

Prevalence of Arecanut Chewing Habit among High School Children in Kanpur- A Cross Sectional Study in North India

Abstract

AIM: Consumption of areca nut products among school children has become very common social evil in India. The aims of this study were to find out the prevalence of areca nut chewing habit, evaluate reasons for areca nut chewing as well as etiological and socioeconomic aspect of areca nut chewing habit among high school children in Kanpur city of Uttar Pradesh, North India. **Material and Methods:** Data on areca nut chewing habit among high school children were collected from 3513 students of age group 14-18 years from 16 high schools by random selection in Kanpur, U. P. and information were obtained from self-administered questionnaire. **RESULTS:** The results from this study shows that the areca nut chewing habit is significant among the students of Kanpur and the frequency of chewing sweet supari (89.01%) followed by, pan masala (4.79%), gutkha (6.06%) and mistee pan (0.12%) habit were reported and it increased with age. **CONCLUSION:** It is mandatory to motivate the children not to initiate the habit and to enable the adolescent children to realize the potential health risk of areca nut product.

Key Words

Areca nut; pan masala; school children; mistee pan

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INTRODUCTION

Areca nut is the fourth most commonly used substance of abuse in the world after tobacco, alcohol and caffeine.^[1] Areca catechu is the nut of the Areca catechu tree that belongs to the Arecaceae family, also known as the Palmae (Palm family). It is cultivated in Sri Lanka, India, Malaysia, Indonesia, Taiwan and the Philippines for its seed. It is very often, wrongly called Betel nut as it is traditionally used wrapped up in the leaf of the 'Betel Piper' in the form of 'paan'.^[2] In Urdu, Areca nut is called 'Chaalia' or 'Supari'. It is chewed stand alone itself (plain or sweet), or in combination with other ingredients. More recently areca catechu has become available as Pan Masala. Originating in India, this became available in the sub-continent in 1970's.^[2] Pan masala is basically a preparation of areca nut, cardamon, lime and a number of natural and artificial perfuming and flavouring materials.

Gutkha is a variant of pan masala, in which in addition to these ingredients flavoured chewing tobacco is added. Both products are often sweetened to enhance the taste. Promoted by a slick, high profile advertising campaign and aggressive marketing, pan masala and gutkha have become very popular with all sections of Indian society, including school children.^[3] The adverse health effects associated with areca nut use include oral and oropharyngeal cancer, oral premalignant lesions and conditions (oral leukoplakia and sub mucous fibrosis), gum disease and addiction.^[1] The slaked lime acts to release an alkaloid from the areca nut, which produces a feeling of euphoria and well-being. Tobacco may also be used as a component of paan, and this ingredient is associated with a significant risk of oral cancer. Other substances of local preference may be added, such as grated coconut or a variety of spices, for example, aniseed,

Table1: Distribution of subjects according to sex

AGE (years)	BOYS (MALES)			GIRLS (FEMALES)			TOTAL (%)
	Habit (%)	Non habit (%)	Total (%)	Habit (%)	Non habit (%)	Total (%)	
14 – 15 (%)	60 (11.24)	343 (21.55)	403 (18.96)	05 (1.64)	246 (21.79)	251 (18.10)	654 (18.62)
15 – 16 (%)	93 (17.42)	395 (24.81)	488 (22.95)	46 (17.83)	300 (26.57)	346 (24.95)	834 (23.74)
16 – 17 (%)	212 (39.70)	346 (21.73)	558 (26.25)	84 (32.56)	261 (23.12)	345 (24.87)	903 (25.78)
17 – 18 (%)	169 (21.65)	508 (31.91)	677 (21.84)	123 (47.67)	322 (28.52)	445 (32.08)	1122 (31.94)
Total (%)	534 (25.12)	1592 (74.88)	2126 (100)	258 (18.60)	11 29 (81.40)	1387 (100)	3513 (100)

Table 2: Association of chewing habit according to sex in urban area

AGE (years)	HABIT PRESENT			HABIT ABSENT			X ² P
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	
14 – 15 (%)	41 (93.18)	3 (6.82)	44 (100)	195 (57.01)	147 (42.99)	342 (100)	40.16 < 0.001 Significant
15 – 16 (%)	47 (70.15)	20 (29.85)	67 (100)	234 (57.78)	171 (42.22)	405 (100)	3.65 < 0.05 Significant
16 – 17 (%)	124 (71.68)	49 (28.32)	173 (100)	210 (61.95)	129 (38.05)	339 (100)	4.78 < 0.05 Significant
17 – 18 (%)	103 (58.86)	72 (41.14)	175 (100)	352 (66.92)	174 (33.08)	526 (100)	3.69 < 0.05 Significant

