pISSN: 0976 3325 eISSN: 2229 6816

ORIGINAL ARTICLE

ORAL PREMALIGNANT LESIONS ASSOCIATED WITH ARECA NUT AND TOBACCO CHEWING AMONG THE TOBACCO INDUSTRY WORKERS IN AREA OF RURAL MAHARASHTRA

Kawatra Abhishek[1], Lathi Aniket[2], Kamble Suchit V[3], Sharma Panchsheel[4], Parhar Gaurav[5]

[1]Asstistant Professor, Department of community Medicine, GAIMS Bhuj Gujarat, [2]Assistant Professor, Department of ENT, Rural Medical College, PIMS-DU, Loni, Maharashtra, [3]Associate Professor, Department of community Medicine, KVG Medical College, Sulai [4]Assistant Professor, Department of community Medicine, Rural Medical College, PIMS-DU, Loni, Maharashtra, [5]MBBS, Pravara Institute of Medical sciences

ABSTRACT

Background: The visualization of independent adverse health effects of chewing tobacco and areca nut compounds rather than "smokeless tobacco" were intended to study among chewing tobacco industry workers. The present study conducted to estimate the prevalence and the strength of association with premalignant lesions with regards to duration and frequency of consumption.

Methods: A cross-sectional camp approach with multi-phasic screening of the 1414 workers was adopted in the study. Structured close ended questionnaire was used to gather the Socio-demographic and eating habits of various forms of tobacco and areca nut compounds. Clinical screening by oral examination was followed by staining with iodine and acetic acid (decolourizing agent) for diagnosis of premalignant oral lesions. Mean percentage proportion and chi square test of significance were used for data analysis.

Results: Among total chewing study population, tobacco chewers (67.01%) were approximately twice of the Areca nut chewers (32.99%). The association between Areca nut chewers, tobacco chewers and non chewers with respect to development of oral lesion was highly significant. The areca nut chewers (3.28%) outnumbered the Tobacco chewers (2.69%) in age group of less than 25 years. 86.88% of oral lesions were due to Arecanut related compounds with in duration of 10 years and frequency of 5 times, which is greater than due to tobacco chewing (54.31%)

Conclusion: Areca nut compounds have the potential like tobacco in producing oral lesions, with the most adverse effect among the young generation which is consuming Gutka (areca nut compound). Periodical Oral health examination and behaviour change communication strategies to sensitize these individuals plays a key role in refraining them from these "Flavored addictive carcinogens".

Key words: Areca-nut, tobacco industry, oral premalignant lesions.

BACKGROUND

India, country with diverse cultures, health beliefs, practices, habits and risk factors for disease is facing epidemiological and demographic translation in arena of rise of Non communicable diseases. The use of tobacco and areca nut in various forms is very popular here (International Agency for Research on Cancer, 2004). Areca nut has a long history of use and is deeply ingrained in many socio-cultural and religious activities.[1] Gutka(Areca nut compound) is a commercially powdered mixture containing the same ingredients as paan with mock tail of various chemical carcinogenic compounds. Regular use of these leads to oral cancer and precancerous conditions[2]. The most important consideration is the relation between areca nut use and the development of mouth cancer (oral squamous cell carcinoma) and its precursor's leukoplakia and sub mucous fibrosis[3-4]. Prevalence of oral leukoplakia in India varies from 0.2%-5.2%.[5-6,7-8]

Oral Sub Mucous Fibrosis (OSMF) is characterized by loss of oral mucosa elasticity and development of fibrous bands[9]. The prevalence of OSMF in India varies between 0.03% and 3.2% according to various studies conducted here[5-8,10-11]. The disease is precancerous' and carries a high relative risk (397.3 after controlling for tobacco use) for malignant transformation[12].

Urvish Joshi et al[13] of Jamnagar district of Gujrat reported about 37.2% of study population (2513 individuals) was ever-tobacco-chewers. Mawa-masala (63.7%) and Gutka (57.6%) were preferred forms of chewing tobacco in their observation. Rajnarayan R. Tiwari et al[14] of Nagpur city Maharashtra observed 43.4% of study population (1168) using tobacco in form of chewing.

