

## RESEARCH ARTICLE

# Knowledge, Attitude and Practice of Tobacco Use and Its Impact on Oral Health Status of 12 and 15 Year-Old School Children of Chhattisgarh, India

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### Abstract

**Background:** Tobacco is a leading preventable cause of deaths worldwide; the situation is particularly serious in the developing countries. Tobacco use amongst the children and adolescents is already a pandemic and they are vulnerable targets of tobacco industry. This is also the case in India. **Objectives:** 1) Document and monitor the prevalence of tobacco use including smoked, smokeless and other forms of tobacco; 2) Understand student knowledge and attitudes related to tobacco use and its health impact; 3) Assess the impact of tobacco on the oral health status of school-going children in India. **Materials and Methods:** The sample was 1,500 school children of the age group 12-15 years age. A pretested, close ended questionnaire was administered in the form of extensive face to face interview to understand student knowledge, attitudes and behavior related to tobacco use and its health impact and to assess the prevalence of tobacco use including smoked, smokeless and other forms of tobacco. Oral health status was assessed using the Community Periodontal Index (CPI). Frequency distribution, Chi-square tests and Odd's ratio was calculated. **Results:** Prevalence of tobacco usage amongst the prevalence was 20.4%: 9.2% reported smoking, 15.8% used tobacco in the chewable form and 25.3% children were involved in consuming betel nut/areca nuts. The OR (Odd's ratio) for calculus formation was highest for guthka chewers (OR=14.322), paan masala chewers had the highest odds of developing bleeding on probing when compared to the others. **Conclusions:** There is an urgent need to launch school-based tobacco prevention programs for community awareness of children and the public, as preventing the initiation of a habit is far easier than stopping it.

**Keywords:** Tobacco - adolescents - India - betel nut - 12-15 years - oral lesions - cancer

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### Introduction

Tobacco use is a leading preventable cause of deaths worldwide; the situation is more morbid in the developing countries (Raj et al., 2011). Use of tobacco amongst the children and adolescents is already a pandemic (Chadda et al., 2002). India accounts for the world's second largest tobacco production, which is the leading cause of death and each year it is estimated to kill approximately 5 million people worldwide (Deepa et al., 2012), and current trend shows that tobacco use will cause more than 8 million deaths annually by 2030 (Phinse et al. 2013). Results from the Global Youth Tobacco Survey (GYTS) 2009 indicated the national prevalence of current tobacco use among school going children (13-15 year age group) was 14.6 % (Gajalakshmi and Kanimozhi, 2010), and which has still not changed significantly from the GYTS 2006 (13.7%)

and the GYTS 2003 (16.9%) (Bhojani et al., 2011). Many of the reports in India have marked the initiation of tobacco use before 10 year of age (Raj Narain et al., 2011).

Tobacco industry's vulnerable targets are the adolescents who are easily influenced by cinema, television, mass media, and their peers and friends. Also some factors associated with youth tobacco use, as per the US Department of Health and Human Services, 1994 are the low socioeconomic status, availability, and cheaper price of tobacco products, lack of parental support or involvement, low levels of academic achievement, and low self-image or self-esteem, a perception that tobacco use is the norm (Phinse et al., 2013).

When compared to other countries, tobacco usage in any form is a greater public health challenge because of the varieties of tobacco consumed which includes both smoked and smokeless forms (Phinse et al., 2013). The

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well known consequences of smoking are shortness of breath, respiratory illness, reduced physical fitness, poor lung function, lung cancer, cardio vascular mortalities and morbidities. The smokeless fibrosis, and cancers of mouth, pharynx, esophagus etc (Anindya et al., 2012). Apart from the causing pain, functional and esthetic problems, cancer also lead to a loss of working man hours and hence in the long run it can have a significant impact on the Indian economy. Hence preventing and controlling the adverse health effects of tobacco consumption is an emerging issue of public health significance (Ram et al., 2014). While in most developed nations cigarette, cigars and water pipe are the main form of tobacco use, whereas in India tobacco is consumed mainly in the form of bidi smoking and in smokeless form such as chewing tobacco and mishri.