Table 3: Association of chewing habit according to sex in rural area

AGE (years)	HABIT PRESENT			HABIT ABSENT			X ² P
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	
14 – 15 (%)	19 (90.48)	02 (9.52)	21 (100)	148 (59.92)	99 (40.08)	247 (100)	7.69 < 0.05 Significant
15 – 16 (%)	46 (63.89)	26 (36.11)	72 (100)	161 (55.52)	129 (44.48)	290 (100)	1.64 > 0.05 Non-Significant
16 – 17 (%)	88 (71.54)	35 (28.46)	123 (100)	136 (50.75)	132 (49.25)	268 (100)	14.90 < 0.05 Significant
17 – 18 (%)	66 (56.41)	51 (43.59)	117 (100)	156 (51.32)	148 (48.68)	304 (100)	0.88 > 0.05 Non-Significant

peppermint, cardamom and cloves.^[4] It is apparent that among the chemical constituents, alkaloids from areca nut are the most important biologically. Four alkaloids have been conclusively identified in biochemical studies, arecoline, arecaidine, guvacine, guvacoline, of which arecoline is the main agent.^[5] There are several recent reports, predicting an increase in oral cancer incidence in India. This prediction is based upon observation of an increasing prevalence of oral submucous fibrosis, especially in younger individuals, caused by industrially manufactured smokeless tobacco products. Gutkha is one of the most highly

advertised products in almost all media and it is noteworthy that tobacco users reported watching more tobacco advertisement compared to never users.⁶ The web site (www.newindia.com/kothari/) of the first major manufacturer of pan masala and gutkha presents their strategy as '...to prepare convenient anytime, anywhere substitute for pan...give some respectability to a habit that was considered low in image by the genteel'. The product was put on the market in 1985 as 4 g sachets. Today sachets and bulk packages are produced and sold in India and exported to markets in the USA, Europe, the Middle East, Australia and

Table 4: Types of habit details of males in urban and rural areas

AGE (years)	URBAN				RURAL				
	TOTAL	Sweet supari	Pan masala	Gutkha	TOTAL	Sweet supari	Pan masala	Gutkha	Mistee pan
14 – 15 (%)	41 (100)	38 (92.68)	03 (7.32)	nil	19 (100)	16 (84.21)	03 (15.79)	nil	nil
15 – 16 (%)	47 (100)	42 (89.36)	04 (8.51)	01 (2.13)	46 (100)	39 (84.78)	nil	07 (15.22)	nil
16 – 17 (%)	124 (100)	110 (88.71)	04 (3.23)	10 (8.06)	88 (100)	85 (96.59)	01 (1.14)	02 (2.27)	nil
17 – 18 (%)	103 (100)	85 (82.52)	05 (4.85)	13 (12.62)	66 (100)	35 (53.03)	17 (25.76)	13 (19.70)	01 (1.52)
Total	315	$X^2 = 11.21$ P < 0.05 significant			219	$X^2 = 83.95$ P < 0.05 significant			significant

Table 5: Types of habit details of females in urban and rural areas

AGE (years)	URBAN				RURAL				
	TOTAL	Sweet supari	Pan masala	Gutkha	TOTAL	Sweet supari	Pan masala	Gutkha	Mistee pan
14 – 15 (%)	03 (100)	03 (100)	nil	nil	02 (100)	02 (100)	nil	nil	nil
15 – 16 (%)	20 (100)	20 (100)	nil	nil	26 (100)	25 (96.15)	01 (3.85)	nil	nil
16 – 17 (%)	49 (100)	49 (100)	nil	nil	35 (100)	35 (100)	nil	nil	nil
17 – 18 (%)	72 (100)	72 (100)	nil	nil	51 (100)	49 (96.08)	nil	02 (3.92)	nil
Total	144	$X^2 = 25.04$ P < 0.05 significant			114	$X^2 = 16.73$ P < 0.05 significant			significant