Various researchers have conducted the studies among special groups like Medical students [15] Loom workers[16], but data in tobacco industry is constraint. These individuals are of special interest because of free access to chewing tobacco. Moreover the "Smokeless tobacco" consists of tobacco and areca nut products and has been labeled as carcinogenic. But the individual health effects of these two groups have not been studied extensively. So, primarily this study was designed to further classify this group to visualize the health effects caused by them independently. This will also help in estimation of the prevalence of Tobacco and areca nut consumers and detect the cases of premalignant conditions with regard to duration and frequency of its consumption.

METHODOLOGY

The present cross-sectional study was conducted in tobacco industry at sangamner (Maharashtra) from August to September 2011. This place is approx 30km from religious pilgrimage Sai Baba Shirdi temple (nationally renowned). Purposive sampling was adopted for choosing the tobacco industry and all the employees employed in various processing units were enrolled in the study with involving those working on shift duties also. The tobacco industry was informed about the health check camps for next few days. This was done for the enrollment of the maximum number of employees in the study. Total employees were 1450, out of which 1414 attended the camp and accounted for the sample size. Multiphasic screening was the adopted criteria for screening, after the acceptance of written consent from the study population. Total of 60 individuals were interviewed daily on basis of pre-structured and predesigned questionnaire by the principal Investigator which accounted to 24 days to screen the total study population. Concurrently these individuals were than examined by ENT surgeon for any clinical lesion in oral cavity. This accounted for the clinical screening criteria. The individuals with clinical lesions were than stained with Toludine blue (colorizing agent) and acetic acid (decolorizing agent) with appropriate aseptic technique for diagnosing the cases of precancerous conditions.

Data was collected using questionnaire including the socio-demographic information and the consumption of various forms of plain tobacco (mishri, tobacco, mashari) and areca nut related products with or without tobacco like gutka, supari, Pan masala, with additional information of the frequency and duration of consumption.

The data was tabulated in Microsoft excel sheet on daily basis and was than analyzed using SYSTAT statistical software. Mean percentage and proportion were analysed before tabulation of data. Statistical test to measure the strength of association for qualitative data (Chi square) was applied.

RESULT AND DISCUSSION

The smokeless Tobacco group was classified into Areca nut related compounds and tobacco chewing. Various researchers have reported the effects of whole smokeless tobacco group rather than the division which was included in the present study. So a comparison between the present study and other researchers work was tedious.

The overall prevalence of Tobacco chewers, Areca nut related compounds and Non Chewers was estimated at 650 (45.97%), 320 (22.63%) and 444 (31.4%) respectively among the total study population. If we consider only total chewing study population it was observed that the tobacco chewers (67.01%) were approximately twice of the Areca nut chewers (32.99%). **(Table 1)** The tobacco industry employees have the free access to chewing tobacco rather than areca nut was the reason for more number of individuals consuming tobacco. The study on Power loom workers reported the prevalence of Tobacco

chewing population as 66.07% by Zaki Anwar Ansari et al. [16]. This shows that tobacco chewing is more common among employees in comparision to areca nut.

