

RESEARCH ARTICLE

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Comparison of School-Attending Adolescent Areca Nut Users with Tobacco-Only Users and Those Using Both Substances on Demographic Variables and Behavioral Determinants

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Abstract

Objective: Consumption of areca nut and tobacco, often initiated in adolescence, are important causes of oral cancers in India. Areca nut prevention, often subsumed into school tobacco prevention programs, assumes that users are similar. However, differences in gender or age of users could necessitate unique approaches. The study aimed to find if adolescent areca nut-only users are different from tobacco-only users and users of both areca and tobacco. **Methods:** A cross-sectional survey with school-students attending grades 7, 8, 9 was used to compare differences in age, gender, knowledge, and attitudes among areca nut only users, tobacco-only, users of both, and non-users. **Results:** Of 1909 respondents, 464 (24.3%) used only areca nut, 25 (1.3%) used only tobacco, 177 (9.3%) used both, and 1243 (65.1%) were never-users. Females, overwhelmingly, consumed only areca nut. Users of both substances, in greater proportions, were male, older in age, and more than half believed that tobacco-users had more friends. A third of tobacco-only and users of both substances found it hard to turn down a friend's request to use compared to a fifth of areca-only and non-users. **Conclusions:** Differences in gender, age, and behavioral determinants such as subjective norms and perceived behavioral control between the different types of users underlines the need for prevention and cessation programs and policies that are specific to and tailored to their unique profiles and needs.

Keywords: Adolescents- India- tobacco-use- areca-nut use- users of both areca and tobacco

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Introduction

Nearly 10% of all cancer-related deaths in India are attributed to oral cancers [1]. Smokeless tobacco is a known risk factor for oral cancer [2]. In India, areca nut, used with or without tobacco, is also linked with oral cancers. Areca nut (known as supari), an ingredient of various smokeless tobacco products and betel quid (or paan), is classified as a Group 1 carcinogen [3-5]. Risks of tobacco-related diseases are highest for those who initiate early and continue to use for longer periods making adolescence a critical period for prevention [6].

India has about 253 million adolescents [7]. Nearly 8.5% of a nationally representative sample of 13-15 year olds currently used any tobacco product with median age of initiation of 9.9 years for smokeless tobacco and 11.5 years for cigarettes [8]. Data from the nationally representative Global Adult Tobacco Survey 2016–2017 showed that areca nut use among 15-18 year olds was 18.3% and 19-23 year olds was 21.5% [9]. Various cross-sectional studies in schools show nearly a quarter of adolescents using areca nut along with low levels of awareness about harms of chewing areca nut and use of

both tobacco with areca nut [10-11].

Nearly one out of every four adults in India consumes areca nut, that is, almost 223.79 million users, making areca nut consumption a numerically larger substance use problem than smokeless tobacco (199 million users) [9]. Widespread use, easy availability for adolescents in the form of attractive sachets, perception of areca use as relatively harmless, and high oral cancer makes areca nut a serious public health issue in India [5, 9,12,13]. However, programs directed at areca nut use among Indian adolescents are scarce. The Cigarettes and Other Tobacco Products Act (COTPA) (2003) has two provisions focused exclusively on adolescents [14]. There are comprehensive guidelines for creating tobacco-free environments in educational institutions [15]. By contrast, information on betel quid or areca nut use has generally been subsumed under smokeless tobacco use, including the first GATS in India [4]. Areca nut is classified as an unsafe food product at the national level and some states have banned manufacture and sale of scented, flavored areca nut, but enforcement has been ineffective [4,5,16]. Low priority and resource constraints also lead school-based prevention and cessation programs in India to include areca-nut

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within tobacco-prevention and cessation activities; both types of users are often included in the same behaviour modification group [5,17]. The assumption is that what works for tobacco-use prevention will work for areca nut too. The present study questions and explores this assumption: Are adolescent areca-nut users similar to or different than tobacco-only users and users of both substances - areca and tobacco? The findings are expected to help design effective interventions for areca-nut use prevention among adolescents.