Table 6: Dose

DOSE	URBAN		RURAL	
	MALE	FEMALE	MALE	FEMALE
1 Pouch / Day	106	56	60	42
2 Pouch / Day	45	27	22	17
3 Pouch / Day	17	NIL	19	NIL
1-2 Pouch / Day	33	02	24	NIL
2-3 Pouch / Day	15	NIL	19	NIL
1 Pouch 1-4 Days	98	59	67	55
No Reply	01	NIL	08	NIL
Total	315	144	219	114

many other countries.^[3] Although the actual prevalence of this habit is unknown, its popularity can be gauged by commercial estimates valuing the Indian market for pan masala and gutkha at several hundred million US dollars. These products are typically consumed throughout the day. The surveys conducted in schools and colleges in several states of India have shown that 13-50% of students chew pan masala and gutkha on a regular basis.^[3] Kanpur is metropolitan and biggest city of Uttar Pradesh. In Kanpur areca nut with flavoring agent and tobacco

like gutkha are available in each and every corner of the road. The younger generation is very much addicted to these different areca nut habits. Hence the present study was conducted to collect the data regarding the habits of supari or pan masala consumption among the school children in Kanpur (U. P.), North India.

AIMS AND OBJECTIVES

- To know prevalence of areca nut chewing habit among high school children in Kanpur city of Uttar Pradesh, North India.

Table 7: Distribution according to list of reasons for chewing areca nut

Reasons For Chewing	Number Of Cases	%
Craving	183	5.21
Boredom	Nil	nil
Aid to concentration	Nil	nil
When unhappy	Nil	nil
Postpone hunger	Nil	nil
Taste	197	5.62
Do something with mouth	48	1.38
Custom	117	3.34
Pleasure	153	4.37
Snack	Nil	nil
Refresh breath	82	2.33
Look mature	Nil	nil
Look good	Nil	nil
No reply	12	.003
Total	792	22.54

- To evaluate reasons for areca nut chewing in various forms in children.
- To find out the etiological and socioeconomic aspect of areca nut chewing habit, so in future proper preventive measure can be taken to reduce this monstrous habit.

MATERIALS AND METHODS

The school based cross - sectional study was carried out in various educational zones of urban and rural Kanpur as per convenience. Study sample consisted of 3513 students' from 16 high schools by random selection in Kanpur U. P. which were affiliated to the Government. Children of both sexes were included in this study. Permission to undertake the study in these schools was obtained from the school authorities. Data on consumption of areca nut were obtained by a self-administered questionnaire based upon demographic characteristics, areca nut use, daily frequency of areca nut chewing, other ingredients mixed with nut (e.g. leaf and lime), tobacco use (smoking and/or chewing), age of initiation of nut chewing, reasons for use, social influence factors and risk perceptions. The data was compiled and Chi - square test was applied.

RESULTS

Out of 16 schools included in the study 8 schools were selected from urban areas and 8 schools from the rural areas. Data were collected from 3513 students by whom participated in the study. Of these 2126 (60.52%) were males out of which 403 (18.96%) males were in the age group of 14-15 years, 488 (22.95%) were in the age group of 15-16 years, 558 (26.25%) were in the age group of 16-17

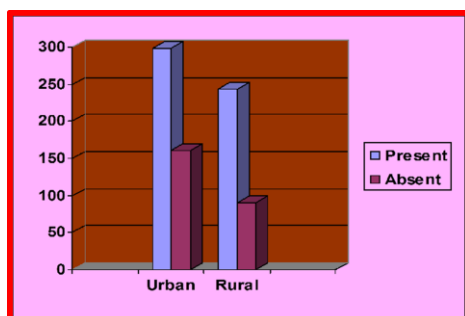
years and 677 (31.84%) were in the age group of 17-18 years. 1387(39.48%) subjects were females out of which 251 (18.10%) females were in the age group of 14-15 years, 346 (24.95%) were in the age group of 15-16 years, 345 (24.87%) were in the age group of 16-17 years and 445 (32.08%) were in the age group of 17-18 years (Table 1). In the urban areas between the age group of 14-15 years, total number of subjects were 386 out of which 44 were habituated and 342 were non habituated with $X^2 = 40.16$ and p value < 0.001 . In the age group of 15-16 years, total number of subjects were 472 out of which 67 were habituated and 405 were non habituated with $X^2 = 3.65$ and p value < 0.05 . In the age group of 16-17 years, total number of subjects were 512 out of which 173 were habituated and 339 were non habituated with $X^2 = 4.78$ and p value < 0.05 . In the age group of 17-18 years, total number of subjects were 701 out of which 175 were habituated and 526 were non habituated with $X^2 = 3.69$ and p value < 0.05 which was significant (Table 2). In rural areas in the age group of 14-15 years, total number of subjects were 268 out of which 21 were habituated and 247 were non habituated with $X^2 = 7.69$ and p value < 0.05 , in the age group of 15-16 years, total number of subjects were 362 out of which 72 were habituated and 290 were non habituated with $X^2 = 1.64$ and p value > 0.05 in the age group of 16-17 years, total number of subjects were 391 out of which 123 were habituated and 268 were non habituated with $X^2 = 14.90$ and p value < 0.05 , in the age group of 17-18 years, total number of subjects were 421 out of