Table 1: Socio demographic profile of study participants

Age in years (n=1414)	Plain Chewing Tobacco (%)	Compounds containing areca nut (%)	Non chewers (%)	Total (%)
<25	38 (2.69%)	54 (3.82%)	62 (4.38%)	154(10.89%)
≥25 to <30	84 (5.94%)	70 (4.95%)	76 (5.37%)	230(16.26%)
≥30 to <35	114 (8.06%)	92 (6.51%)	86 (6.08%)	292(20.65%)
≥35 to <40	150 (10.61%)	50 (3.54%)	90 (6.36%)	290 (20.51%)
≥40 to <45	136 (9.62%)	20 (1.41%)	74 (5.23%)	230 (16.26%)
≥45 to <50	74 (5.23%)	16 (1.13%)	40 (2.83%)	130 (9.19%)
≥50	54 (3.82%)	18 (1.27%)	16 (1.13%)	88 (6.22%)
Gender (n=1414)				
Male	464 (32.81%)	314 (22.21%)	330 (23.34%)	1108 (78.36%)
Female	186 (13.16%)	6 (0.42%)	114 (8.06%)	306 (21.64%)
Socio Economic status (n=1414)				
Class I	38 (2.69%)	38 (2.69%)	200 (14.14%)	276 (19.52%)
Class II	342 (24.19%)	152 (10.75%)	150 (10.61%)	644 (45.54%)
Class III	206 (14.57%)	94 (6.65%)	84 (5.94%)	384 (27.16%)
Class IV	34 (2.40%)	30 (2.12%)	4 (0.28%)	68 (4.80%)
Class V	30 (2.12%)	6 (0.42%)	6 (0.42%)	42 (4.96%)
Duration in years tobacco chewers (n=650)				
≥1 to <5	162 (24.92)	Mean years duration=7.22 years		
≥5 to <10	130 (20.00)			
≥10 to <15	134 (20.62)			
≥15 to <20	68 (10.46)			
≥20	156 (24.00)			
Frequency/day of tobacco chewers(n=650)				
1-5	440 (67.69)	Mean frequency= 3.40 times		
6-10	168 (25.85)			
11 and above	42 (6.46)			
Duration in years Areca nut and related products chewers (n=320)				
≥1 to <5	190 (59.37)	Mean years duration=1.06 years		
≥5 to <10	90 (28.13)			
≥10 to <15	28 (8.74)			
≥15 to <20	10 (3.13)			
≥20	2 (0.63)			
Frequency/day Areca nut and related products chewers (n=320)				
1-5	192 (60.00)	Mean frequency=0.84 times		
6-10	94 (29.37)			
11 and above	34 (10.63)			

The individuals consuming areca nut related compounds and tobacco were maximum in the age group of 30 to 40 years(10.05%) (Table 1), whereas Harayana study by Krishnan A et al[17] reported the maximum use at 45-54 years. There may be the possibility that either the individuals of young age are now predisposed to these compounds or there may be a cultural difference between the two states in pattern of consumption.

Males predominance was observed in comparison to females (3.6:1) among the total study participants (Table 1). Vellappaly S et al[18] in cross sectional study observed the ratio of 2.58:1. Prevalence of tobacco chewing among Males and females was 32.81% and 13.16%, whereas a high prevalence among man (53%) and women (49%) of Pune (Maharashtra) was reported by Mehta FS et al[5]. This is due to the fact that independent factors were not studied as have been adopted in present study.

Tobacco chewing was more common among the lower class (19.09%) in comparison to areca nut chewing (9.19%)(Table 1), which is in accordance to findings of BK Gupta et al.[19]

Table 2: Profile of oral lesions among study participants

Oral Lesion Substance	*LkP (%)	Keratosis (%)	**OSMF (%)	Keratosis + OSMF (%)	Keratosis + LKP (%)	LKP + OSMF (%)	Total (%)
Duration (yrs)							
Tobacco chewers (n=586)							
≥1 to <5	16 (11.94)	116 (86.57)	2 (1.49)	0	0	0	134 (100)
≥5 to <10	38 (31.66)	80 (66.67)	2 (1.67)	0	0	0	120 (100)
≥10 to <15	24 (19.67)	98 (80.33)	0	0	0	0	122 (100)
≥15 to <20	26 (39.39)	40 (60.61)	0	0	0	0	66 (100)
≥20	80 (55.55)	62 (43.05)	2 (1.40)	0	0	0	144 (100)
Total	184 (31.40)	396 (67.58)	6 (1.02)	0	0	0	586 (100)
Areca nut and related products chewers (n=298)							
≥1 to <5	18 (10.35)	22 (12.65)	86 (49.42)	16 (9.19)	2 (1.16)	30 (17.24)	174 (100)
≥5 to <10	8 (9.30)	2 (2.32)	36 (41.86)	20 (23.26)	0	20 (23.26)	86 (100)
≥10 to <15	0	0	20 (71.44)	4 (14.28)	0	4 (14.28)	28 (100)
≥15 to <20	0	0	4(50)	2 (25)	0	2 (25)	8 (100)
≥20	0	0	0	2 (100)	0	0	2 (100)
Total	26 (8.72)	24 (8.05)	146 (49.0)	44 (14.77)	2 (0.67)	56 (18.79)	298 (100)
NonChewers	6 (30)	12 (60)	2 (10)	0	0	0	20 (100)

***Leukoplakia, **Oral Submucous Fibrosis**

The areca nut chewers (3.28%) outnumbered the Tobacco chewers (2.69%) in age group of less than 25 years (Table 1). It was observed that with increase in age i.e more than twenty five, the individuals consuming areca nut related compounds decreases. With respect to duration, decreasing percentage of Areca nut related compounds chewers was observed with increase in duration (years) of exposure i.e. more individuals at start of 1-<5 years (59.37%) to (0.63%) at a duration of more than 20 years (Table 1). Thus the younger population is consuming more areca nut compounds or the mortality due to complications of premalignant lesions is early. There may be possibility of easy availability, at a low price, with good fragrance that the younger generation is fond of areca nut related compounds like gutka and older for tobacco only.

