukoplakia range from 3.6% to 17.5%.<sup>[7-9]</sup> Erythroplakia is not as common as leukoplakia and has an incidence of 0.02–0.83%.<sup>[10]</sup> Villa *et al.*,<sup>[11]</sup> reported the global mean prevalence of oral erythroplakia to be 0.11% (0.01–0.21%). All erythroplakia cases show some degree of epithelial dysplasia in which 51% were invasive squamous cell carcinoma, 40% were carcinoma *in situ* or severe epithelial dysplasia and 9% were mild-to-moderate dysplasia.<sup>[12]</sup> A malignant transformation rate of 14.3–66.7% was reported by Villa *et al.*,<sup>[11]</sup> A prevalence of 9.5% was reported for palatal lesions of reverse smokers and has been associated with a significant risk of malignant transformation.<sup>[13]</sup>

There is no single cause of oral cancer and it results from a variety of factors that operate over time and is dependent on each individual's response to these factors. The most important risk factors are tobacco and alcohol consumption and up to 75% of oral cancers could be attributed to them. A causal role in the etiology of oral cancer has been established for tobacco use both smoking and chewing, separately, and in conjunction with betel quid chewing and alcohol drinking.<sup>[14-17]</sup>

Despite numerous advances in surgery, radiation, and chemotherapy, the 5-year survival rate for oral cancer has not

improved significantly over the past several decades.<sup>[18]</sup> As survival is directly related to stage at diagnosis, prevention and early detection have the potential for decreasing the incidence and improving the survival rates.

Despite the fact that the oral cavity is accessible for visual examination, and oral cancers, and premalignant lesions have well-defined clinical diagnostic features, oral cancers are typically detected in their advanced stages. Oral cancer is a potentially preventable disease, but the lack of awareness coupled with a delay in diagnosis generally results in the presentation of these lesions in their advanced stages. In India, 60–80% of patients present with advanced stages of the disease as compared to 40% in developed countries.<sup>[19]</sup>

The screening for PMD's helps in the early detection and intervention, which would substantially reduce the burden of illness for both individual and community. Several large population-based oral cancer screening programs have been carried out, either as opportunistic or as population-wide screenings which have confirmed the effectiveness of screening to detect oral PMD's. A study from India demonstrated that oral cancer screening by trained health workers can lower mortality of the disease especially in individuals with a history of tobacco use.<sup>[20]</sup>

Industrial workers are known to be at risk of oral malignant and PMD's due to exposure to potential risk factors such as smoking/chewing tobacco-related products and alcohol which may be due to the poor standard of living, lifestyle, socioeconomic status, increased stress.<sup>[21]</sup> Industrial workers who were employed during the day, may not visit the screening centers or be at home during the day of screening by the health care professionals. Hence, workplace screening programs for detection of oral malignant and premalignant lesions and conditions in these groups is suitable and cost-effective alternative measure.<sup>[22]</sup>

Using employees in different settings, oral cancer and precancer as well as related risk factors have been evaluated by a number

## Access this article online

Quick Response Code:



Website: www.sajc.org

DOI: 10.4103/2278-330X.173177

Department of Public Health Dentistry, Manipal College of Dental Sciences, Manipal University, Manipal, Karnataka, India

**Correspondence to:** Dr. Kalyana Chakravarthy Pentapati,

E-mail: drkalyan81@gmail.com

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.

**For reprints contact:** reprints@medknow.com

**How to cite this article:** Kumar YS, Acharya S, Pentapati KC. Prevalence of oral potentially malignant disorders in workers of Udupi taluk. South Asian J Cancer 2015;4: 130-3.

of investigators.<sup>[23,24]</sup> Very few studies have been reported in the literature that have assessed the prevalence of PMD's in industrial workers and no previous studies were conducted in Udupi taluk. Hence, we aimed to evaluate the prevalence and risk factors of PMD's among industrial workers of Udupi taluk.

## Materials and Methods

We conducted a study to assess the prevalence and risk factors of oral PMD in industrial workers in Udupi taluk from January to May, 2013. Udupi is one of the three taluks of Udupi district in the Southern Indian state of Karnataka, situated along the west coast of the Indian peninsula. The sample was selected from factories present in the industrial area in Udupi taluk.