which 117 were habituated and 304 were non habituated with $X^2 = 0.88$ and p value > 0.05 (Table 3). In urban areas out of 315 habituated males, 275 (87.30%) were in the habit of taking sweet supari, 16 (5.08%) of them were taking pan masala and 24 (7.62%) were in the habit of taking gutkha with $X^2 = 11.21$ and p value < 0.05 . In rural areas out of 219 habituated males, 175 (79.91%) were in the habit of taking sweet supari, 21 (9.59%) of them were taking pan masala, 22 (10.05%) were in the habit of taking gutkha and 1 (0.46%) with the habit of taking mistee pan with $X^2 = 83.95$ and p value < 0.05 (Table 4). In urban areas out of 144 habituated females, all the 144 (100%) were in the habit of taking sweet supari only with $X^2 = 25.04$ and p value < 0.05 . In rural areas out of 114 habituated females, 111 (97.37%) were in the habit of taking sweet supari, 01 (0.88%) of them taking pan masala and 02 (1.75%) were in the habit of taking gutkha with $X^2 = 16.73$ and p value < 0.05 (Table 5). The odd ratio of chewing habits is slightly higher for those who live in rural areas. Out of 792 families, 298 urban families were associated with habits and 243 rural families were associated with habits with $X^2 = 5.00$ with p value < 0.05 (Graph 1). In urban areas, most of the males (33.65%) were in the habit of taking 1 pouch per day whereas, at least about (4.76%) were in the habit of taking 2 to 3 pouches per day and among females, most of them (40.97%) were in the habit of 1 pouch in 1 to 4 days whereas, at least about (1.39%) were in the habit of taking 1 to 2 pouches per day. In rural areas, most of the males (30.59%) were in the habit of taking 1 pouch every 1 to 4 days whereas, at least about (8.68%) were in the habit of taking 2 to 3 pouches per day and among, females most of them (48.25%) were in the habit of taking 1 pouch in 1 to 4 days whereas, at least about (14.91%) were in the habit of taking either 2 pouches per day (Table 6). Graph 2 shows duration of habits in both the habituated males and females of different age groups. Among 60 males in the age group of 14-15 years 49 were in the habit from 0-1 years, 11 males were from 1-2 years and 5 females were in the habit from 0-1 years. Among 93 males in the age group of 15-16 years 69 were in the habit from 0-1 years, 17 were from 1-2 years, 07 were from 2-3 years and among 46 females in the age group of 15-16 years 31 were in the habit from 0-1 years, 14 were from 1-2 years and 1 female was from 2-3 years. Among 212 males in the age group of 16-17 years 144 males were in the habit from 0-1 years, 42 males were from 1-2 years, 13 males were