Moreover, the use of areca nut, areca catechu is commonly consumed as an adjunct to tobacco (Madani et al., 2012). Irony of the situation is that most people including the medical health professionals are unaware of the side effects of areca nut: addiction and carcinogenicity (Shah et al., 2012). In India since the 1980s the areca nut industry has developed new product constituting areca nut and catechu ready for immediate consumption, packed in small and attractive sachets. One of these products with tobacco and catechu is known as 'paan masala' and the one containing tobacco and zarda is called 'guthka' (Madani et al., 2012). Areca nut is known to be mutagenic and have genotoxic effects on the tissues of the body which may lead to various neoplastic and preneoplastic lesions (Trivedy et al., 2002; IARC, 2003). Areca nut is established to the fourth commonly used psychoactive substance used worldwide, after tobacco, alcohol, and caffeine containing beverages. Areca nut quid influences central and autonomic nervous system at various levels (Shah et al., 2012). Also the constituents of areca nut involve with the collagen production and degradation pathway as they increase collagen production and inhibit collagen degradation thereby causing fibrosis and hence it is a well established cause of premalignant condition of the oral cavity: Oral Sub Mucous Fibrosis (Trivedy et al., 1999).

The Control of Tobacco Products Act (COTPA), 2003 in India restricts the sale of tobacco to the minors, prohibition of any kind of advertisement of tobacco containing products and also restricting the sale of any kind of tobacco products within 100 meters of school premises (Deepa et al., 2012). Despite of the intensifying regulations children and adolescents continue to be exposed to tobacco products (Kotsedi et al., 2013). The onset of tobacco use among the Indians occurs in adolescence and it is estimated that every day 5500 young people are trapped by the tobacco net and initiate the use (Cheryl et al., 2009). This early initiation urges the need to intervene and protect the future generation from getting entrapped into this addiction (Raj et al., 2011).

Chhattisgarh, a state in Central India, ranks 17<sup>th</sup> in terms of population and 10<sup>th</sup> in terms of area in the country. The state is on the urge of fast track development average GSDP (Gross State Domestic Product) growth rate between year 2004-05 and 2011-12 was about 15.0 percent. Durg District is situated centrally in Chhattisgarh,

on the east bank of river Shivrath, District Durg is herald of Chhattisgarh's Industrial Development, Cultural competence, Social harmony and Meaningful use of resources. Till now there are no studies in Chhattisgarh reporting the prevalence of tobacco, arecanut and guthka use and their effects on the oral health among the school going children of Chhattisgarh state. This study was conducted with the following objectives: 1) document and monitor the prevalence of tobacco use including smoked, smokeless and other forms of tobacco; 2) understand students' knowledge and attitudes related to tobacco use and its health impact; 3) Impact of tobacco on the oral health status, of 12 & 15 year old school going children in India.

## Materials and Methods

### Source of data

Durg tehsil/block consist of 2 Nagar Nigams (Urban) and 70 gram panchayats (Rural) and the school structure in Durg according to ownership and management can be divided into the Government Schools and Private Schools. A detailed list of number of schools, names of schools and total number of school children was obtained through the District Education Office (DEO).

### Study population

All 12-15-year old school going children in Durg district.

### Sample size determination and sampling procedure

The sample size for the study was calculated scientifically based on the data obtained from the pilot study. A pilot study was carried out among 50 children, (15 year old school children) from a private school of Bhilai Nagar Nigam to estimate the desired sample size and to have prior idea regarding the number of children to be studied per day and number of schools to be selected. Pilot study assessment was utilized for proper planning and execution of the main study and also to finalize the survey form to be used for collection of data. Depending upon the prevalence rate of tobacco usage obtained from the private school of Bhilai Nagar Nigam, sample size was determined to be 508. The same numbers of subjects were selected from the government schools of Bhilai Nagar Nigam and government schools of the rural areas from Durg gram panchayat to obtain the desired sample size using a simple random sampling technique. Hence the total number of sample size consisted of 1524 children which was then rounded up to 1500.

### Inclusion criteria

All 12-15-year old school going children in Durg district who were present on the day of examination were included in the study.