Oral lesion Keratosis accounted at 67.58% and 8.05% among tobacco and areca nut related compound chewers respectively (Table 2). No mixed oral lesions were evident among these two groups. Maximum of 86.5% of tobacco chewers had the Keratosis lesion within five years. (Table 2) The present study findings are consistent with the result of George E Kaugars et al [20] which assumes the development of lesion within two years of Smokeless Tobacco use as a whole group.

Prevalence of OSMF among the employees of tobacco industry population was estimated at 18.89% (Table 2) which is comparatively higher than observed by P C Gupta (3.2%) among the general population of Bhavnagar, Gujarat[21]. This variation may be attributed to specific population and regional/cultural differences on pattern of consumption between the two states. The individuals chewing Areca nut related compounds had the maximum manifestation of OSMF at 146 (49%) (Table 2).Similarly, high percentage of individuals (66.5%) consuming these compounds was reported by shruti pandya et al [22]. It is evident from the Table II that approximately half i.e.49.42% of the total individuals of areca nut related oral lesion of duration less than five years, manifests with OSMF. In consistent to the present study Shah N et al reported that Pan masala (without tobacco) chewers developed the condition in about half the time compared to quid users with 75% of the pan masala chewers developing the disease within 4.5 years[23].

The overall prevalence of leukoplakia in the present study is estimated at 15.27%. This premalignant condition was observed in 31.40% and 8.72% among tobacco and areca nut related compound chewers in tobacco industry (Table 2). Mehta et al. observed 3.48% of these lesions among Mumbai police but has not segregated the group of smokeless tobacco [24]. The leukoplakia was more evident in Tobacco and areca nut related compounds chewers than Non chewers (Table 2) which are in accordance to MN Shiu et al[25]. Their findings even suggested that elimination of betel nut influence may prevent 62% cases of leukoplakia and 26% of cases of malignant transformation to oral carcinoma.

Oral pre malignant lesions were estimated at 20 out of 1411 (1.41%) among Non chewers (Table 2), which is similar to findings reported by Gigi Thomas et al in Kerala case control study [26].

The association between Areca nut chewers, tobacco chewers and non chewers with respect to development of oral lesion was highly significant (Table 3), which is in accordance to George et al for smokeless tobacco group as a whole[20].

Table 3: Association between chewers, non chewers and oral lesions

	Oral lesion present (%)	Oral lesion absent (%)	Total (%)	χ^2	P value
Areca nut compound chewer	298(21.08)	22 (1.55)	320 (22.63)	151.43	P<0.0001*
Tobacco chewer	586 (41.44)	64 (4.53)	650 (45.97)	358.72	P<0.0001*
Non chewers	20 (1.41)	424 (29.99)	444 (31.40)	992.1	P<0.0001*
Total	904 (63.93)	510 (36.07)	1414 (100)		

*significant

Table 4: Association between type of lesions with frequency and duration of consumption of Tobacco and Areca nut related compounds

Frequency / Duration	1 to 5		6 to 10		11 and above	
	Tobacco lesion (n=394) (%)	Areca lesion (n=244) (%)	Tobacco lesion (n=154) (%)	Areca lesion (n=54) (%)	Tobacco lesion (n=38) (%)	Areca nut lesion (n=8) (%)
≥1 to <10	214 (54.31)	212 (86.88)	34 (22.08)	44 (95.65)	6 (15.79)	4 (50)
≥10	180 (45.69)	32 (13.12)	120 (77.92)	2 (4.35)	32 (84.21)	4 (50)
P value	<0.0001*		<0.0001*		0.03*	