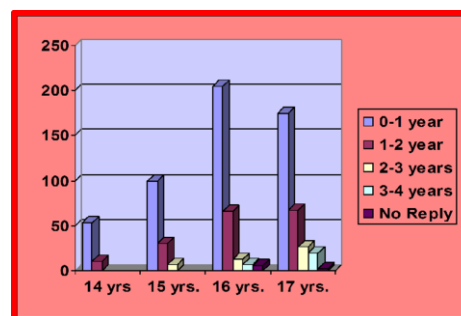
from 2-3 years, 07 were from 3-4 years and 06 were with no reply. Among 84 females in the age group of 16-17 years 60 were in the habit from 0-1 years and 24 were from 1-2 years. Among 169 males in the age group of 17-18 years 87 were in the habit from 0-1 years, 36 were from 1-2 years, 23 were from 2-3 years, 20 were from 3-4 years and 03 were with no reply. Among 123 females in the age group of 17-18 years 88 were in the habit from 0-1 years and 31 were from 1-2 years and 4 were from 2-3 years. Popular brand (low cost) with tobacco was used by 67 subjects and without tobacco was used by 521 subjects. Standard brand (high cost) with tobacco was used by none of the subjects whereas without tobacco was used by 204 subjects with $X^2 = 25.40$ and p value < 0.05 (Graph 3). The most prevalent reason for chewing areca nut was taste (5.62%), followed by for craving (5.21%), for pleasure (4.37%), as a custom (3.34%), to refresh their breath (2.33%) and in the last followed by the subjects who chewed it just because of doing something with the mouth (1.38%) (Table 7). Among the urban areas, out of 459 subjects, awareness was present in 183 and absent in 276 and among the rural areas, out of 333 subjects, awareness was found to be present in 95 and absent in 238 (Graph 4).

DISCUSSION

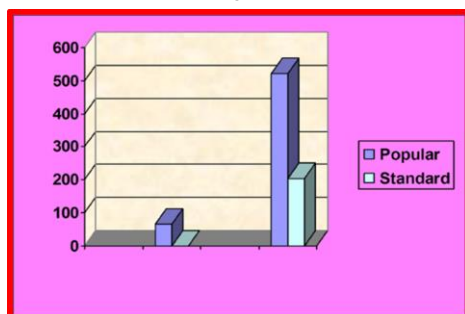
It has been estimated that, worldwide, six hundred million people chew areca nut. A causal association between tobacco and betel quid (BQ) chewing habits and oral mucosal diseases such as leukoplakia, oral submucous fibrosis (OSF) and oral cancer has been established and heavy users have a significantly increased mortality rate. Oral cancer is the fifth most common cancer worldwide.^[3] Recent epidemiological data indicates that, the number of cases of OSF has risen rapidly in India from an estimated 250,000 cases in 1980 to 2 million cases in 1993. The reasons for the rapid increase of the disease are reported to be due to an upsurge in the popularity of commercially prepared areca nut preparations (pan masala) in India and an increased uptake of this habit by young people are seen due to easy access, effective price changes and marketing strategies.^[5] Pan masala and gutkha have been reported to be genotoxic and mutagenic in several short-term assays. Aqueous extracts of various brands of pan masala were mutagenic in *S. typhimurium* strains. Aqueous extracts of both pan masala and gutkha induced chromosomal aberrations, sister chromatid exchange and



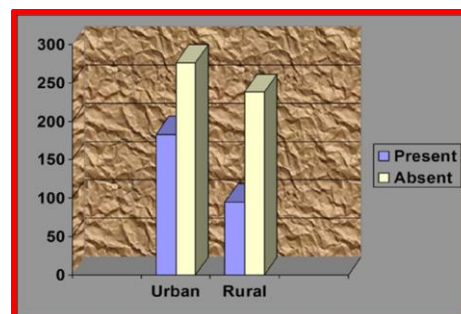
Graph 1: Association of family history of chewing habit



Graph 2: Distribution of subjects according to duration of habits



Graph 3: Distribution of subjects according to type of brand



Graph 4: Distribution of subjects regarding awareness

micronucleated cells in Chinese hamster ovary cells in the presence or absence of an exogenous metabolic system, although metabolic activation markedly inhibited the chromosome damaging effect, implicating the presence of direct-acting mutagens. Pan masala and gutkha have been shown to be clastogenic and carcinogenic in animal studies and a battery of in vitro test systems, the tobacco-containing gutkha being more potent. Increased cytogenetic damage has been observed in peripheral blood lymphocytes and exfoliated buccal mucosal cells of pan masala chewers. These genotoxic effects are most likely caused by tobacco- and areca nut-specific nitrosamines and reactive oxygen species ROS generated by areca nut and catechu polyphenols and slaked lime. Population studies conducted among Asian ethnic groups in the UK suggest that chewing habits are prevalent in 14±15% of 11± 15 year old children, with pan masala having the highest average frequency of use. Areca nut chewing is an addictive habit and evidence from the UK shows that the use of pan masala and gutkha is also addictive.^[3] However, Ahmad M. S. *et al.* in 2006 done an etiological and epidemiological study of OSF in Patna, Bihar, India. Total 157 cases of OSF and 135 control subjects were selected for the study in the period of 2002-2004 and it was observed that male: female ratio was 2.7:1. The youngest case of OSF was 11 year old and oldest one was 54 year age. Gutkha