Materials and Methods

A cross-sectional survey was conducted with 1909 students from 7th, 8th and 9th grades in twelve schools managed or aided by the Brihanmumbai Municipal Corporation (BMC) of Mumbai, India. These schools serve students from low-income communities, and have uniform management structure, type of teachers, curriculum and academic performance indicators. School selection was based on willingness of principals to participate in the study. Approximately 350,000 students are enrolled in BMC schools [18]; and it was estimated that a sample size of slightly more than 2000 would provide statistically significant results with confidence interval of 95% and margin of error of 2%. Inclusion criteria for students was willingness to participate, enrolment in relevant grade of selected school, and consent of parents. No willing students from the selected grades were excluded from the study. Participating students gathered in their respective classrooms during school-hours and completed a self-administered structured questionnaire with the help of trained facilitators. The facilitators were selected from among those who had experience in working with adolescents on previous projects. Additionally, they attended a training program with sessions on project objectives and instruments, administration of instrument, how to handle queries, research ethics and working with adolescents. School teachers were not present during the survey. The facilitator read each item loudly and respondents marked their response on the questionnaire. Given the comprehension level of the students this method was preferred over a completely self-administered survey. The data-gathering exercise was conducted in separate classrooms which have a limited number of students. The facilitator read each question loudly and gave time to the students to answer honestly. Students were told that there were no correct or incorrect answers, only what they did, thought or felt. Anyone with queries or doubts raised their hand. If many students had the same query, then the facilitator explained it to the entire class. If few hands were raised, the facilitators walked over to that particular student's desk.

The structured questionnaire gathered information on: (i) socio-demographic details such as gender, age, grade; (ii) ever-use of tobacco and areca nut (the colloquial term *supari* was used); (iii) tobacco-related knowledge, attitudes and beliefs through agree/disagree responses to items such as: 'There is an association between tobacco use and health problems,' 'Tobacco-use is cool', 'Tobacco-use relieves stress', 'Tobacco users have more friends',

and 'How easy is it to turn down a request to smoke made by a friend?'; and (iv) areca (*supari*)-related knowledge, attitudes and beliefs through items worded in the same way as above (see Table 1).

Ethics

The study was approved by the Institutional Ethical Review Board of Narotam Sekhsaria Foundation and Salaam Bombay Foundation. Written consent was obtained from school principals and parents before the recruitment of students in the study. Additionally, student assent was obtained prior to administration of questionnaire.

Data analysis

Data were analyzed using SPSS software version 16.0 (IBM Corp., Armonk, New York, USA). The sample was categorized into four groups: areca-only users, tobacco-only users, users of both tobacco and areca nut, and non-users. Comparisons of categorical variables on knowledge, attitudes and practices for all groups were conducted using a chi-square test of independence. Ages of the groups were compared using a Kruskal-Wallis test with Dunn's pair-wise post-hoc tests adjusted using the Bonferroni correction.

Results

Of 1909 participants, 965 (50.6%) were female and mean age was 13.43 years. About 24.3% (464) had ever-used areca-nut only, 1.3% (25) had only used tobacco (smoking or smokeless), 9.3% (177) reported using both tobacco and areca nut (both), and 65.1% (1243) were non-users.

Of 965 females, 774 (80.2%) were non-users, 162 (16.8%) used areca only, 2.2% used both areca and tobacco, and 0.8% used tobacco-only. Thus, only a fifth (19.7%) of all females reported any use, and of those 191 users more than four in five (84.8%) consumed areca-only. In comparison, of 944 males, only 469 (49.7%) were non-users, 302 (32%) used areca-only, 156 (16.5%) used both and 17 (1.8%) used tobacco-only. Thus, 63.6% of 475 males reporting use had used areca-only and 32.8% were users of both. However, it is important to note that among both male and female students, the larger proportions used areca-only.