### Exclusion criteria

(1).Children with the history of systemic disease like epilepsy etc. (2).Mentally or physically challenged children. (3).Those patients who are not willing to take part in the study. (4).Students absent on the day of study.

### Ethical clearance and informed consent

Ethical approval was obtained from institutional review board Rungta College of Dental Sciences and Research, Bhilai. Permission was obtained from the District Educational Officer to conduct the survey. Permission to select, examine and collect the relevant data from the school children was obtained from the school authority before the start of the survey, verbal consent was obtained from the school children before doing the examination and only children with the consent were included in the study. School children requiring treatment were referred as and when required to Rungta College of Dental Sciences and Research, Bhilai.

### Training and calibration

The investigator was trained in the Department of Public Health Dentistry, Rungta College of Dental Sciences and Research, on 10 school children. Calibration of examiner was done on 20 school children who were examined twice using diagnostic criteria on successive days, and then the results were compared to know the diagnostic variability. Agreement for assessment was 90 percent. The recording clerk (dentist) was also trained in entering data using the WHO Proforma.

### Collection of data

**Questionnaire:** A pretested, close ended questionnaire was administered in the form of extensive face to face interview to understand students' knowledge, attitudes and behaviors related to tobacco use and its health impact and to assess the prevalence of tobacco use including smoked, smokeless and other forms of tobacco. The questionnaire was prepared covering age, sex, socio-demographic details, school type, knowledge, attitudes and behaviors related tobacco.

**Oral Health Assessment:** The survey form was prepared with the help of WHO, 1997 Oral Health Assessment form (WHO, 1997). The investigator carried out the examination solely. Community Periodontal Index (CPI) was used to assess the periodontal health status and Treatment need part of the CPITN index was used to record the treatment needs. A detailed schedule was prepared for data collection and survey took place for a period of four months from January to April 2014. Examination of each individual took approximately 15 mins. On an average of 50 school children were examined per day.

### Infection control

All the instruments to be used were sterilized using the autoclave one day prior to the examination and on the day of examination chemical method of disinfection and sterilization was followed by using Korolex (Glutaraldehyde-7 gms, 1,6 dihydroxy 2,5 dioxahexane -8.2gms and polymethylol urea derivative-17.6gms) diluted by adding 1 part to 9 parts of potable water. After each day's survey all the instruments were again autoclaved.

### Health education and courtesy reporting

Health education about the harmful effects of tobacco

use was given after the survey in their respective classes. Visual aids (models, charts, etc) were also used in motivating the children. Survey findings were reported to the respective school authorities after the completion of the survey in each school.

### Statistical analysis

The data was transformed from pre-coded survey form to computer. A master file was created for the purpose of data analysis. SPSS version 16.0 (SPSS Pty Ltd, Chicago, IL, USA) was used for the statistical analyses. Frequency distribution, Chi-square tests (to determine the presence of association between the risk factor and the outcome) and Odd's ratio (OR)/cross-product ratio (to deduce the strength of association between the risk factor and outcome) at 95% confidence interval was calculated as well was used for analyzing the results. The statistical significance was fixed at 0.05.

## Results

### Baseline Characteristics and behavior towards tobacco consumption

Table 1 shows the baseline characteristics of the respondents. Total 1500 school children of the age group 12 years (N=904) and 15 years (N=596) took part in the study. Male to female ratio was approximately 1:1. When assessed about the tobacco consumption behaviours among the school children, the prevalence was 20.4% which is very high. Out of the total students screened 9.2% were involved in smoking and 15.8% were involved in using smokeless tobacco, amongst these students, were some who had the habit of consuming both smoked and non smoked tobacco. 25.3% children were involved in consuming betel nut/areca nuts. The smoked tobacco