The study was approved by Kasturba Hospital Ethics Committee, Kasturba Hospital, Manipal University, Manipal, India (IEC 41/2013). The list of industries in Udupi taluk area was made with information provided by the workers association (District Small scale Industrial Association, Udupi) after which appropriate permissions were obtained to conduct the screening of the employees. Only factories ( $n = 53$ ) which provided permissions were approached. The workers who were present at the time of examination were invited to participate and were briefed about the purpose of the survey and informed consent was obtained for all the participants. Only subjects who were residents of Udupi taluk, aged  $\geq 18$  years, present at the time of examination were included in the study. The sample size was calculated to be a minimum of 384 subjects after assuming a prevalence of 50% with a precision of 90%.

A self-reported questionnaire was designed to assess the sociodemographic and behavioral factors like age, gender, religion, income, education, tobacco, alcohol, and betel quid usage (frequency per day and duration of usage). The utilization of dental services was assessed by asking the participant "Have you visited dentist before?" If yes, "when was the last dental visit?" and purpose of dental visit.

One trained and calibrated examiner conducted all clinical examinations with the trained recorder recording the observations. Before conducting the survey, training was carried out for the examiner and the recorder in Comprehensive Dental Care Centre of Department of Public Health Dentistry, Manipal.

All the subjects were asked to rinse their mouth prior to the examination. The examiner was blinded for the participant's responses in the questionnaires. Two mouth mirrors were used for the examination. Digital palpation of the mucosa was done to gain an idea of the texture of the oral mucosa, using necessary precautions. Any participants wearing dentures were requested to remove them before starting the examination. A thorough oral examination was performed as per the guidelines.<sup>[25]</sup>

Following oral examination, the participants were provided oral health education pamphlets for raising their awareness on oral hygiene and ill effects of tobacco use. The participants who required dental treatment were given referral cards and were encouraged to avail free treatment at Manipal College of Dental Sciences, Manipal.

## Statistical analysis

All the analysis was carried out using the Statistical Package for Social Sciences (SPSS version 16.0, SPSS Inc., Chicago, South Asian Journal of Cancer ♦ July-September 2015 ♦ Volume 4 ♦ Issue 3

IL, USA). A  $P \leq 0.05$  was considered statistically significant. Age was categorized using median split procedure ( $\leq 40$  and  $>40$  years). Education and income of the participants were categorized based on modified Kuppusswamy scale.<sup>[26]</sup> Analysis of habits was done for individual habits (tobacco or alcohol or betel quid) and combined habits (tobacco + alcohol or alcohol + betel quid or tobacco + betel quid or all 3). Chi-square test was used compare categorical variables. The mean frequency per day and duration in years of tobacco, alcohol, and betel quid usage was compared using Mann-Whitney U-test.

## Results

A total of 430 people were invited to participate in the study, out of which 396 (85.8%) completed all steps of the survey and were included for analysis. The mean age of the participants was  $31.23 \pm 9.78$  years (18–70). A total of 204 (51.5%) were  $\leq 40$  years and 231 (58.3%) were males. Majority of the participants were Hindu by religion (66.4%) followed by Christians (22.7%). Almost half of the participants (46.5%) completed high school education with only a few participants having primary school (4.5%) and graduation (3%) education. Majority of the participants had income ranged between 4556 and 7593 Indian rupees (52.8%) [Table 1].

A total of 14, 11.4 and 14.4% were tobacco, alcohol, and betel quid users, respectively. Cigarette (38.6%) and Gutka (29.8%) were the most common type of tobacco consumed by the study participants. Smoking (49.1%) and smokeless (50.9%) forms of tobacco were almost equally prevalent among the study participants.

One-fourth of the study participants (23.2%) had some form of abusive habits. A total of 11.1 and 12.1% of the study participants had single habit (tobacco or alcohol or betel quid) and multiple combined habits (either tobacco + alcohol or alcohol + betel quid or tobacco + betel quid or all), respectively.

A total of 88.6% of the study participants had normal mucosa. Leukoplakia (3%) and OSMF (3.5%) were the

**Table 1: Comparison of sociodemographic characteristics of study participants with respect to oral PMD**

Sociodemographic characteristics	Oral mucosal condition (n (%))		P
	Normal (n=365)	PMD (n=34)	
Age (years)			
$\leq 40$	189 (52.2)	15 (44.1)	0.367
$>40$	173 (47.8)	19 (55.9)	
Gender			
Male	198 (54.7)	33 (97.1)	<0.001
Female	164 (45.3)	1 (2.9)	
Education			
Up to middle	78 (21.5)	17 (50.0)	0.001
High	175 (48.3)	9 (26.5)	
Intermediate and above	109 (30.1)	8 (23.5)	
Income (INR)			
1521-4555	33 (9.1)	2 (5.9)	0.854
4556-7593	190 (52.5)	19 (55.9)	
7597-11,361	96 (26.5)	10 (29.4)	
11,362-15,187	43 (11.9)	3 (8.8)	