Users of both areca nut and tobacco were the oldest with mean age of 14.13 years followed by areca-only users at 13.55, and tobacco-only users and non-users at 13.28 years ($p < .001$). Around a fourth of areca-only users and tobacco-only users, 23.7% and 28% respectively, were in the 10-12 years age group, and in lower grades, as compared to only a tenth (11.7%) of users of both areca and tobacco. Males comprised 88.1% of those who used both as compared to 65.1% and 68% of areca-only users and tobacco-only users respectively ($p < 0.01$).

With respect to knowledge of association with health problems, two-thirds or greater of non-users, areca-only users, and users of both areca and tobacco answered affirmatively compared to half of tobacco-only users ($p < 0.05$). However, between-group differences in responses were not significant for the four items: Tobacco

Table 1. Comparison on Age, Gender and Various Knowledge, Attitude Items between Different Groups or Categories of Users – areca nut (supari) only users, both tobacco and areca nut users, and tobacco-only users

Variable	Total (1909) N (%)	Non-users (1243) N (%)	Areca nut- only users (464) N (%)	Users of Both (tobacco & areca nut) (177) N (%)	Tobacco-only users (25) N (%)	p-value
Mean age in years	13.43 ± 1.30	13.28 ± 1.24	13.55 ± 1.34	14.13 ± 1.38	13.28 ± 1.24	<0.001 ^{b*}
Age categories						
10-12 years	500 (26.2)	362 (29.1)	110 (23.7)	21 (11.9)	7 (28.0)	<0.001 ^a
13-15 years	1296 (67.9)	826 (66.5)	324 (69.8)	128 (72.3)	18 (72.0)	
16-18 years	113 (5.9)	55 (4.4)	30 (6.5)	28 (15.8)	0 (0.0)	
Sex						
Female	965 (50.6)	774 (62.3)	162 (34.9)	21 (11.9)	8 (32.0)	<0.001 ^a
Male	944 (49.4)	469 (37.7)	302 (65.1)	156 (88.1)	17 (68.0)	
There is an association between health problems and tobacco use						
Agree	1248 (65.7)	806 (65.2)	301 (65.2)	129 (73.3)	12 (48.0)	0.043 ^a
Disagree	651 (34.3)	430 (34.8)	161 (34.8)	47 (26.7)	13 (52.0)	
There is an association between health problems and areca nut use						
Agree	1260 (66.6)	809 (65.6)	310 (67.5)	130 (73.9)	11 (44.0)	0.014 ^a
Disagree	633 (33.4)	424 (34.4)	149 (32.5)	46 (26.1)	14 (56.0)	
Tobacco-use is cool						
Agree	490 (25.9)	326 (26.4)	102 (22.4)	56 (31.8)	6 (24.0)	0.094 ^a
Disagree	1400 (74.1)	907 (73.6)	354 (77.6)	120 (68.2)	19 (76.0)	
Areca nut-use is cool						
Agree	452 (24.0)	287 (23.3)	107 (23.5)	53 (30.5)	5 (20.0)	0.204 ^a
Disagree	1434 (76.0)	945 (76.7)	348 (76.5)	121 (69.5)	20 (80.0)	
Tobacco-use relieves stress						
Agree	556 (29.2)	355 (28.7)	134 (29.0)	63 (35.8)	4 (16.0)	0.113 ^a
Disagree	1345 (70.8)	883 (71.3)	328 (71.0)	113 (64.2)	21 (84.0)	
Using areca nut use relieves stress						
Agree	526 (27.7)	340 (27.5)	124 (27.0)	57 (32.8)	5 (20.0)	0.376 ^a
Disagree	1370 (72.3)	898 (72.5)	335 (73.0)	117 (67.2)	20 (80.0)	
People who use tobacco have more friends						
Agree	817 (43.1)	532 (43.0)	185 (40.1)	92 (53.2)	8 (32.0)	0.018 ^a
Disagree	1079 (56.9)	705 (57.0)	276 (59.9)	81 (46.8)	17 (68.0)	
People who use areca nut have more friends						
Agree	848 (44.6)	537 (43.3)	206 (44.6)	97 (54.8)	8 (32.0)	0.020 ^a
Disagree	1055 (55.4)	702 (56.7)	256 (55.4)	80 (45.2)	17 (68.0)	
How easy will it be for you to turn down a request made by your friend, to smoke (use tobacco)?						
Not easy	404 (21.4)	249 (20.1)	90 (19.9)	57 (32.4)	8 (33.3)	0.001 ^a
Easy	1487 (78.6)	989 (79.9)	363 (80.1)	119 (67.6)	16 (66.7)	
How easy will it be for you to turn down a request, made by your friend, to use areca nut?						
Not easy	379 (20.0)	221 (17.9)	99 (21.7)	51 (29.0)	8 (32.0)	0.002 ^a
Easy	1515 (80.0)	1015 (82.1)	358 (78.3)	125 (71.0)	17 (68.0)	
Intend to use a tobacco product in next 12 months						
Yes	93 (4.9)	14 (1.1)	29 (6.3)	47 (26.7)	3 (12.0)	<0.001 ^a
No	1809 (95.1)	1225 (98.9)	433 (93.7)	129 (73.3)	22 (88.0)	
Intend to use an areca-nut product in next 12 months?						
Yes	258 (13.5)	47 (3.8)	117 (25.3)	89 (50.3)	5 (20.5)	<0.001 ^a
No	1647 (86.5)	1194 (96.2)	345 (74.7)	88 (49.7)	20 (80.0)	