**Table 1. Baseline Characteristics**

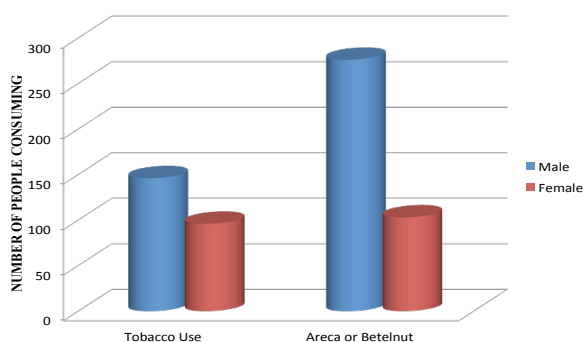
Variables	Frequency	Percentage
CN=1500		
Gender		
Male	748	49.9
Female	752	51.1
Age Group		
12 Years	904	60.3
Male	435	48.1
Female	469	51.9
15 Years	596	39.7
Male	313	52.5
Female	283	47.5
School Type	Students	
Rural Government	500	33.3
Urban Government	500	33.3
Urban Private	500	33.3
Tobacco Use		
Smoked Form	138	9.2
Smokeless Form	237	15.8
Both	69	4.6
Tobacco Use		
Males	146	19.60
Female	96	12.76
Betel/Areca Nut		
Male	276	36.9
Female	103	13.7

**Table 2. Enlists the Descriptive Statistics for Knowledge and Attitude about Tobacco Products**

Serial	Questions	BOYS		GIRLS	
		YES	NO	YES	NO
1.	Smoking is harmful to health	1380 (92%)	120 (8%)	1440 (96%)	60 (4%)
2.	Sale of tobacco products to minors is prohibited in India.	1038 (69.2%)	462 (30.8%)	957 (63.8%)	543 (36.2%)
3.	Consuming chewable tobacco cause Oral Cancer	945 (63%)	555 (37%)	1248 (83.2%)	252 (16.8%)
4.	Oral cancer can cause death	501 (33.4%)	999 (66.6%)	804 (53.6%)	696 (46.4%)
5.	Smoke from other person is harmful	690 (46%)	810 (54%)	990 (66%)	510 (34%)
6.	Do you think people who use tobacco have more friends?	279 (18.6%)	1221 (81.4%)	132 (8.8%)	1368 (91.2%)
7.	Do you think smoking makes young people look cool?	306 (20.4%)	1194 (79.6%)	153 (10.2%)	1347 (89.8%)
8.	Do you wish to consume guthka/ paan masala after you see any related advertisements?	441 (29.4%)	1059 (70.6%)	105 (7%)	1395 (93%)
9.	Do you wish to smoke when you see any sportsman, film actor smoking?	303 (20.2%)	1197 (79.2%)	156 (10.4%)	1344 (89.6%)
10.	Do you consider occasional tobacco use injurious to health?	975 (65%)	525 (35%)	1005 (67%)	495 (33%)

**Table 3. Comparison of Bleeding on Probing and Calculus Formation, in Tobacco Consumers v/s Non Consumers**

Variable	Calculus		Bleeding on Probing	
	P-Value	Odds Ratio (95% CI)	P-Value	Odds Ratio (95% CI)
Smokers v/s non Smokers	<0.001	5.237 (3.489-7.860)	<0.001	1.546 (1.178-2.030)
Guthka Chewers v/s non Guthka Chewers	<0.001	14.322 (3.676- 18.804)	<0.05	0.859 (0.702-1.051)
Paan Masala Chewers v/s non Paan Masala Chewers	<0.001	6.391 (1.766-7.130)	<0.007	1.630 (1.505-0.787)
Betel quid with tobacco chewers v/s non Betel quid with tobacco chewers	<0.001	1.185 (1.111-2.308)	<0.05	0.646 (0.540-0.774)
Betel nut / Areca nut chewers v/s non Betel nut / Areca nut chewers	<0.001	5.416 (4.214- 6.960)	<0.008	1.372 (1.086-1.734)



**Figure 1. Tobacco and Areca/Betelnut Consumption among Males and Females**

consumption done was mainly in 2 forms; cigarette (7.3%) and bidi (1.9%) and the smokeless tobacco consumption was done in the form of guthka (7.5%), paan masala (4.0%), and quid with tobacco (4.3%). Figure 1 depicts the tobacco and areca/ betel nut consumption among males and females school children.