was the most commonly used habit with 2-10 pouches/ day in OSF cases.^[7] In the present study also it was reported that the frequency of pan masala and gutkha consumption is high compared to other habits which is similar to study conducted by Ahmad M. S. *et al.* Shah SMA *et al.*, in 2002 evaluated the habits of betel quid use and areca nut chewing among school-aged children in Karachi, Pakistan. Stratified random sample of 160 primary school children between 4 and 16 years of age showed 74% of the children (118/159) used areca nut and 35% (55/159) used betel quid daily. Boys chewed areca nut more than girls (72% vs30%). The proportion of areca nut users increased by grade (from 48% in first grade to 90% in fifth grade). Most areca users first tried it with a family member (42%) or a friend (26%), and most (68%) consumed three or more packets a day.^[8] The most common reasons cited for children to start using tobacco are peer pressure, parental tobacco habits and pocket money given to children.^[9] Khandelwal A *et al.*, conducted a study to assess areca nut chewing habit among middle school-aged children in Indore, India. A retrospective collection of data was done to evaluate the prevalence of mesiodens conducted, for which the study was carried out on 3896 middle school-going children aged 8-17 years in Indore. A simple random sampling was done; school-going children belonging to different zones of Indore were randomly selected. Children of both sexes were

included in the study. 27.06% of the school-going children (1054/3896) had areca nut chewing habit. More boys chewed areca nut than girls (2:1). 45.42% of school going children of rural area panders to areca nut chewing habit, whereas in urban area 20.09% children are indulged. Government school children are more involved in areca nut chewing habit. 81.02% of the children used sweetened and flavoured form of areca nut. The majority of the users were not aware of harmful effects that the use of areca nut might be harmful for health. He concluded that diminish the use of areca nut, the Indian Government should consider limiting trade, advertising, and actively communicating its health risks to the public and should deem heavy taxes on it.^[10] The results from the present study showed that the areca nut habits are significant among the students of Kanpur. Chewing areca nut alone was the most commonly used habit especially in the form of sweet supari, followed by mistee pan and pan masala with a very less percentage using betel quid. The percentage of users engaged in more than one habit was non significant. The boys were more likely to begin with this habit earlier than the girls. The highest period of risk for catching the habit of taking areca nut alone and mistee pan for the both boys and girls was between the ages of 14 & 15, whilst pan, pan masala was also more likely to be taken up after the age of 14 years. Additionally, the frequency of chewing pan and pan masala was reported to increase with the age and also this study suggests that the highest period of risk for developing the habit of being engaged in areca nut alone, or mistee pan or pan masala is between the ages of 16 and 17 years. This is almost similar to the data collected in the previous studies concerning the age of chewing habit between 11 to 15 years. Although young, some of these children could have a prolonged history of an areca nut habit, which would be particularly problematic when associated with cigarette smoking or when different habits are engaged concurrently.

CONCLUSION

In present study it has been reported that the prevalence of habit is significant among school children and frequency of habit increased with age, the most commonly being used was is sweet supari, gutkha and pan masala. The risks of tobacco use are highest among those who start early and continue its use for a long period. The early age of initiation underscores the urgent need to intervene and protect

this vulnerable group from falling prey to this addiction. It is suggested that other approaches such as the use of health promotion strategies specifically directed towards reducing the number of children being engaged in any areca nut habits may be required. Urgent regulatory actions are therefore warranted to control the manufacture, marketing and the consumption of the products that contain areca nut and / or tobacco especially sweet supari, pan masala and gutkha. The effective strategies to motivate the young children not to initiate the habit and to enable the adolescent children to realize the potential health risks of this substance (areca nut). Therefore, school health education programmes in future should emphasize on the ill effects of areca nut chewing and tobacco use to bring an end to this social evil.

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