^a, p-value based on a chi-square test; ^b, p-value based on the Kruskal-Wallis test; * Dunn's pair-wise post-hoc tests were carried out. All pair-wise comparison were statistically significant except between the groups (i) non-users & tobacco-only users, and (ii) tobacco-only users & areca-only users

use is cool; Supari use is cool, and Tobacco-use / Supari-use makes a person free from stress. In response to the statements: Tobacco/Supari users have more friends - slightly more than one in two of both users agreed as compared to two in five non-users and areca nut users, and a third of tobacco-only users ($p < .05$). About 33.3% of tobacco-only users (33.3%) and 32.4% of both users said it was not easy to turn down a request, made by a friend, to use as compared to 19.9% of areca-only users and 20.1% of non-users ($p < 0.01$). The proportions were similar for ability to turn down a request to use supari ($p < 0.01$).

The proportion of respondents intending to use supari in the next 12 months was: 3.8% of non-users, 25.3% of areca-only, 20.5% of tobacco-only, and 50.3% of users of both areca and tobacco. This was higher as compared to intent to use tobacco which was: 1.1% of non-users, 6.3% of areca-only, 12% of tobacco-only, and 26.7% of users of both areca and tobacco respectively.

Discussion

This cross-sectional study compared adolescent areca nut-only, tobacco-only, users of both substances -areca and tobacco, and non-users. The differences found between user-categories could have an effect on design and delivery of educational and cessation interventions for areca nut. One of the most striking differences was gender. Of all female-users, whose proportion was much lesser than male users, more than four in five (84.8%) female-users consumed areca nut. By contrast, one in three male users reported use of both substances, areca nut and tobacco. However, areca nut was the most frequently used substance even among male users (63.6%). With respect to age, users of both areca and tobacco were older than all other user groups and non-users. School-based programs often tend to prioritize smoking [19] or tobacco prevention [17], and mix different types of users in the same groups for cessation interventions [17]. The gender and age differences found in this study raise the question whether education and cessation strategies that treat tobacco and areca nut use as if they were the same problem would be as effective as programs tailored to specific types of substance users? The existence of gender differences has been found even in studies conducted in Sri Lanka where prevalence of use among boys was almost three to four times greater than use reported by girls [20]. This phenomenon requires further examination of socio-cultural factors in areca and tobacco use, especially in the South Asian context [19, 20].