PMD=Potentially malignant disorders, INR=Indian rupees

commonly prevalent mucosal conditions seen among the study participants followed by Smokers palate (1.8%) and Geographic tongue (1.5%). Very few participants had Frictional keratosis (0.8%) and Erythroplakia (0.3%). A total of 8.6% ( $n = 34$ ) reported to have PMD's (Leukoplakia, Erythroplakia, OSMF, and Smokers palate) among the study participants.

No significant difference was seen in the distribution of habits when compared with age ( $P = 0.569$ ) and income ( $P = 0.096$ ) categories. The prevalence of habits was significantly higher in males (94.6%) than females (5.4%) ( $P < 0.001$ ). A significantly higher number of participants with habits had middle (38%) or high school (33.7%) when compared to participants without habits ( $P = 0.001$ ).

No significant difference was seen in the distribution of participants in prevalence of PMD's when compared with age ( $P = 0.367$ ) and income ( $P = 0.854$ ) categories. The prevalence of PMD's was significantly higher in males (97.1%) than females (2.9%) ( $P < 0.001$ ). A significantly higher number of participants with PMD's had middle (50%) or high school (26.3%) when compared to participants without habits ( $P = 0.001$ ). A significantly higher number of participants with single (11.4%) or combined habits (60.4%) had PMD's while none of the participants without habits reported any PMD's ( $P < 0.001$ ) [Table 1].

The mean frequency of tobacco consumption per day and duration in years in participants with PMD's was significantly higher as compared to with normal oral mucosa ( $P = 0.001$  and  $P < 0.001$ ), respectively. The mean mL of alcohol consumption per day was in participants with PMD's was significantly higher as compared in participants with normal oral mucosa ( $P = 0.002$  and  $0.002$ ), respectively. The mean number of years of betel quid consumption was  $9.73 \pm 8.82$  in participants with PMD's which was significantly higher as compared to  $6.17 \pm 5.95$  in participants with normal oral mucosa ( $P = 0.04$ ) [Table 2].

## Discussion

Our study reported the prevalence of habits and PMD's among the industrial workers of Udupi district. It was seen that the prevalence of habits and PMD's was substantial among the workers. The cause and effect relationship and dose-response were also shown to be significantly associated.

**Table 2: Comparison of frequency and duration of tobacco, alcohol and betel quid usage with respect to the condition of oral mucosa**

Type of habit	Oral mucosa				P
	Normal		PMD		
	Mean	SD	Mean	SD	
Tobacco					
Frequency/day	2.47	2.33	5.44	4.96	0.001
Mean number of years	2.96	2.59	8.22	8.82	<0.001
Alcohol					
mL/day	50.00	25.33	75.00	22.83	0.002
Mean number of years	4.12	4.49	7.50	5.35	0.002
Betel quid					
Frequency/day	4.47	4.93	6.42	5.49	0.119
Mean number of years	6.17	5.95	9.73	8.82	0.04

PMD=Potentially malignant disorders, SD=Standard deviation

The overall prevalence of PMD's was high (8.6%) in our study population. The prevalence of Leukoplakia was 3%, which was similar to studies reported earlier<sup>[5,6,27-29]</sup>, whereas it was higher than studies reported by Reichart *et al.*<sup>[30]</sup> Bánóczy and Rigó<sup>[31]</sup>. The prevalence of OSMF was 3.5% which was higher than that reported in previous studies.<sup>[32]</sup> Erythroplakia was prevalent in 0.3% and was similar to that in the previous studies.<sup>[10,11,29]</sup> Overall, the prevalence of various PMD's was almost similar to the previous studies reported but slight discrepancies were obtained due to differential habit prevalence and usage patterns. Furthermore, our study was done in specified target population, which was different from other studies where sampling frame was from the general population. Hence, direct extrapolation of the result may not be feasible.

One-fourth of the study participants (23.2%) had some form of abusive habits. A total of 11.1 and 12.1% of the study participants had single habit (tobacco or alcohol or betel quid) and multiple combined habits, respectively.

Horowitz *et al.*,<sup>[33]</sup> in their review stated that delays in identification and recognition of suspicious lesions are major contributors for advanced stage at diagnosis and poorer survival rates. They also highlighted that prevention and early diagnosis are major cornerstones for the control of oral and oropharyngeal cancer.