*Knowledge and Attitude towards tobacco consumption*

Table 2 enlists the Descriptive statistics for knowledge and attitude about tobacco products among school children aged 12 and 15 years. The first five questions were asked to assess the knowledge and the next five assessed the attitude of the students towards tobacco. The girls tend to have a better knowledge about tobacco consumption and its health impacts as compared to the boys. In assessing the

attitude, an inclination towards smoking was seen in boys.

*Oral health impacts of tobacco use on children*

Table 3 reports the comparison of bleeding on probing and calculus formation, in tobacco chewers, guthka chewers, paan masala chewers, betel quid with tobacco chewers, betel nut/areca nut chewer and non chewer group and amongst smokers and the non-smokers. Odd's ratio (OR)/cross-product ratio at 95% confidence interval was calculated as well (to deduce the strength of association between the risk factor and outcome). It shows that Tobacco chewers had more calculus as compared to non-tobacco chewers. These associations were found to be statistically significant at  $p < 0.001$  also the association between tobacco chewing and bleeding on probing was statistically significant ( $p < 0.001$ ). The OR for calculus formation was highest for guthka chewers (OR=14.322), the same when observed for betel quid with tobacco chewers was found to be minimum (1.185) amongst all. Similarly when compared for the bleeding on probing all these associations were found to be statistically significant ( $p < 0.05$ ). Paan masala chewers had the highest Odds of developing bleeding on probing when compared to the others. The findings can be seen in Table 3.

**Discussion**

The rationale of this cross-sectional study was to document and monitor the prevalence of tobacco use



including smoked, smokeless and other forms of tobacco; 2) understand students' knowledge and attitudes related to tobacco use and its health impact; 3) Impact of tobacco on the oral health status, of 12 & 15 year old school going children in India. The present survey is the first comprehensive study conducted in Chhattisgarh among school going children aged 12 and 15.

The age groups 12 and 15 years have been specified as the global monitoring age for international comparisons and monitoring of disease trends by the WHO (World Health Organization) to monitor the oral health status and also these age group are especially important as a reliable sample may be obtained easily through the school system, and thus convenient to be surveyed (WHO, 1997). The male to female ratio was fairly 1:1 to facilitate uniformity in the comparisons.

Varying reports are present on the prevalence of tobacco use amongst students in different states of India, ranging from 1.9 % in Delhi- the national capital to 75.3% in Mizoram- the eastern most corner of the country (Kapoor et al., 1995; Sinha et al., 2003; Bhojani et al., 2006; Kumar et al., 2006; Raj et al., 2011). In the present study, 20.4% (boys: 19.6, girls: 12.76) school students from amongst the 1500 were indulged in consuming tobacco in one or the other form. Smokeless tobacco was consumed by 237 (15.8%) and 138 (9.2%) were indulged in smoking habits. In addition to this, there were 69 (4.6%) of the students who had the habit of both smoking and chewing tobacco, which is coinciding with the reports of Raj et al. (2011) who investigated the initiation & prevalence of tobacco use among school children (11-19 years) in Noida in 2005 and Bhojani et al. (2011), 2011 who studied the perception of adolescents about smokers in India. Also as per the Global Youth Tobacco Survey (GYTS) 2009 (Gajalakshmi et al., 2010) reported that 14.6% (19% boys, 8.3% girls) were indulged in tobacco products consumption which does not change much from the GYTS 2006 (13.7%)<sup>5</sup> and GYTS 2003 (16.9%) (Upendra et al., 2011).

The smokeless tobacco in the form of guthka, paan masala, and quid with tobacco are marketed in the country in various forms, size, shape and attractive packaging unreasonably with easy availability, cheaper costs, and injudicious publicity, under least supervision (Ram Vinod Tiwari et al., 2014) which are the attributed factors for their prevalent use in all age groups. Global Youth Tobacco Survey (GYTS) 2009 reported the prevalence of smokeless tobacco to be 9.0% and in 2006 at 9.4%. In the present study, when compared to females, males were more into the smokeless tobacco consumption and which is in line with the findings of GYTS 2009 and 2006 (Gajalakshmi et al., 2010).