Larger proportions of those who answered affirmatively to items such as 'Tobacco-users have more friends' and 'I will be unable to refuse an offer of tobacco by a friend' were users of both substances as compared to areca-only users. The older age of users of both substances seems to imply that they have been perhaps using longer and hence may find it difficult to quit. The cross-sectional design of this study makes it difficult to decipher which came first, the practice or the attitudes and beliefs. Prior research has shown that engaging in risky behaviors often fulfills important functions in adolescents' lives such as fun and peer bonding [21]; therefore, it is important to

understand how adolescents prioritize the different risks posed by areca versus tobacco. Adolescent users have been found to perceive areca as relatively harmless, or even non-addictive, while stating that tobacco is extremely harmful [5,12,13]. This perception of areca nut as non-addictive has been found even among nursing students [19], and in general among Sri Lankans [20]. This notion that areca nut is harmless might be a unique feature of South Asia where areca nut use is considered traditional practice and culturally acceptable [20]. In the present study, the proportion of adolescents intending to use areca nut in the future was greater than those intending to use tobacco. Is it because adolescents perceive areca as harmless [5]? Cessation and prevention interventions have to be careful in presenting risks of these hazards while discussing choices to meet adolescent needs of social bonding because it is possible that users of both areca and tobacco might drop tobacco-use while continuing to use areca nut, in order to bond socially, because they perceive it as harmless. However, that will not reduce the burden of oral cancer in India. While tobacco-use rates drop, the persistence of areca could still fuel the growing oral cancer problem [5].

Higher proportion of tobacco-only users, who were younger, did not acknowledge the health harms of tobacco compared to both users. The older age of users of both areca and tobacco could also mean greater exposure to prevention messages or perhaps older adolescents provided socially desirable responses. Despite knowledge of the harms of tobacco and areca, a large number in each user-group still continued to use. Similar findings were seen in a survey of government-aided schools in Ahmedabad, India [22]. Given the gap between knowledge and actual use, future research will have to examine adolescents' prioritization of risks in their daily lives and other behavioral determinants, including qualitative studies of peer interactions and household and cultural messaging about areca nut. This will help design appropriate and effective interventions.

This cross-sectional study has limitations. Data collected from adolescents in conveniently selected municipal schools in Mumbai might not be representative of all Indian adolescents. Use of tobacco and areca nut was based on self-report which could be a source of bias with either under-reporting or over-reporting of the behavior. The classroom setting for gathering data and the sensitive topic of tobacco-use could lead to social desirability bias. The instrument did not gather data on parental use, addiction behavior of family members, household and community influences on adolescent's behavior. While information on socioeconomic status of the family was not gathered, all the selected schools cater to children from low-income families.

In conclusion, understanding that there are clear differences between adolescents who use areca-only and those who use tobacco-only or both areca and tobacco, will help prevention and cessation programs to address them and make adequate distinctions and specifications in program content and delivery. For instance, greater use of areca-only by female students and use of both areca and tobacco by males necessitate gender-sensitive

prevention and cessation interventions for areca nut use. More research is needed to understand areca nut use in general and among adolescents. The gender differences in use, especially areca nut, are clear among both the general population and youth in South Asia [9, 20] Future research has to examine the role of gender in substance use more closely. The identification of unique social and behavioral determinants at different levels of the ecosystem - personal, interpersonal, family, and community - that influence areca nut use and use of both substances among adolescents in order to design distinctive and effective interventions is also required in future research.

The current understanding of areca nut use among adolescents is mainly based on findings of cross-sectional studies. There is a need for longitudinal studies with adolescents on the problem of areca nut and tobacco use and understand the transitions between areca nut use to tobacco use or use of both substances and identify characteristics of adolescent users who make those shifts. Longitudinal research will also help answer the question whether areca nut use acts as a gateway to future tobacco or whether tobacco use lead to areca nut use.

Author Contribution Statement

All authors jointly conceptualized the manuscript. NC wrote the initial draft. All authors contributed to the final version and approved its content.

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Approved by any scientific Body/ part of an approved student thesis

This study was not approved by any scientific body and was not part of any student thesis

Availability of data

The data supporting the findings of this study are available within the article and/or its supplementary materials.

Ethical issue

The study was approved by the Institutional Ethical Review Board of Narotam Sekhsaria Foundation and Salaam Bombay Foundation.

Conflict of interest

The authors declare no conflict of interest.

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