*Significant

There is significant association between duration and frequency of 1-5 times ($\chi 2$ =72.04, d. f=1,p<0.0001) , 6-10 times ($\chi 2$ =80.59, d. f=1, p<0.0001) and 11or more times ($\chi 2$ =4.52, d. f=1 ,p=0.03) of tobacco and areca nut related lesions. (Table 4).It was observed that 86.88% of oral lesions were due to Arecanut related compounds with in duration of 10 years and frequency of 5 times, which is greater than due to tobacco chewing (54.31%).It is evident from the study that within duration of 10 years, the same pattern of increase in oral lesion cases due to areca nut in comparison to tobacco was followed with increase in frequency. The present study reveals that more individual's manifest oral lesions due to tobacco in comparison to areca nut related products after duration of 10 years of consumption. Gigi Thomas et al reported dose response relationship for frequency (p<0.0001) and duration of tobacco chewing (p<0.0001) for oral premalignant lesions [26]. Similar significant findings in regards to hours of tobacco chew, Snuff use and development of oral lesions (t=2.98, p<0.0002) was reported by George et al. who has taken only various forms of chewing tobacco in consideration [20].

CONCLUSION

The word "Smokeless tobacco" is used by various researches in determining its impact on oral health, with the use of this whole group the individual effect of Areca nut and tobacco is not segregated. Even the unexplored area, in terms of health of the workers, employed in tobacco industry, the present study was conducted among these workers. The prevalence of Tobacco chewers, Areca nut related compounds and Non Chewers were estimated at 45.97%, 22.63% and 31.4% respectively. Though the majority of individuals were habituated to tobacco chewing but the young population in the present study was more addicted to Areca nut related compounds (gutka). The carcinogenicity of tobacco is well documented but the individuals consuming areca nut compounds (gutka) were predisposed to oral premalignant lesions early compared to tobacco chewers. These lesions were found significantly associated with the duration and frequency of consumption. The so called "Safe sweet suparis" and "paan masala" consumed by youngsters is as dangerous as chewing tobacco, rather more. If the consumption of these substances in young

age is not slowed down with effective behaviour change communication and implementable regulations than this hidden epidemic may lead to a volcanic disastrous public health problem with substantial economic burden for developing country like India.

Abbreviations:
OSMF: Oral Sub Mucous Fibrosis.
Lkp: Leukoplakia
ENT: Otorhinolaryngeology