Smoking tobacco in India is broadly done in 2 ways i.e. Cigarette and Bidi. Bidi is a cheap smoking stick, handmade by rolling a dried, rectangular piece of temburni leaf (*Diospyros melanaxylon*) with 0.15-0.25g of sun-dried, flaked tobacco filled into a conical shape and the roll is secured with a thread. The length of a beedi varies from 4.0-7.5cm. Beedis are commercially available in small packets and more common in rural areas (Raj et al., 2011). 9.2% of the students screened in the present study

were smokers which are similar findings as reported by The GYTS 2009 (Gajalakshmi et al., 2010) and Raj Narain et al. Further stratification confirmed of the variants in smoking, cigarette (7.3%) and bidi (1.9%). Trend toward smoking among the youths is increasing smoothly as reported by GYTS 2009 (Gajalakshmi et al., 2010).

With streaming modernization and rapid urbanization in India, use of tobacco is on the up rise among the girl students but still less as compared to the boys, this observation is also corroborated by the other Indian reports (Kapoor et al., 1995; Chadda et al., 2002; Reddy et al., 2005). Yet another mutagen found in easy reach of the school children was the betel nut/ areca nut which are a well known etiological agent for the causation of precancerous lesion: Oral Sub Mucous fibrosis (OSMF); a prevailing condition in the Asian subcontinent. The prevalence of use being 25.3% amongst the children and to the marked astonishment was its prevalence among boys as high as 36.9% which is an alarming threat; the prevalence amongst girls was 13.7% which cannot be considered low. The betel nut/ areca nut are marketed and available in the form of small colorful and attractive sachets in distinct flavors easily purchasable by the minors as are not covered under any jurisdiction (Ministry of Health and Family Welfare, 2003). The public health implication of these habits starting at an early age is that it is well established fact that people change over from smokeless form to smoking over a time span (Raj et al., 2011), which sooner or later will form a threat and burden to the national and international health and economy.

With an increase in number of students habituating the use of tobacco in the Chhattisgarh state it was necessary to assess their knowledge and attitude towards tobacco and its health implications. Smoking was irrespectively considered bad for health by both boys and girls. Cigarettes and Other Tobacco Products Act (COTPA), Ministry of Health and Family Welfare, Government of India, 2003 makes sure that it is illegal to sell any tobacco containing product to the person aged below 18 years. When assessed for the knowledge of this legislation among the children boys (69.2) had a fair more knowledge than do the girls (63.8).

Dr. Margaret Chan, Director-General, World Health Organisation, May 29, 2007 stated "The evidence is clear. There is no safe level of exposure to second-hand tobacco smoke. I urge all countries that have not yet done so to take this immediate and important step to protect the health of all by passing laws requiring all indoor workplaces and public places to be 100% smoke-free." Secondhand smoke (also referred to as involuntary smoking, environmental tobacco smoke, and passive smoking) is a complex mixture of more than 4,000 chemical compounds, including 69 known carcinogens (What's In A Cigarette? 2001; National Cancer Institute 2001). Article 8.1 of the Framework Convention on Tobacco Control (FCTC) states that "scientific evidence has unequivocally established that exposure to tobacco smoke causes death, disease and disability" (WHO Framework Convention on Tobacco Control, 2003). In the present study 46% boys and 66% girls stated the smoke from others (passive smoking) to be harmful for health which is in accordance with the

findings from GYTS 2009 (Gajalakshmi et al., 2010) and Mukherjee et al. (2012).

India due to its large population is considered to be the global epicenter of oral carcinoma and the first description of this malady recognized by the world as oral cancer was seen in Sushruta Samhita, an epitome of excellence in surgery written in Sanskrit around 600 BC (Chiba I, 2001). Accounting for almost 40% of total cancer deaths in the country, tobacco in all its forms (non-smoked and smoked) is the long standing established risk factor (Bhawna Gupta et al., 2013). The knowledge about tobacco as risk factor for oral cancer was present in 83% girls and 63% boys. Oral cancer can be fatal: this fact was agreed upon by 53.6% girls and 33.4% boys. These findings are coinciding with that reported by Mukherjee et al. (2012) in 2012. The perspectives, thus seen implies that knowledge related to tobacco use and its health impact in the present study was more in girls than boys which is again in constant with the finding reported by Mukherjee et al. (2012)