The need for continuing educational campaigns at various levels to educate the public about the risk factors and early signs/symptoms was also highlighted. Health care workers must be encouraged to perform oral cancer examinations as part of their patient care regime, and to be knowledgeable about early signs of oral cancer and premalignant disorders.

Workplace screening programs for detection of oral malignant and premalignant disorders in these groups is suitable and cost-effective alternative measure and emphasis should be given to the management of the industries for organizing regular screening of oral and general health.<sup>[22]</sup> Effective utilization of existing infrastructure and manpower through involvement of medical and dental colleges in the areas can also help in screening and early diagnosis. Industries should be promoted to ban sale and use of tobacco related products in around the workplace which would decrease the usage of the product and overall might reduce the disease prevalence and severity of the oral premalignant and malignant lesions.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

## References

- Barnes L, Eveson JW, Reichart P, Sidransky D. World Health Organization Classification of Tumours. Pathology and Genetics of Head and Neck Tumours. New Delhi, India: International Agency for Research on Cancer (IARC) IARC Press; 2005. p. 177-9.
- Pindborg JJ, Mehta FS, Gupta PC, Daftary DK. Prevalence of oral submucous fibrosis among 50,915 Indian villagers. *Br J Cancer* 1968;22:646-54.
- Murti PR, Bhonsle RB, Pindborg JJ, Daftary DK, Gupta PC, Mehta FS. Malignant transformation rate in oral submucous fibrosis over a 17-year period. *Community Dent Oral Epidemiol* 1985;13:340-1.
- Wahi PN, Kapur VL, Luthra UK, Srivastava MC. Submucous fibrosis of the oral cavity 1. Clinical features. *Bull World Health Organ* 1966;35:789-92.