REFRENCES

1. Bedi R, Jones P. Betel-quid chewing among Bangladeshi community in the United Kingdom. London: Centre for Trans-cultural Oral Health 1995;11-25.
2. Murti, Bhonsle, Pindborg Johnson, Ranasinghe, Warnakulasuriya, Mehta at al. IARC 2004.
3. Zain RB, Ikeda N, Gupta PC, Warnakulasuriya KAAS, van Wyk CW, Shrestha P, et al. Oral mucosal lesions associated with betel quid, areca nut and tobacco chewing habits: consensus from a workshop held in Kuala Lampur, Malaysia, November 25-27, 1996. Journal Oral Pathology Medicine 1999;28:1-4.
4. Thomas S, Kearsley J. Betel quid and oral cancer: a review. Eur J Cancer B (Oral Oncology) 1993;29 B:251-5.
5. Mehta FS, Gupta PC, Daftary DK, Pindborg JJ; Choksi SK. An epidemiological study of oral cancer and precancerous conditions among 101, 761 villagers in Maharashtra, India, Intermit J Cancer 1972;10: 134-41.
6. Pindborg JJ; Chavla TN, Mishra RK, Nagpaul RK, Gupta VK. Frequency of oral carcinoma, leukokeratosis, leukoedema, submucous fibrosis and lichen planus in 10,000 Indians in Lucknow, Uttar Pradesh, India Report, Journal Dental Research 1965; 44: 625.
7. Pindborg FF, Mehta FS, Gupta PC, Daftary DK. Prevalence of oral submucous fibrosis among 50,915 Indian villagers, Brit J Cancer1968; 22:646-54.
8. Wahi PN, Mittal VP, Lahiri B, Luthera UK, Seth RK, Arma GD. Epidemiological study of precancerous lesions of the oral cavity: A preliminary report. Ind J Med Res 1970; 50:1361-91.
9. Mehta FS, Hamner IE. Tobacco-related oral mucosal lesions and conditions in India. A guide for dental students, dentists and physicians. Bombay:Tata Institute of Fundamental Research1993.
10. Pindborg JJ, Bhat M, Devnath KR, Narayan HR, Ramchandra S. Frequency of oral white lesions in 10,000 individuals in Bangalore, South India, Preliminary report, Ind J Med Science 1966; 2: 349-52.
11. Zachariah J, Mathew B, Varma NAR, Iqbal AM, Pindborg ff: Frequency of oral mucosal lesions among 5000 individuals in Trivandrum, South India, JhidDentAssoc;1966;38:290-4.
12. Gupta PC, Bhonsle RB, Murti PR, Oaftary OK, Mehta FS, Pindborg. An epidemiologic assessment · of cancer risk in oral precancerous lesions in India with special reference to nodular leukoplakia. Cancer 1989;63:2247-52.
13. Urvish Joshi, Bhavesh Modi, Sudha Yadav. A study on prevalence of chewing form of tobacco and existing quitting patterns in urban population of Jamnagar, Gujarat 2010; 35 suppl 1: 105-108
14. Rajnarayan R. Tiwari, Sanjay P. Zodpey. Use of Smokeless Tobacco – A Community-based Study of Behaviour, Attitudes and Beliefs Regional Health Forum WHO South-East Asia Region(Volume 3)
15. Ranjeeta Kumari, Bhola NathStudy. Use of Tobacco Among Male Medical Students in Lucknow India, Indian Journal of Community Medicine 2008;33: 2.
16. Zaki Anwar Ansari, Nafees Bano S, Zulkifle M. Prevalence of tobacco use among power Loom workers-Across-sectional study. Indian Journal of Community Medicine 2010; 35 suppl 1:34-39.
17. Krishnan A, Shah B, Vivek Lal, Shukla DK, Eldho Paul, Kapoor SK. Prevalence of risk factor for Non-Communicable diseases in rural area of Faridabad district of Haryana.Indian Journal of Public Heath 2008;52 suppl 3:117-124.
18. Vellappally S, Jacob V, Smejkalová J, Shriharsha P, Kumar V, Fiala Z. Tobacco habits and oral health status in selected Indian population. Cent Eur J Public Health. 2008 ;16 suppl 2:77-84.
19. Gupta BK, Kaushik A, Panwar RB, Chaddha VS, Nayak KC, Singh SB at al. Cardiovascular Risk Factors in Tobacco-Chewers: A controlled study. JAPI 2007 ;5:27-31.
20. George E Kaugars, William T. Riley, Richard B Brandt, James C Burns, John A Svirsky. The Prevalence of Oral Lesions in Smokeless tobacco users and an evaluation of risk factors. Cancer.1992;70 suppl 11: 2579-2585.
21. Gupta PC, Sinor PN, Bhonsle RB, Pawar VS. Mehta HC: Oral submucous fibrosis in India: A new epidemic? National Med J Ind 1998;11:113-16.
22. Shruti Pandya, Ajay Kumar Chaudhary, Mamta Singh, Mangal sing, Ravi Mehrotra. Correlation of histopathological diagnosis with habits and clinical findings in oral submucous fibrosis. Head and neck Oncology 2009;1:10.
23. Shah **N**, Sharma PP. Role of oral habits in the etiology of Oral Submucous Fibrosis with special emphasis on Pan-masala and Areca-nut chewing (1996-1997).
24. Mehta FS, Sanjana MK, Shroff BC, Doctor RH. Indian J. med. Res.1961; 49:393-399
25. Shiu MN, Chen THH, Chang SH, Hahn LJ. Risk factors for leukoplakia and malignant transformation to oral carcinoma: a leukoplakia cohort in Taiwan. British Tournal Of Cancer 2000;82 suppl 11:1871-1874.
26. Gigi Thomas, Mia Hashibe, Binu J Jacob, Kunnambathu Ramdas, Babu Mathew, Rengaswamy Sankaranarayanan at al. Risk factors for multiple oral premalignant lesions. International Journal Cancer 2003:107: 285-29.

Correspondence:
Dr. Abhishek Kawatra
Asstistant Professor, Department of community Medicine, GAIMS Bhuj Gujarat
Mobile: 09975085850
E mail: drkawatrapsm@gmail.co