The youth is targeted by the tobacco industry effectively with the help of mass media by projecting smokers and tobacco chewers as trendy, sporty and super successful and thereby demonstrate tobacco consumption as a daily necessary routine (Chadda et al., 2002; Smith, 2006). The exposure to smoking in films is associated with the initiation of smoking has been reported in the United States both cross-sectionally (Sargent et al., 2001; Sargent et al., 2004) and prospectively (Dalton et al., 2003; Distefan et al., 2004). The attitude towards taking up the tobacco habit by seeing the film stars, sports personalities or any television advertisement was also assessed and it was found that boys showed double the chances of inculcating such habits than do the girls. Our findings establish an agreement with the reports by Hunt et al. (Kate et al., 2009) and Sargent et al. (Sargent et al., 2009) The misnomer that smoking makes one look cool was also checked and it was found that 20.4% of boys and 10.2% girls agreed to this fact which is in accordance to the GYTS 2009 (Gajalakshmi et al., 2010). Consuming tobacco helps in having big friend circle is another misnomer, when assessed it was found that 18.6% boys and 8.8% agreed to this and it is in line but slightly less than findings reported by GYTS 2009 (Gajalakshmi et al., 2010).

Tobacco use causes many oral diseases and adverse oral conditions; a fact that is universally well accepted. Consumption of tobacco is a significant acquired risk factor for periodontal disease. Smoking invariably has a destructive effect on the periodontium (Papapanou, 1996; Nordreyd et al., 1999) and in young people smoking is a risk factor for aggressive, destructive periodontal disease (Mullally et al., 2004). As the study population comprised in the present study of children age 12 and 15 years, only bleeding on probing and calculus formation was recorded for assessing the periodontal health, as recommended by WHO (WHO, 1997). It was observed that the smokers had more calculus formation and bleeding on probing than do the non smokers. The risk for calculus formation in smokers was five-time when compared to the non smokers which matches in accordance to the study done by Tomar et al. (Tomar et al., 2000). Guthka, a commercially available manufactured smokeless tobacco

product (MSTP), a mixture of areca nut, tobacco and some condiments, marketed in different flavors in colorful pouches (Raj et al., 2011), was found to be most consumed non-smoked tobacco product in the present study. The difference in calculus formation and bleeding on probing was more in the guthka chewers than do the non chewers and the risk for calculus formation was increased to 14 times in a person consuming this product, this finding is much higher than the finding by Singh et al. (Singh et al., 2011). The increased risk of such periodontal destruction due to guthka may be attributed to its way of consumption as apart from chewing it is also frequently kept in the buccal and labial mucosa for a longer time as such; also the manufacturers mix the marketed product with many additive colors and chemicals which tend to more worsen the periodontal condition.

The destructive impact of all forms of tobacco and betel nut/ areca nut consumption in the present study was significantly high on the periodontal health indicators like calculus and bleeding on probing. When compared to smoked form, the smokeless tobacco form had a greater adverse effect on periodontal health.

In conclusion, following conclusions can be drawn from the present study, 1) The prevalence of tobacco consumption in both smoked and smokeless forms remains high in the school going adolescents, but to a very small extent the boys outnumbering the girls in the tobacco consumption. 2) A very harmful and dangerous but yet easily available mutagen found in easy reach of the school children was the betel nut/ areca nut which are known to cause OSMF which consumed in large number by the boys and girls. 3) Knowledge related to tobacco use and its health impact in the present study was more in girls than boys and also they showed a more inclination towards tobacco consumption. 4) Tobacco consumption invariably in any form and betel nut/ areca nut consumption had a destructive impact on the periodontal structures and the oral cavity. The world is in the midst of adolescent tobacco abuse which is still a leading preventable cause of addiction, sickness and mortality. This is a matter of great public health concern. Many psychosocial factors also have an important role to play in initiation of this habit. There is an urgent need to launch school-based tobacco prevention programs community awareness programs for the children and the public, as preventing the initiation of a habit is far easier than stopping it which underlines the rule of primordial prevention.

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