5. Mehta FS, Pindborg JJ, Gupta PC, Daftary DK. Epidemiologic and histologic study of oral cancer and leukoplakia among 50,915 villagers in India. *Cancer* 1969;24:832-49.
6. Petti S. Pooled estimate of world leukoplakia prevalence: A systematic review. *Oral Oncol* 2003;39:770-80.
7. Pindborg JJ, Jolst O, Renstrup G, Roed-Petersen B. Studies in oral leukoplakia: A preliminary report on the period prevalence of malignant transformation in leukoplakia based on a follow-up study of 248 patients. *J Am Dent Assoc* 1968;76:767-71.
8. Roed-Petersen B. Cancer development in oral leukoplakia: Follow-up of 331 patients. *J Dent Res* 1971;50:711.
9. Silverman S Jr, Gorsky M, Lozada F. Oral leukoplakia and malignant transformation. A follow-up study of 257 patients. *Cancer* 1984;53:563-8.
10. Reichart PA, Philipsen HP. Oral erythroplakia - A review. *Oral Oncol* 2005;41:551-61.
11. Villa A, Villa C, Abati S. Oral cancer and oral erythroplakia: An update and implication for clinicians. *Aust Dent J* 2011;56:253-6.
12. Shafer WG, Waldron CA. Erythroplakia of the oral cavity. *Cancer* 1975;36:1021-8.
13. Pindborg JJ, Mehta FS, Gupta PC, Daftary DK, Smith CJ. Reverse smoking in Andhra Pradesh, India: A study of palatal lesions among 10,169 villagers. *Br J Cancer* 1971;25:10-20.
14. Takezaki T, Hirose K, Inoue M, Hamajima N, Kuroishi T, Nakamura S, *et al.* Tobacco, alcohol and dietary factors associated with the risk of oral cancer among Japanese. *Jpn J Cancer Res* 1996;87:555-62.
15. Merchant A, Husain SS, Hosain M, Fikree FF, Pitiphat W, Siddiqui AR, *et al.* Paan without tobacco: An independent risk factor for oral cancer. *Int J Cancer* 2000;86:128-31.
16. Znaor A, Brennan P, Gajalakshmi V, Mathew A, Shanta V, Varghese C, *et al.* Independent and combined effects of tobacco smoking, chewing and alcohol drinking on the risk of oral, pharyngeal and esophageal cancers in Indian men. *Int J Cancer* 2003;105:681-6.
17. Yang YH, Lien YC, Ho PS, Chen CH, Chang JS, Cheng TC, *et al.* The effects of chewing areca/betel quid with and without cigarette smoking on oral submucous fibrosis and oral mucosal lesions. *Oral Dis* 2005;11:88-94.
18. Silverman S Jr. Demographics and occurrence of oral and pharyngeal cancers. The outcomes, the trends, the challenge. *J Am Dent Assoc* 2001;132 Suppl: 7S-11.
19. Kekatpure V, Kuriakose MA. Oral cancer in India: Learning from different populations. *Cancer Prev* 2010; Available from: [http://www.nypcancerprevention.com/archive\\_newsletter/issue/14/cancer\\_prevention/feature/india.shtml](http://www.nypcancerprevention.com/archive_newsletter/issue/14/cancer_prevention/feature/india.shtml) [Last accessed on 2015 Mar 27].
20. Sankaranarayanan R, Ramadas K, Thomas G, Muwonge R, Thara S, Mathew B, *et al.* Effect of screening on oral cancer mortality in Kerala, India: A cluster-randomised controlled trial. *Lancet* 2005;365:1927-33.
21. Warnakulasuriya KA, Johnson NW. Epidemiology and risk factors for oral cancer: Rising trends in Europe and possible effects of migration. *Int Dent J* 1999;46:245-50.
22. Warnakulasuriya S, Kashyap R, Dasanayake AP. Is workplace screening for potentially malignant oral disorders feasible in India? *J Oral Pathol Med* 2010;39:672-6.
23. Nagao T, Warnakulasuriya S, Gelbier S, Yuasa H, Tsuboi S, Nakagaki H. Oral pre-cancer and the associated risk factors among industrial workers in Japan's overseas enterprises in the UK. *J Oral Pathol Med* 2003;32:257-64.
24. Downer MC, Evans AW, Hughes Hallett CM, Jullien JA, Speight PM, Zakrzewska JM. Evaluation of screening for oral cancer and precancer in a company headquarters. *Community Dent Oral Epidemiol* 1995;23:84-8.
25. Kramer IR, Pindborg JJ, Bezroukov V, Infirri JS. Guide to epidemiology and diagnosis of oral mucosal diseases and conditions. World Health Organization. *Community Dent Oral Epidemiol* 1980;8:1-26.
26. Kumar N, Gupta N, Kishore J. Kuppuswamy's socioeconomic scale: Updating income ranges for the year 2012. *Indian J Public Health* 2012;56:103-4.
27. Bouquot JE. Common oral lesions found during a mass screening examination. *J Am Dent Assoc* 1986;112:50-7.
28. Axéll T. Occurrence of leukoplakia and some other oral white lesions among 20,333 adult Swedish people. *Community Dent Oral Epidemiol* 1987;15:46-51.
29. Ikeda N, Ishii T, Iida S, Kawai T. Epidemiological study of oral leukoplakia based on mass screening for oral mucosal diseases in a selected Japanese population. *Community Dent Oral Epidemiol* 1991;19:160-3.
30. Reichart PA, Mohr U, Srisuwan S, Geerlings H, Theetranont C, Kangwanpong T. Precancerous and other oral mucosal lesions related to chewing, smoking and drinking habits in Thailand. *Community Dent Oral Epidemiol* 1987;15:152-60.
31. Bánóczy J, Rigó O. Prevalence study of oral precancerous lesions within a complex screening system in Hungary. *Community Dent Oral Epidemiol* 1991;19:265-7.
32. Ikeda N, Handa Y, Khim SP, Durward C, Axéll T, Mizuno T, *et al.* Prevalence study of oral mucosal lesions in a selected Cambodian population. *Community Dent Oral Epidemiol* 1995;23:49-54.
33. Horowitz AM, Goodman HS, Yellowitz JA, Nourjah PA. The need for health promotion in oral cancer prevention and early detection. *J Public Health Dent* 1996;56:319-30.

## Staying in touch with the journal

### 1) Table of Contents (TOC) email alert

Receive an email alert containing the TOC when a new complete issue of the journal is made available online. To register for TOC alerts go to [www.sajc.org/signup.asp](http://www.sajc.org/signup.asp).

### 2) RSS feeds

Really Simple Syndication (RSS) helps you to get alerts on new publication right on your desktop without going to the journal's website. You need a software (e.g. RSSReader, Feed Demon, FeedReader, My Yahoo!, NewsGator and NewzCrawler) to get advantage of this tool. RSS feeds can also be read through FireFox or Microsoft Outlook 2007. Once any of these small (and mostly free) software is installed, add [www.sajc.org/rssfeed.asp](http://www.sajc.org/rssfeed.asp) as one of the feeds.